Strategy Design for Service Engagement Model Transformation

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Abstract

Service provisioning models underlying service engagements evolve and change as a result of changes in business imperatives. This paper presents a system oriented simulation based framework to handle service engagement model transformation. This framework generates myriad of strategy levers for portfolio managers to choose from in order to handle model transformations. The simulation model along with other components in the framework offers a basis for designing strategy to enable an engagement model transformation by evaluating the impact of each lever on the overall costs, risks and values. The framework has also been illustrated with the help of a case study on engagement model transformation. We believe this study could be of immense value to managers of IT outsourcing firms who are faced with the challenge of handling long term projects that are prone to undergo transformations.

Keywords

Strategy design, service engagement, service provisioning models, system dynamics, optimization, transformation, IT outsourcing

INTRODUCTION

In 1963, Blue Cross of Pennsylvania signed an agreement with Ross Perot's Electronic Data Systems (EDS) to handle its data processing services, which paved way for one of the earliest IT outsourcing engagements (Dibbern et al., 2004). IT outsourcing, since then, has come so far that some firms have gone on to become virtual manufacturers. A classic illustration is the popular outsourcing decision made by Eastman Kodak, where they decided to hand over its data centre to IBM, its microcomputer division to Businessland, and its data networks and telecommunications to DEC and IBM (Wilder, 1989). In the process, Kodak has, in a way, legitimized the process of outsourcing by signing service agreements with all the outsourcing partners (Caldwell, 1994). The Kodak effect, as some refer to, has set a precedent that led to many other companies follow suit by signing long term agreements worth millions of dollars with their service providers / outsourcing partners (Young, 2000).

A service engagement model is a complex of Operating model and the Pricing model. The former includes rules of engagement, team structure, roles & responsibilities, composition of skill of staff etc. and the latter determines how the services provided by the vendor are to be priced. A service engagement is governed by terms of the agreement (a contract) comprising of scope, deliverables, acceptance criteria and reward and punishment matrix. We must address 3 issues when we enter service engagement model transformation domain. What is transformation? Why it is needed and How to carry it out? When we say service engagement transformation we basically mean transformation of the underlying service provisioning model. Service provisioning models describe a continuum on one end of which lie Resource based models and on the other end are Strategic partnership models. When an engagement moves from Resource based model to Strategic partnership model it is moving towards increasing complexity.

Service engagement transformation is called for when a given engagement does not meet expectations of the client as well as service provider and the engagement needs realignment at various levels (Operating model configuration, Resource management, Team structure, Governance structure, Roles & responsibility etc.) to meet the stipulated objectives. This realignment alters the extant service provisioning model into a new model and the process is termed as service engagement model transformation. The raison d'etre for transformation is to bring about informed and well thought out changes in the existing model so that it creates desired business value. It is often the case that a service engagement switches over to another service provisioning model, different from the one it initially started with, in the course of its execution. The reason for this change in service provisioning model are plenty. Business environment and objectives have changed since the commencement of the engagement, relationship with the service provider has undergone change, and greater organizational maturity around the engagement are some of the reasons. It could also be the case that an inadequate model was chosen to begin with and the mistake needs correction. If an incorrect service provisioning model is chosen the model itself becomes a limiting factor for the performance of the engagement. Before we address the 'how' of service engagement transformation we must state the basic premise of our approach for strategy design for service engagement transformation. Our basic premise states as follows. With reasonable approximation a service engagement can be represented as a system dynamics (SD) model. SD models can be simulated to study the behaviour, which in this study is of the engagement, in time as a result of implementing different policies thus becoming the basis for strategy design for service engagement model transformation.

System Dynamics has been used to analyse complex systems in different domains like project management, business strategy, supply chains, economics, sociology and ecological (Coyle & Holt, 1999). Systems' thinking, in contrast to other methodologies that focus on breaking the system down to parts depending on focus of the study, focuses on studying the interactions between other components and the component in focus. System Dynamics was developed by Jay W. Forrester at the Massachusetts Institute of Technology to facilitate the understanding and analysis of complex societal systems. System dynamics, was originally referred to as Industrial Dynamics (Forrester, 1961), heavily derives its origins from engineering control systems and the theory of information feedback systems. In this paper, we propose a simulation based framework to achieve service engagement transformation from As-Is state to To-Be state by adopting the right strategy that creates value in the engagement environment benefiting client as well as the vendor. The rest of the paper is broadly organized as follows- In the next section, we discuss some of the important studies that form base for this study and also how we contribute in plugging some of the gaps in the literature. In the subsequent sections, we describe the framework and illustrate it with a case of engagement model transformation. In the final section, we conclude the paper and present the implications of the methodology adopted for the study.

