Large System Transformation within Healthcare Organizations utilizing Lean Deployment Strategies

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Abstract

Multiple healthcare organizations have been recognized as successful in sustained, enterprise-wide transformation utilizing Lean deployment methods. A realist review of large system transformation utilizing enterprise-level Lean Deployment methods within healthcare organizations was conducted previously. Synthesis and analysis of the results from this review indicate that there are five primary strategies associated with successful healthcare-based Lean deployments: Respect for People; Strategic Alignment; Strategic Deployment; Large Scale System Improvement Efforts; and Small-Scale, Local Improvement Efforts. Additional findings from this review indicate that the applications of the specific mechanisms with these strategies are emergent within multiple transitional phases spanning 6-8 years. In order to better understand the emergent nature of enterprise-level Lean deployment strategies, a more robust understanding of these transitional phases is needed. We have created a dynamic hypothesis and system dynamics model to explore how the mechanisms and context interact to drive phase transitions within healthcare-based enterprise-level Lean deployments. Additionally, we investigate how healthcare-based, enterprise-level Lean deployment programs can be better designed in order to increase rate of success and decrease deployment cycles.

Background/Introduction

The challenges of deploying and sustaining enterprise-level Quality Improvement (QI) programs within healthcare organizations are well documented. Numerous reasons for failed initiatives are sited within the literature, including lack of leadership support and engagement, failure to engage middle management in initiatives (Lukas et al, 2007), and inadequate development of the clinical microsystem (Godfrey et al, 2003), (Kosnik et al, 2003).

However, multiple healthcare organizations have been recognized as successful in sustained, enterprise-wide transformation utilizing Lean deployment methods. A realist review of large system transformation utilizing enterprise-level Lean deployment methods within healthcare organizations was conducted by Hagg, et al. (2013). Synthesis and analysis of the results from this review indicate that there are five primary strategies associated with successful healthcare-based Lean deployments:

1. **Respect for People:** 'Respect for People' describes the basic tenant of the development of front-line staff members as the primary problem-solvers within the organization. This

occurs as a result of the transition of Executive and Mid-Level Management away from exclusively 'top-down' approaches. Common mechanisms cited within this strategy include the expansion of the role of executives to lead transformational efforts as well as the development internal facilitation/coaching capacity to effectively lead improvement initiatives.

2. **Strategic Alignment:** Strategic Alignment describes the alignment of organizational goals and the metrics associated with those goals to the transformational efforts across the organization. Strategic Alignment provides the ability to "see" the results of transformational efforts throughout the organization, allowing timely adjustment of deployment strategies to close gaps in program results. The mechanisms most often used to ensure strategic alignment include the use of proactive strategic planning methodologies (e.g., Hoshin Planning, Transformational Value Stream Analysis) to 1) ensure that organizational priorities and metrics are identified and communicated throughout the organization early in the planning processes, and 2) emphasize the use of common problem solving tools/methods across the organization (A3 thinking).
3. **Large-scale improvement efforts:** Large-scale improvement efforts include system-level initiatives spanning the continuum of patient care. These initiatives are often driven by organizational (rather than local) goals or needs with an intent to result in improvement of organizational systems. The methods most commonly utilized for system level improvement efforts within Lean Enterprise Deployments include Value Stream Analysis and Rapid Improvement Events/Rapid Process Improvement Workshops (RIEs/RPIWs).
4. **Small-scale improvement efforts:** Small-scale improvement efforts include initiatives generally implemented within one healthcare unit or department by staff members to address specific local needs. These types of initiatives are used to improve local processes and reinforce systematic improvement methods and tools as the primary response to resolving identified process issues. Although often less impactful to the larger organizational metrics, small-scale, localized improvement efforts were cited within these organizations as key to creating and sustaining staff engagement in transformational efforts. Mechanisms cited within the Hagg et al. (2013) review support Continuous Daily Improvement (CDI) techniques and include regular (daily) stand-up meetings, area improvement centers and unit-based scorecards.
5. **Strategic Deployment:** Strategic Deployment describes the tools and methods used to create the management systems and structure necessary to diffuse transformation efforts throughout the organization. Strategic deployment efforts ensure that integrated deployment occurs at all levels. Mechanisms most closely aligned within strategic deployment efforts include Leader Standard Work and Management Daily Status Reviews.

Additional findings from this review indicate that the applications of specific mechanisms are emergent within multiple transitional phases spanning 6-8 years. The fundamental purpose of these five strategies was found to be creation of sustained momentum for the transformational efforts within the organization across the transitional phases. This sustained momentum is often referred to as "pull." "Pull" was found to be key to integration of continuous improvement into

the overall management of transformational programs within the organizations studied within the review.