LITERATURE REVIEW

IT Outsourcing has been a thoroughly researched area since early 1990s in the domains of IS and Strategy. Research done in this area can broadly be classified into studies on why, what, how firms outsource, and finally, outcomes of outsourcing. Figure 1 presents a snapshot of IT outsourcing literature landscape. Early seminal papers on outsourcing have largely focused on the need for firms to outsource. It is natural considering IT outsourcing was in a nascent stage in early 90s. Loh and Venkatraman (1992)'s very widely cited paper attempts to identify the determinants of IT outsourcing through innovation perspective. They interpret the process of outsourcing as an administrative innovation. Using various diffusion models on sources of influence, they attempted to understand the reasons behind outsourcing. As IT outsourcing grew, researchers started focussing on what to outsource. Grover (1994), Teng et al. (1995), Davenport (1997) have all examined which functions to outsource and how each of these functions are related to various organizational factors. Both what and why questions together comprise of the outsourcing decision which is obviously made at the start of an engagement (Figure 1).

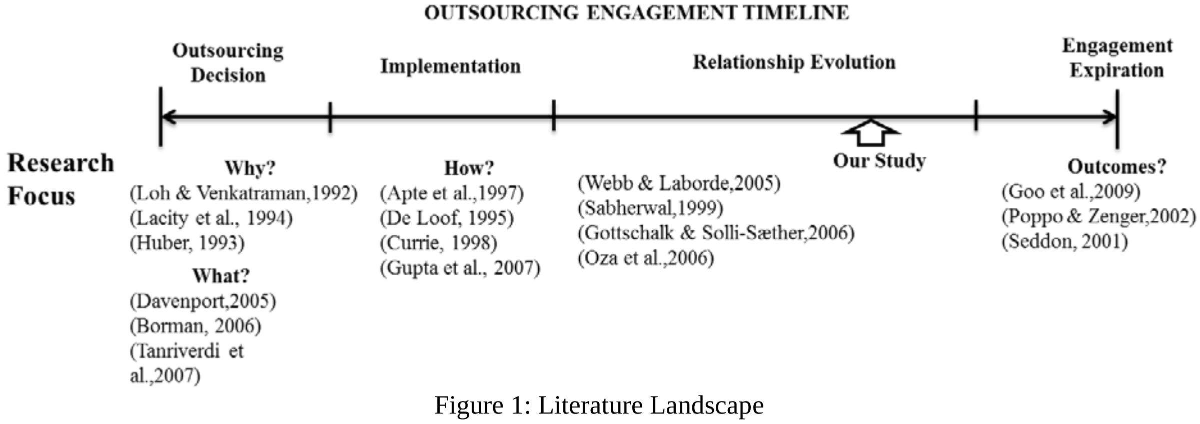

Figure 1: Literature Landscape

Chronologically, implementation comes next, as the organization is confronted with a host of decisions that could be summarized by how to outsource. Vendor selection and structuring the engagement are the research questions that are mainly focussed on. Lee and Kim (1999), Apte et al. (1997), Currie (1998) have focussed on the aspects that need attention while selecting a vendor whereas De Looff (1995), Klepper (1995) have studied on structuring an outsourcing engagement. Studies dealing with how firms outsource have also dealt with how to handle the risks associated with outsourcing. Jurison, in one of the very early seminal papers on outsourcing, has identified the associated risks and returns (Jurison, 1995). Some papers have studied specific risks and risk mitigation strategies that pertain to IT outsourcing projects in general (Aubert et al., 1999); Bahli & Rivard, 2005; Currie & Willcocks, 1998; Willcocks & Lacity, 1999).Whereas Kern et al. have examined the same with respect to the outsourcing model in place (Kern et al., 2002). Researchers have also studied on evaluating the outcomes of IT outsourcing projects. Ang and Slaugther (1998) have studied the impact on employee behaviour (of the client organization) as a result of outsourcing. Saunders et al. (1997) have studied the client satisfaction whereas Heckman and King have explored the vendor satisfaction through outsourcing engagements. There also have been some studies on the financial outcomes of outsourcing engagements (Lacity et al., 1996) (Hirschheim & Lacity, 1998). The literature has been relatively sparse on what happens between the implementation of an outsourcing engagement and the expiration of it. The focus on how the relationship between client and vendor evolves and its impact on the levels of outsourcing, structure of outsourcing engagements has been given minimal focus. Though there are some studies (Goo et al.,2000; Poppo & Zenger,2002; Seddon, 2001) that attempt to study the evolution of client vendor relationship, to the best of our knowledge, the focus on how to move from one engagement (level, model) to another is lacking. The relevance of such study is paramount as most of the outsourcing relations start from the basic staff augmentation (body shop) mode and move to managed team (project management) to managed services (total outsourcing) models as client gains trust on the vendor (Dibbern et al., 2004). There may be changes in the engagement within a specific model over the tenure of an engagement. Our study attempts to plug this gap in the literature by proposing a simulation based framework to design strategy for transforming an outsourcing engagement.

Literature in the last decade includes a study by CGI (CGI, 2010) which compares Managed Services model with Staff augmentation model and strongly recommends adapting the former. NeoIT (2007) discusses a three-phase framework for transitioning from Staff augmentation to Managed services- (1) Knowledge and planning- which includes portfolio assessment and planning for change management, (2) vendor assessment and vendor selection, and (3) transition and governance. Everest Research Institute (2008) treats outsourcing engagement models as part of organizational business strategy. A number of studies have been reported in the area of outsourcing business process for innovation (Lacity et al 2009). Rai and Mehta (2012) discuss As-Is state formation of a service engagement. Rai and Mehta (2014) propose a framework for performance assessment of service engagements using economic theory for outsourcing based Critical Success Factors (CSFs). As-Is state formation and its assessment is essential for understanding the rationale for service engagement model transformation. Rai (2011) argues that Viable System Model by Stafford Beer (Beer, 1985) can be used as a basis for service engagement transformation. Rai (2013) discusses variations in service engagement transformation.

STRATEGY DESIGN FRAMEWORK

The data model presented in figure 2 provides us with an overview of the framework for strategy design.

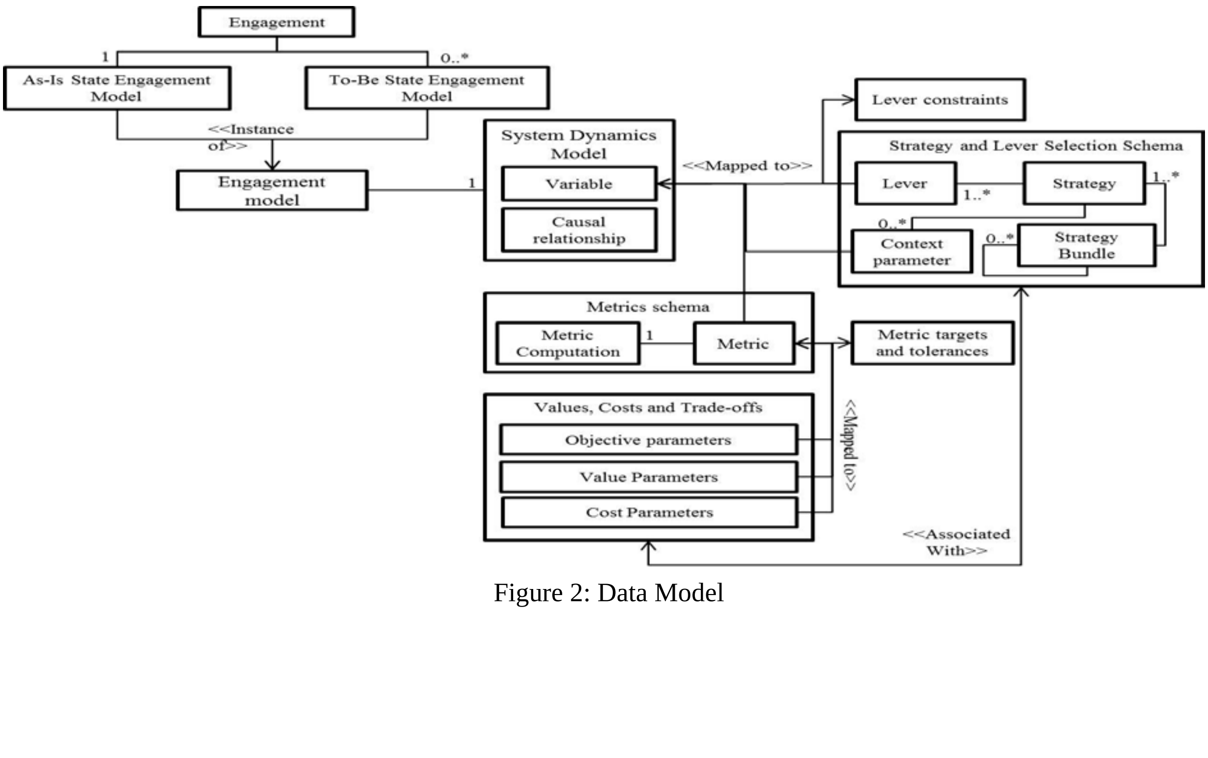

Figure 2: Data Model

Engagement model transformation starts with defining the To-Be state model. Strategy configuration is an iterative procedure. Selecting and configuring a set of strategies is done based on decision support provided by the system dynamics model. Each strategy configuration generates value for the user along with associated risks and costs of strategy implementation. Risks can be avoided, mitigated and/or accepted. Net benefit derived from a particular strategy configuration is the difference between value realization and costs and risks to implement the strategies. Based on the feasibility of net benefit, users may modify strategy configuration, select a different set of strategies and/or create a new to-be state model and re-iterate. We present the framework for strategy design to transform engagement models in detail in next section.

As described above, we are proposing a simulation based iterative framework to configure strategies for transformation of a service provisioning engagement modelled using a system dynamics model. An engagement is composed of a single as-is state model and multiple to-be state models. Each to-be state model for an engagement comprises of – a) Objective parameters (Desired goals from an engagement), b) Value parameters (Parameters which influence goal realization from an engagement), c) Cost parameters, d) Levers (Changeable parameters in a system dynamics model, which can be altered in the actual engagement) and e) Contextual parameters (Changeable parameters in the model which represent the context or facts of engagement). Below are the major components of the framework (Figure 3). Figure 3 describes the process flow and at each stage of the process flow, the system transacts with its relevant section of the data schema described in figure 2.