In order to better understand the emergent nature of enterprise-level Lean deployment strategies, a more robust understanding of these transitional phases is needed. Specifically, research questions include:

- How do mechanisms and context interact to drive phase transitions within healthcare-based enterprise-level Lean deployments?

- How can healthcare-based, enterprise-level Lean deployment programs be better designed in order to increase rate of success and decrease deployment cycles?

Prior work by Keating, et al (1999) includes an extensive four-year study of QI deployments within manufacturing organizations. This work included 5 partner firms: Analog Devices, AT&T, Ford Motor, Harley Davidson, and Lucent. The primary findings from this study supported the need for effective initiation and sustained employee commitment to improvement (or "pull"). Firms unable to manage improvement programs as a dynamic (rather than static) process would eventually fail to sustain program efforts.

However, there are key differences between healthcare and manufacturing organizations (Radnor, Holweg, & Waring, 2012) that must be considered in translation of this earlier work, including:

- **Higher Order System Complexity:** Unlike manufacturing, the end user (patient) is one of multiple customers within a healthcare system. Other customers include insurers/payers for health services, physicians/providers receiving patients from the health system, as well as the local community and society at large. These customer groups often have conflicting value propositions, adding significant complexity to attempts to optimize quality and cost of healthcare received. Within healthcare organizations, even small-scale improvement initiatives may require a higher order of improvement tools/methods. Additionally, outcomes from initiatives may often lack a direct, tangible connection to improving the quality or safety of patient care, limiting staff engagement.

- **Capacity- vs. Demand-Driven Revenue Cycle:** Revenue cycles within healthcare processes are often based on charge capture of specific events or encounters, rather than a single charge for an overall treatment or procedure. The primary result of this phenomenon is that improvement in efficiencies through reduction of processing steps (a fundamental concept within Lean) often reduces (rather than increases) revenue, necessitating alternative strategies beyond cost reduction for engaging management/leadership. Capacity generated during improvement events can often not be reallocated, presenting challenges with respect to generating capacity to support Lean improvement efforts.

Methodology

Stakeholders for Lean deployment initiatives were engaged in discussion of the realist review of enterprise Lean deployments by Hagg, et al (2013). This stakeholder group was then asked to identify key reference modes related to enterprise-level Lean Deployment initiatives as well as to map the five deployment strategies to the goal of creating "pull" for the transformational initiative within the organization. Affinity diagramming was utilized to map relationships between key strategies/mechanisms and contextual elements as well as to identify potential endogenous vs. exogenous elements.

The results from this effort were mapped to the Reference Modes, Model Boundaries/Sub-System Diagram, and Dynamic Hypothesis presented in the following documentation.

Reference Modes:

Transformation Program Results were identified as representing a primary outcome of Lean Enterprise Deployment efforts. Program results for Lean Enterprise Deployment efforts are often represented as the employee engagement within the program, annual or cumulative successful initiatives, as well as the cumulative financial benefit obtained from the program.

The reference modes represented in Figure 1 (below) indicate the expected results for Lean Deployment efforts within three types of organizations:

1. **Robust Organizations** – sustaining program results over 8+ years.
2. **Average Performing Organizations** – strong initial results, but not sustained beyond 5 years.
3. **Low Performing Organizations** – early (Year 1-2) positive results, but program ending after Year 3.

Figure 1: Reference Mode for *Transformation Program Results* over an 8-year Timeframe

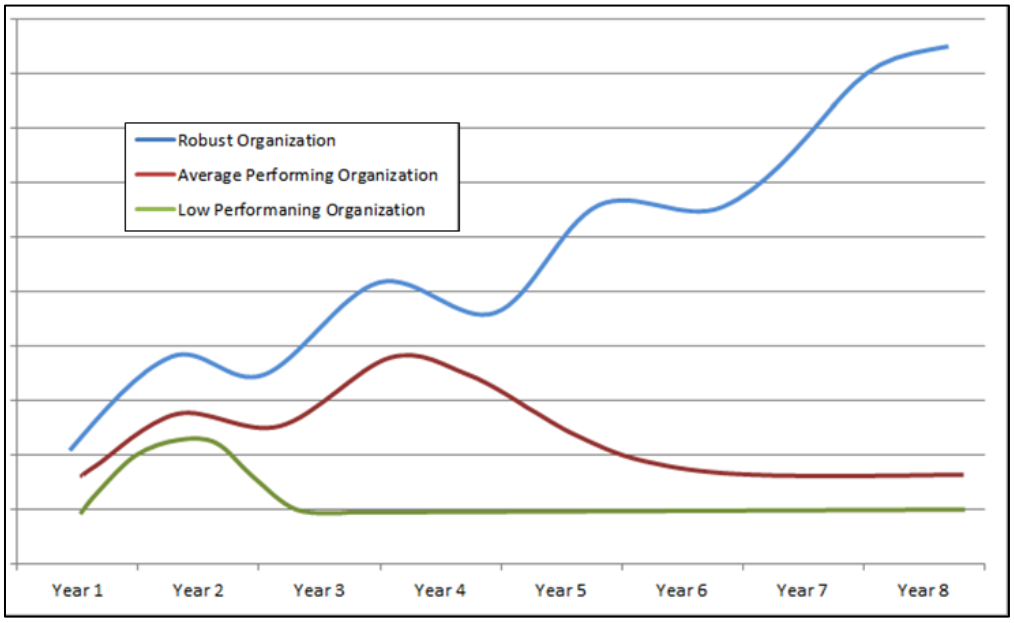
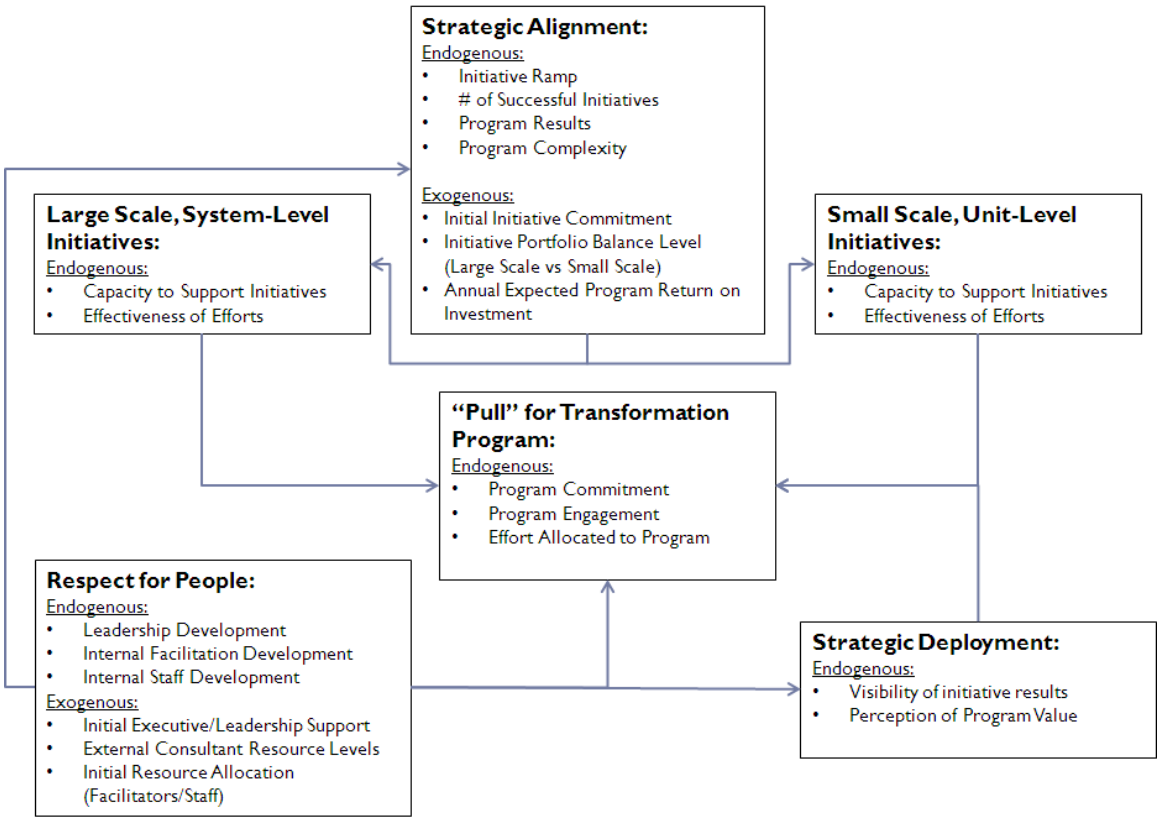