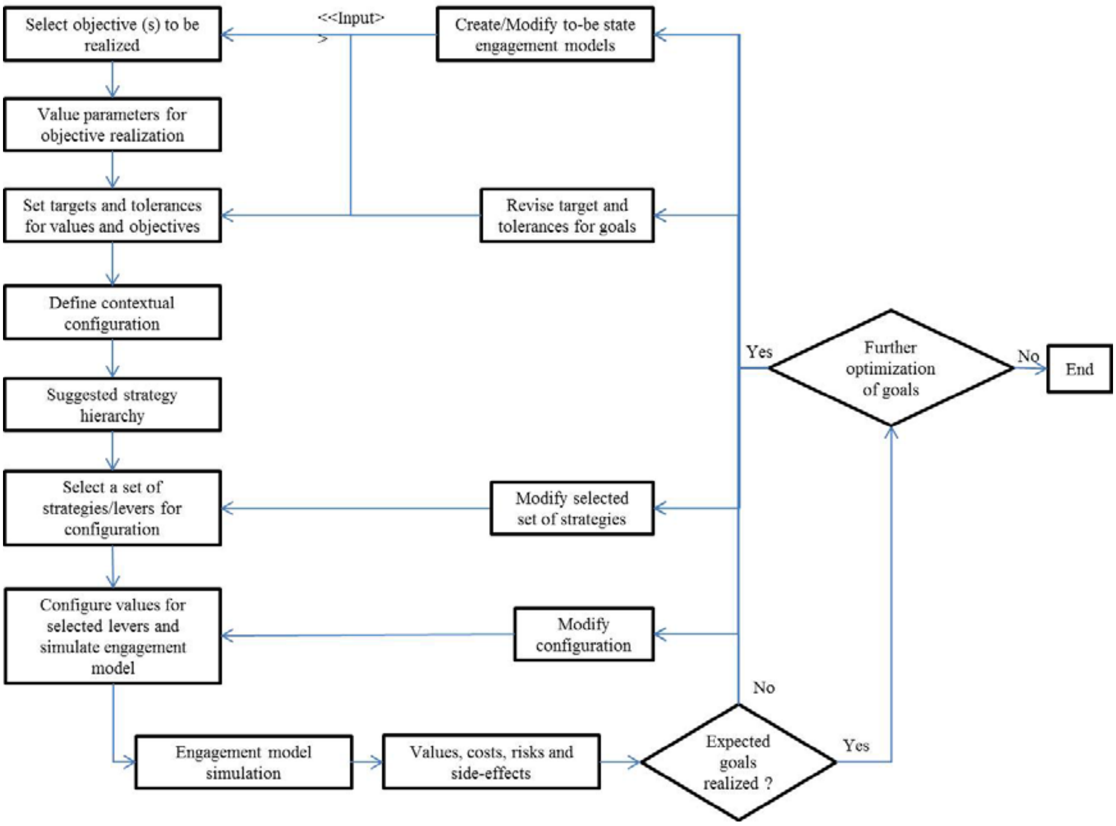

Figure 3: Process flow for goal realization for an engagement model

System modelling: Model here implies identifying the structural components that constitute an engagement. As-is state model represents the current state of engagement, hence it is definitive. However, there could be multiple structural models for the to-be state based on the engagement transformation context and objectives. For example, the engagement may, currently, be in a staff-augmentation model and the aim is to transform it in to a managed services model, which forms the to-be state. There could be multiple to-be states based on configurations such as – 'roles and responsibilities definition', 'pricing model definition', 'service provisioned (such as application development or production support)', 'service level agreement(SLA) and key performance indicators(KPI) definition', 'knowledge management' etc. Each dimension should be represented by multiple entities in the model. Addition / deletion / modification of these entities results in a new to-be state structural model.