Figure 2: Model Boundaries/Sub-System Diagram



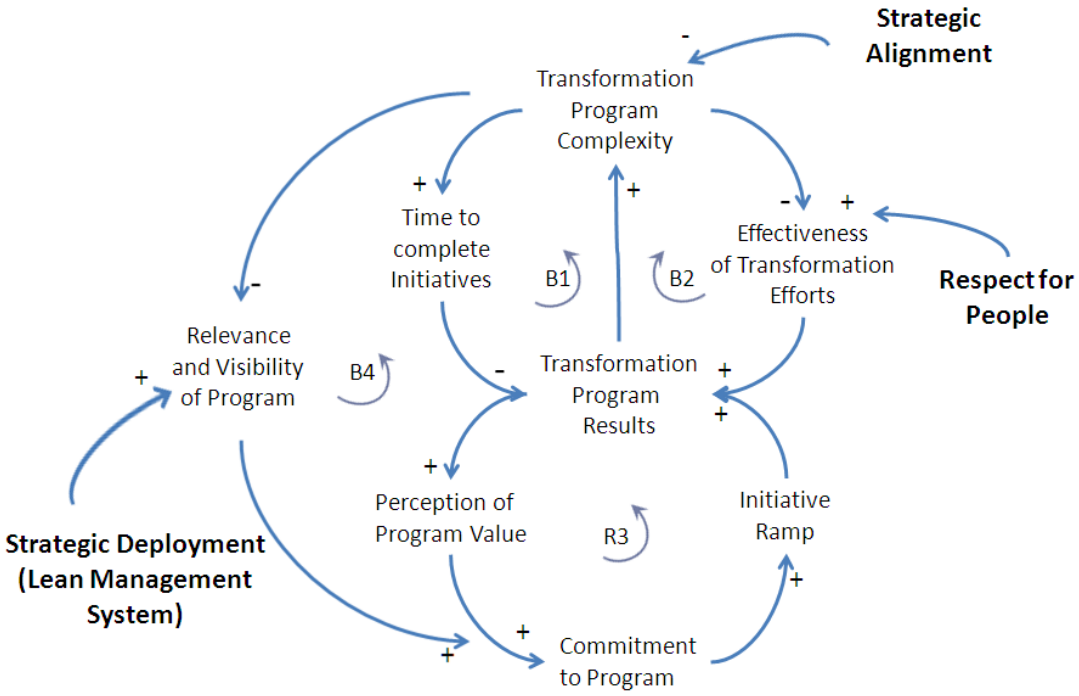
Model Boundaries/Sub-System Diagram:

The five primary strategies identified within the successful transformational initiatives were mapped to the higher order strategy of creating "pull" for the enterprise-level Lean Deployment Program within the organization, as shown in Figure 2 (above).

- *Strategic Alignment* determines alignment of initiatives to organizational goals as well as the 'mix' of initiatives within the transformational efforts (*large-scale* vs *small-scale initiatives*).
- *Respect for People* provides the level of Executive and Management commitment for transformation efforts as well as the management-level commitment and capability to lead and effectively direct transformational activities (Strategic Alignment) and as well as implement management systems that facilitate diffusion/spread of initiatives throughout the organization (Strategic Deployment).
- *Strategic Deployment* efforts impact the overall perception of the transformational program value through translation of program results into relevant and visible accomplishments clearly linked to the local and organizational goals.

Initial Dynamic Hypothesis:

Figure 3: Initial Dynamic Hypothesis – Creating Pull for Transformation



The initial dynamic hypothesis was developed based on the previously cited work by Keating, et al. (1999). Within this model (Figure 3 above), loop #R3 represents a reinforcing loop creating "pull" for the transformational efforts within the organization. As the results from the transformation program are aggregated, the perception of the program value to the organization increases, also increasing the organizational commitment to the organization. This results in a greater number of transformational initiatives being initiated (increased Initiative Ramp), which then, in-turn, increases the program results.

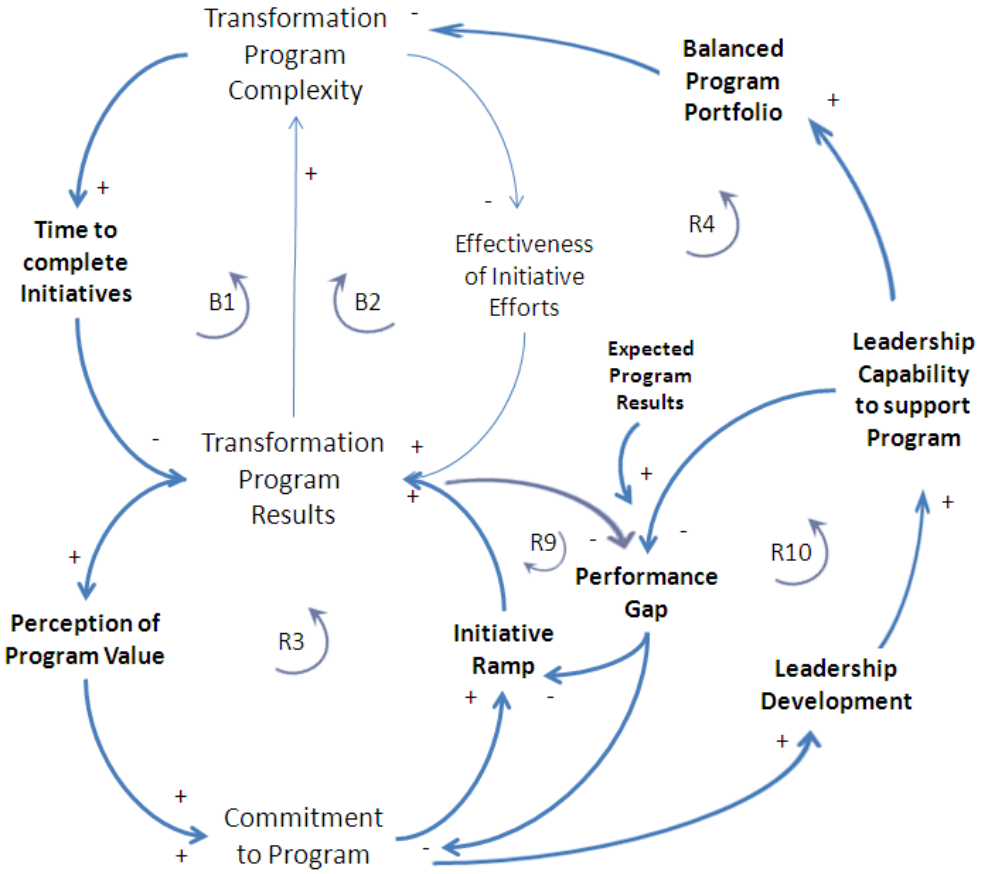
Loops #B1/B2 are the balancing loops representing the two primary constraints to continued increase in the Lean deployment "pull": capacity and capability. As outlined by Keating, as the program results from the transformation efforts continue to expand, new initiatives will have higher complexity as low-hanging fruit issues are resolved, resulting in longer time to complete and higher-level QI tools/methods to effectively resolve issues. This higher order of program complexity slows the pace of improvement, reducing program results.

Loop #B4 is a balancing loop representing the direct impact that the program complexity has on the commitment. As the program complexity increases, the relevance and visibility of the program initiatives to the day-to-day work within the organization decreases, resulting in a decrease in the organizational commitment to the program, reduced initiative ramp and program results.

Expanded Dynamic Hypothesis:

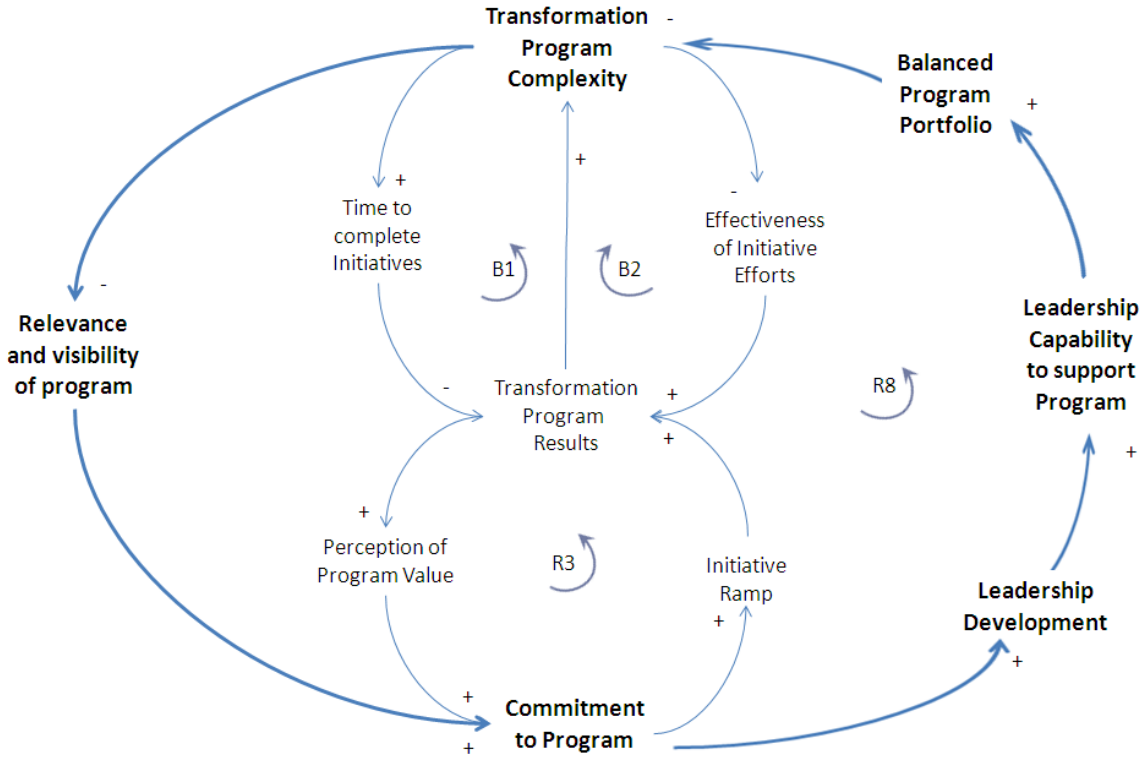
The initial dynamic hypothesis was expanded to integrate mechanisms associated with the five strategies utilized by successful healthcare organizations in enterprise-level Lean transformational programs. This integration is explored in the following sections.