Objective definition: Objectives and value parameters (that influence goal realization from an engagement), which are included in the given to-be state model and mapped to underlying system dynamics model, are selected. Targets, tolerances and objective type (maximize, minimize or bounded) are set for the selected set of objectives and value parameters.

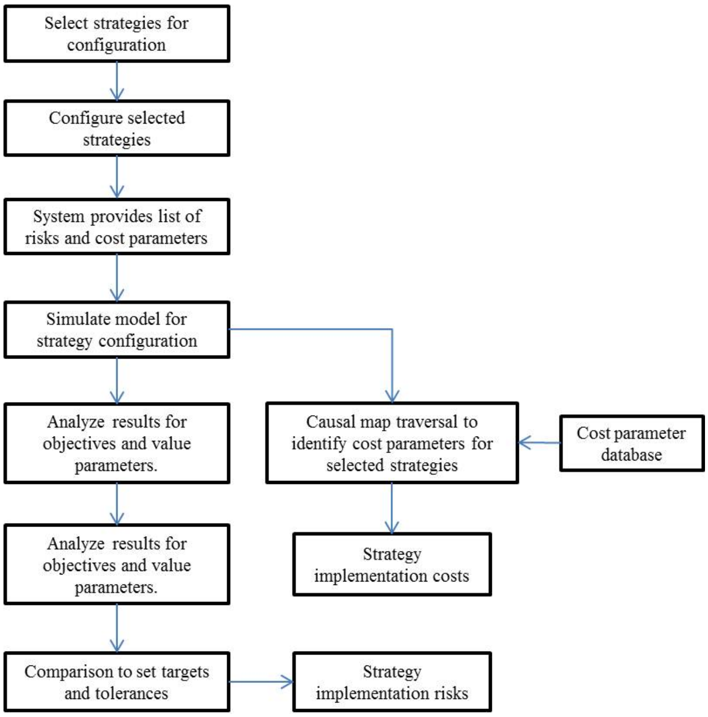

Figure 4: Strategy Selection for a set of value parameters

Contextual configuration: Every engagement has context parameters which represents constraints and environmental context that come from the nature of the application for support or development. Examples – 'available resources', 'off-shoring constraints', 'service level agreements', 'initial state of service delivery processes'. Context parameters need to be initialized before engagement model configuration. There is a dependence on the available strategies for transformation on the contextual variables.
Strategy Organization: For each selected value parameters to be analysed, we pick the set of strategies and levers that would affect the value parameters by following the steps below Figure 4. The Strategy and lever selection section of the data schema, as described in figure 2, transacts with the system during strategy organization.
For all value parameters, backward trace system's causal model to identify levers that affect selected objectives and value parameters.