Figure 4: Expanded Dynamic Hypothesis Representing the Strategic Alignment Integration with the Base Model



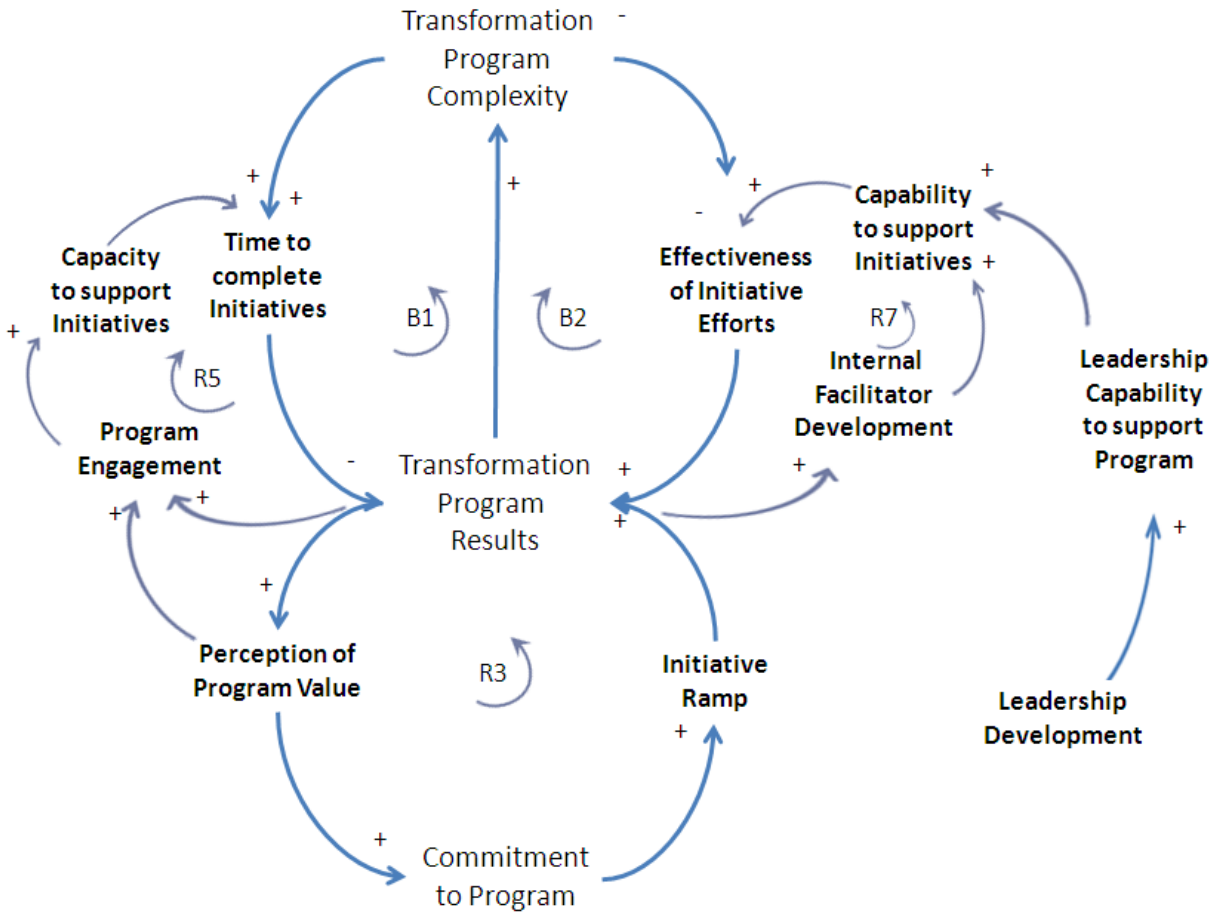
Strategic Alignment (Loop #R4/R9/R10, Figure 4): *Large Scale, System-Level Improvements* will have higher complexity, resulting in longer time to complete and slower pace of improvement, reducing program results. However, although *Small Scale, Unit-level Improvements*, can be completed with a faster timeline, these initiatives will have less of an impact on the overall transformational effectiveness and therefore, on the overall program results. Strategic Alignment mechanisms enable a balance between Large-scale and Small-scale program portfolios as well as the number of efforts initiated (Initiative Ramp). This is accomplished through the capability of the leadership to 1) appropriately align organizational goals/metrics (Loop #R9); 2) measure and assess performance gaps in the Lean deployment program (Loop #R10); and 3) appropriately balance the program portfolio and initiative ramps to ensure growth in program results without increasing the complexity of the overall program beyond organizational capabilities (Loop #R4).