- An impact model stores the impact value matrix of levers on objectives and value parameters. For identified levers and given context configuration, we first check whether an impact model exists.
- If an impact model does not exist for the selection of levers and given context configuration, then an impact model is created using design of experiments (DoE) methodology (Fisher, 1935). The methodology is outlined as follows.
    - For the selected levers and given context configuration, provide lever constraint (Maximum, Minimum and Base values) inputs.

    - Select and define an experimental design – Full factorial, Box design etc.
    - System runs experiments for multiple lever combinations (as defined in the experimental design).
    - System outputs an impact matrix, which stores impact values of levers on objectives and value parameters.
- Organize levers in a descending order based on their degree of impact.
- For all strategies, query all strategy bundles which contain selected strategies.
- Re-order selected strategy bundles, strategies and levers to create hierarchy.

Strategy and lever selection: Select a set of levers from suggested strategy hierarchy to begin lever configuration process for goal realization.
Values, costs and risks mapping: For selected strategies, a set of risk parameters are to be identified. It is to be noted that risk parameters are not separately defined. Instead they arise as an outcome of negative policy effects on objectives and value parameters. Cost parameters are mapped within the model. Causal tracing is used to identify cost parameters related to selected strategies.
Configuration of Levers: The values for selected levers are configured by setting values for selected levers and running the simulation. The outcomes are analysed as per the next step and the iteration of configuration and outcome analysis is re done in case the objectives are not met.

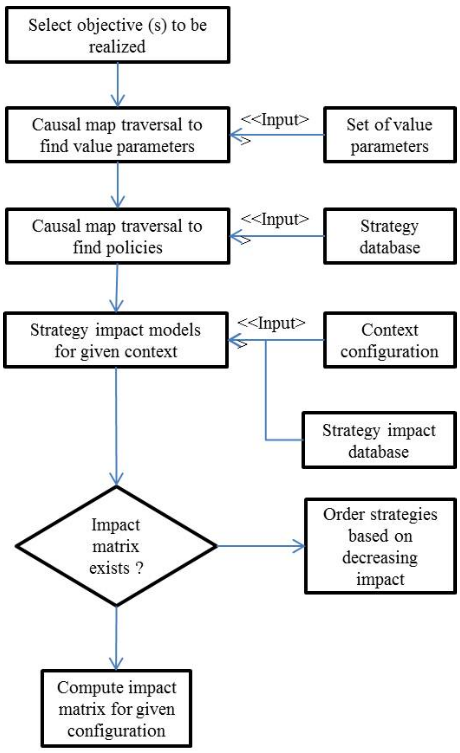

Figure 5: Outcome Analysis

Outcome analysis: The time series data of objectives, costs and risks obtained from the simulation are further analysed as shown in Figure 5. The Metrics, value costs and trade-offs section of the data schema, as described in figure 2, primarily transacts with the system during analysis of the outcomes.

- Net value computation through cost function normalization
  - For each parameter, assign a cost-function.
  - Based on the simulation time-series data, compute cost outcome for each parameters.
  - Compute net value as based on the benefits, costs and risks.
- Net value computation through fuzzy normalization
  - For each parameter, a fuzzy function (rule) is defined for coding and decoding the value of the parameter. Example – If service availability is higher than 90% for more than 90% of time, then service availability is 'High'. (Here, 'High', 'Medium', 'Low' may be the fuzzy parameters).
  - Rules are defined for combination of multiple fuzzy parameters. Example – If 'Service availability' is 'Low' and 'Reduction in costs' is 'High' then net benefit is 'Low'.

Strategy modification: If expected values are not met, say, within minimum costs and risks or the level of expected benefits, through the selection of levers in the earlier step, then the following could be done.

- Re-configuration of levers.
- Change (add / delete / combine) selected set of strategies / levers and re-configure selected levers.
- Revise targets and tolerances for metrics – Objectives, values and cost parameters.
- Create a new to-be state model.

However, if the expected goals are realized and the risks due to transformation are acceptable, the desired configuration for the given to-be state model is arrived at by the given strategy design used to make the transformation.

In the next section, we illustrate the framework with a case of engagement model transformation.

A CASE OF ENGAGEMENT MODEL TRANSFORMATION

We consider a case where the to-be state of the engagement is managed services model. The objective is to minimize time to market (to 600 days) and reduce costs (bring costs down by 30%). As mentioned previously, system dynamics modelling paradigm has been used to represent the system. Vensim DSS[1] simulation software has been used to for system dynamics (SD) representations. Vensim is a popular modelling and simulation software for handling complex, dynamic models that involve feedbacks. Simulation of the SD representations and optimization for configuring the right set of strategy levers were also carried out on Vensim DSS. As mentioned before, by configuring different levers, the objective is to meet the desired goals within 600 days of simulation, which in itself is a goal and is referred to here as 'Estimated time to market'. Also the model has to be seeded with the as-is setup (baseline case), Table 1has the configuration of different levers in as-is state.

Table 1: Baseline configuration for selected levers

Strategy - Process automation	Baseline
Increment in process automation	0
Percentage of team resources used for automation	0
Strategy - Resource management	
Percentage of resources on bench	0
Maximum number of resources on bench	100
Minimum number of resources on bench	0
Mean interval (days) between resource level reviews	5
Senior to junior employees ratio	0.2
On-site to off-site ratio	0.2
Strategy - Competency development	
Improvement in team competency (Number of training sessions)	0
Number of subject matter experts in team	3
Percentage time spent on training (during competency development)	0

Once the objectives and contexts are set, the next step is to organize strategies by backward tracing of the system's causal model Table 2. Below is the hierarchical list of Strategy Bundles (SB), Strategies (S) and Levers (L) for the goal parameter 'Estimated time to market'. Process automation, Resource management, Competency management, Knowledge management are the strategy bundles under which strategies and levers that influence the goal parameter are organized.

[1] http://vensim.com/vensim-software/#professional-amp-dss

Table 2: Causal Map Trace for 'Estimated Time to Market'

Goal: Estimated Time to market
SB: Delivery Management
S:Process Automation
L:Fixed time required for process automation
L:Increment in process automation
L:Fixed number of resources automation
L:Percentage of team resources automation
SB: Resource Management
S:Bench Resource Management
L:Maximum number of resources on bench
L:Percentage of resources on bench
SB: Competency Management
S:Skill Coverage
L:Desired senior junior ratio
SB: Governance and Communication
S:Communication Management
L:Frequency of stakeholder meetings

Once the strategy has been selected, the associated costs and risks are to be identified. In the case of process automation strategy, Table 3 has the list of costs and risks that need to be examined along with the strategy choice.

Table 3: Costs and Risks associated with Process Automation Strategy

Cost Parameters	Risk Parameters
Costs of process automation	Production costs
Production costs	Cycle time per work order
Labour costs	Estimated Schedule overrun
Total overhead costs	Production costs
Training costs	Resource deficit
	Resource utilization
	Service quality
	Schedule overrun

The levers obtained from the causal map trace can be used to influence the goal parameters. Table 4 captures the list of levers and their movements across iterations as we aim to reach the to-be state by altering them iteratively. Figures in bold indicate the variables that were altered between iterations. The impact of changes in these levers is seen in Table 5. As discussed in the previous section, the choice of levers has to go hand in hand with their relative influence on the goal parameters.

Table 4: Levers across iterations

Strategy - Process automation	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Increment in process automation	0.3	0.3	**0.5**	**0.348**
Percentage of team resources used for automation (0-1)	1	1	**0**	**1**
Strategy - Resource management				
Percentage of resources on bench	0	**0.2**	**0.1**	**0.21309**
Maximum number of resources on bench	100	100	100	100
Minimum number of resources on bench	0	**5**	5	5
Mean interval (days) between resource level reviews	5	5	5	**10**
Senior to junior employees ratio	0.2	0.2	**0.15**	**0.2**
On-site to off-site ratio	0.2	**0.1**	0.1	0.1

Strategy - Competency development				
Improvement in team competency (Number of training sessions)	0	**4**	**10**	10
Number of subject matter experts in team	3	**5**	**3**	**2**
Percentage time spent on training (during competency development)	0	100%	100%	100%

But it is evident from the results of iteration 1of Table 5; contrary to expectations, automation does not decrease time to market by a desired margin. This is could be due to following reasons.

- In the model, improvement in process automation entails utilization of team resources for process automation. Due to engagement of team resources in improving process automation, service quality and cycle time would be affected. Furthermore, the hiring of extra resources to compensate for engaged resources would create an additional delay and escalate costs of resources as well as costs of training hired resources.
- To allow for mitigation of risks arising from improvement in process automation due to engagement of team resources, a lever is provided which represents the percentage of team resources to be used for automation. It mitigates above mentioned risks, but it is contextually dependent on availability of additional resources to improve process automation. Delay in on-boarding resources for process automation (context-based data parameter) would delay any positive effect such as increase in productivity and service quality arising from the same.