Figure 5: Expanded Dynamic Hypothesis Representing the Strategic Deployment Integration with the Base Model



Strategic Deployment Integration (Loop #R8, Figure 5): Multiple organizations cited that system level, high complexity initiatives did not translate as well throughout the organization, reducing the ability to increase commitment to the Lean transformation program. *Strategic Deployment* mechanisms including Lean Management System and Continuous Daily Improvement (CDI) are achieved through balancing the overall program portfolio – e.g. the ratio of small-scale vs. large scale initiatives *(Strategic Alignment)*. These mechanisms allow the organization to better manage the overall program complexity, ensuring that program results and impact are highly visible and relevant throughout the organization, increasing the commitment to the program. However, the implementation of *Strategic Deployment* mechanisms often require advanced leadership and management strategies that can only be realized through intensive leadership and management development.

Figure 6: Expanded Dynamic Hypothesis Representing the Respect for People integration with the Base Model



Respect for People (Loop #R5/R7, Figure 6): These loops represent the capacity and capability to support initiatives. As the Transformation Program results are aggregated, the overall program complexity increases as prior initiatives must be sustained over time and methods and tools to sustain may be more complex than needed for the initial transformation initiatives. Capacity to support initiatives is provided by engaged staff members. Engagement occurs as a function of the perception of program value and participation in successful transformational initiatives (Loop #R5). The capability of internal coaches and facilitators, as well as the organizational leadership to appropriately support initiatives, ensures the effectiveness of Lean transformation efforts (Loop #R7).

Analysis

Model Development/Validation

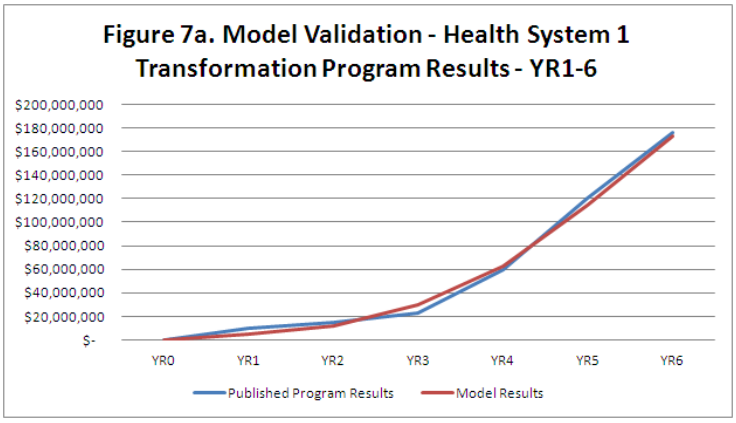
An SD model was developed within iThink representing the dynamic hypothesis as shown in Appendix A. Model constants were pulled from prior work (Hagg, et al 2013) or estimated by the key stakeholder group as indicated in the table in Appendix B.

The System Dynamics Model was validated against published results for Lean Enterprise Deployment for three (3) separate Large Health Systems. In all cases, systems reported implementing deployment interventions associated with strategic alignment in years 2-3 and strategic deployment in years 4-8. These interventions were input as exogenous model parameters during model validation.

Health System #1 is a large public, integrated healthcare system located in the Midwest US. This system has published extensively about the Lean Enterprise Deployment that was initiated in 2005. This system reported an initial deployment strategy supported by external consultants with a focus on Large Scale, system-level initiatives. In year 2 of the deployment, this system reported a shift to a more balanced (large scale vs. small scale initiatives) approach with the training of over 250 additional facilitators and integration with unit-level management strategies. This system reports a completion of 416 initiatives since 2005, with over $160M in financial benefit (Goodman, 2012). Model validation against the financial performance for this system is shown in Figure 7.