To mitigate risks of resource deficit and further improve resource productivity at a lower marginal cost, we would need a different set of strategies. Strategies that impact our goal parameters in strategy bundles of Resource Management and Competency Development are considered. Iteration 2 column in Table 4 shows the configuration of levers and results in Table 5 for the second iteration. Cost benefits remain the same because increase in costs is offset by increase in productivity. As explained earlier, we try to mitigate risks of schedule over-run due to automation by using a separate team for automation. Further analysis points us to higher costs, delay in on-boarding of a separate team, overhead due to disconnect between delivery team and process improvement team. Based on the results, we reconfigure the levers and re-run the simulation. But the risks of on-boarding a new team for process automation outweigh benefits arising from the same. This strategy gives the worst realization in terms of costs and time-to-market combined.

Again the first three iterations here are done manually to better illustrate the framework, but, this process of iterative optimization has been done by using Vensim DSS' optimization engine. To enable the optimization engine, we first define a payoff function that will be maximized by the software by iteratively adjusting the policy levers.

The pay-off function is defined as follows –

$$\boldsymbol{Payoff = \alpha * Prod. Cost\ benefits - \beta * Schedule\ Overrun}$$

Where, $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are weights assigned to cost benefits and schedule over-run respectively.

Table 5: Simulation Results (iteration wise)

Value realization	Baseline	Iteration 1	Iteration 2	Iteration 3	Iteration 4[2]
Time to market (days)	700	690	660	671	640
Production cost benefits	15%	21%	21%	9%	22%
Costs (in million units)					
Labour costs	7.336	6.757	6	5.7	6.1
Knowledge management costs	0	0	1	1.08	1.08
Training costs	0	0	0.12	0.12	0.1
Process improvement costs	0	0.3	0.8	1.1	0.41
Overhead costs	0.035	0.03	0.03	0.1	0.04
Total project execution costs	7.37	6.87	7.3	8.1	7.8
Risks and trade-offs					
Quality of service	0.75	0.8	0.8	0.8	0.82
Resource utilization	88%	88%	90%	90%	83%
Productivity (work orders / hour)	0.88	0.92	0.9	1	1
Cycle time (days)	1.847	1.587	1.6	1.5	1.8
Schedule over-run (%)	17%	15%	10%	12%	7%

[2] Iteratively arrived at by maximizing the payoff function by Vensim DSS' optimization engine

As shown in table 5, optimization provides the best possible values for goal realization. However, the values realized are the closest to the desired objectives but do not accomplish the to-be state objectives. To reach the goals, the relative weights assigned could be relooked at or a different set of strategies (and their model components) that are not a part of this system representation could be added.

CONCLUSION

Research literature in the domain of IT outsourcing has focussed a wide variety of questions related to what, when, how to outsource and outcomes of outsourcing, primarily from client's perspective. But as we often see it, the relationship between client and vendor goes through phases and is predominantly reflected by the outsourcing engagement. Our study proposes a framework to assist the vendor deal with such engagement model transformations. IT outsourcing engagements are complex systems, with multiple feedback loops and are very dynamic in nature due to the ever changing technology landscape, client needs and internal capabilities. The first step of the framework consists of representing the system in a way that a holistic understanding is gained. Managers of outsourcing engagements are often provided with a myriad of strategy levers to handle a system as complex and as dynamic as this. The onus is on the manager to not only transform the engagement but do it in a way that his organization's (outsourcing vendor) payoffs are maximized without being at odds with client's objectives. Our framework provides a way by which the levers could not only be narrowed down by the causal map trace but also their relative impacts on the goal parameters could be evaluated. The final determination of the right set of levers and the changes needed in them to reach the goals is to be done by maximizing a payoff function that represents the objective of this optimization exercise. Broadly, the entire framework can be summarized as a three step process. Firstly, represent the system with a system dynamics stock and flow representation. Secondly, with the help of causal map tracing, arrive at the set of levers that have an impact on the goal parameters. Finally, iteratively optimize by maximizing a payoff function, which represents the objectives, by adjusting the strategy levers keeping the costs and risks in check. IT outsourcing is one domain in which this has direct applicability, but there can be other domains where this framework with domain specific modifications can be appropriate.

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