Health System #2 is a medium teaching healthcare system located in the Western US. This system is widely recognized as being on the forefront of Lean Enterprise Deployment within healthcare and has also published extensively about transformation program efforts. This system has reported three transitions in the deployment strategy: reduction in efforts in Year 5 to allow for a "months long reflection period" where prior initiatives were remeasured and evaluated in order to address initiative sustainability issues. The outcome of this period was a revised deployment starting beginning in 2006 with additional resource allocation (facilitation and staff) and a balanced initiative portfolio (large scale vs. small scale initiatives). This system has not published on the program-level financial benefit of the Lean Deployment. As a result, model validation was conducted utilizing the reported Kaizen Activity (Kenney, 2011) as shown in Figure 8.

Health System #3 is a large, multi-facility healthcare system located in the Eastern US. This system initiated an external consultant-supported Enterprise Lean Deployment in 2007 and to-date has not published on their Enterprise Lean Deployment, but shared information related to their deployment efforts and outcomes (HHC, June 11, 2013). This system has reported initiating strategic alignment (Hoshin Kanri) efforts in 2010 and strategic deployment (Daily Management System) efforts in 2012, resulting in completion of over 1300 Lean initiatives, with staff participation at over 7500 employees. The financial benefit of this program has been reported to be over $300M. Model validation against the initiative starts, staff participation levels, and annual financial benefit is shown in Figure 9.



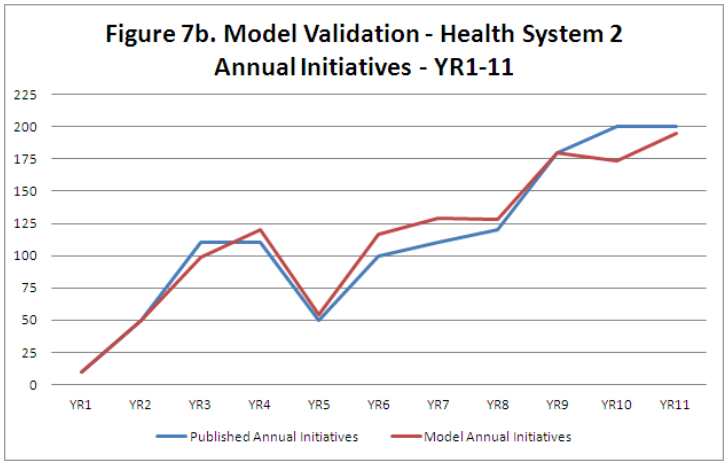
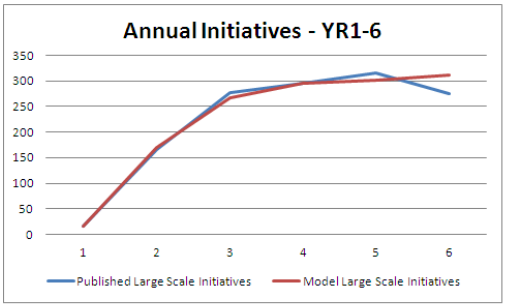
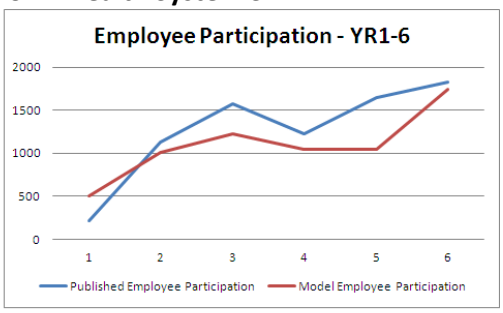
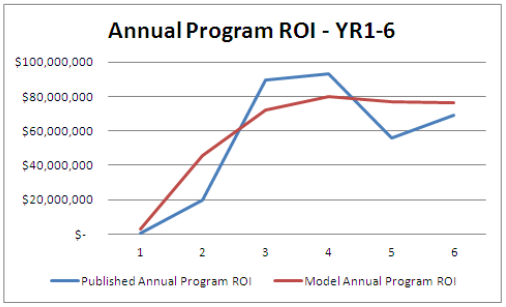


Figure 7c. Model Validation – Health System 3







Results

Multiple scenarios were run utilizing the SD model in order to evaluate specific program strategies with respect to the program results in comparison with baseline performance. In each case, baseline performance results were obtained by utilizing initial program setpoints typical of underperforming organizations: minimal initial staff/facilitator support for improvement efforts, low levels of external facilitation support, and a portfolio balance level of 100% Large Scale Initiatives. Additional scenarios were explored utilizing setpoint and ranges typical of Lean Transformation Deployments explored in prior work (Hagg, et al 2013)

Table 1 (below) outlines the exogenous variable ranges and setpoints explored in the Analysis section of this paper. Additional variable listings are presented in Appendix B.

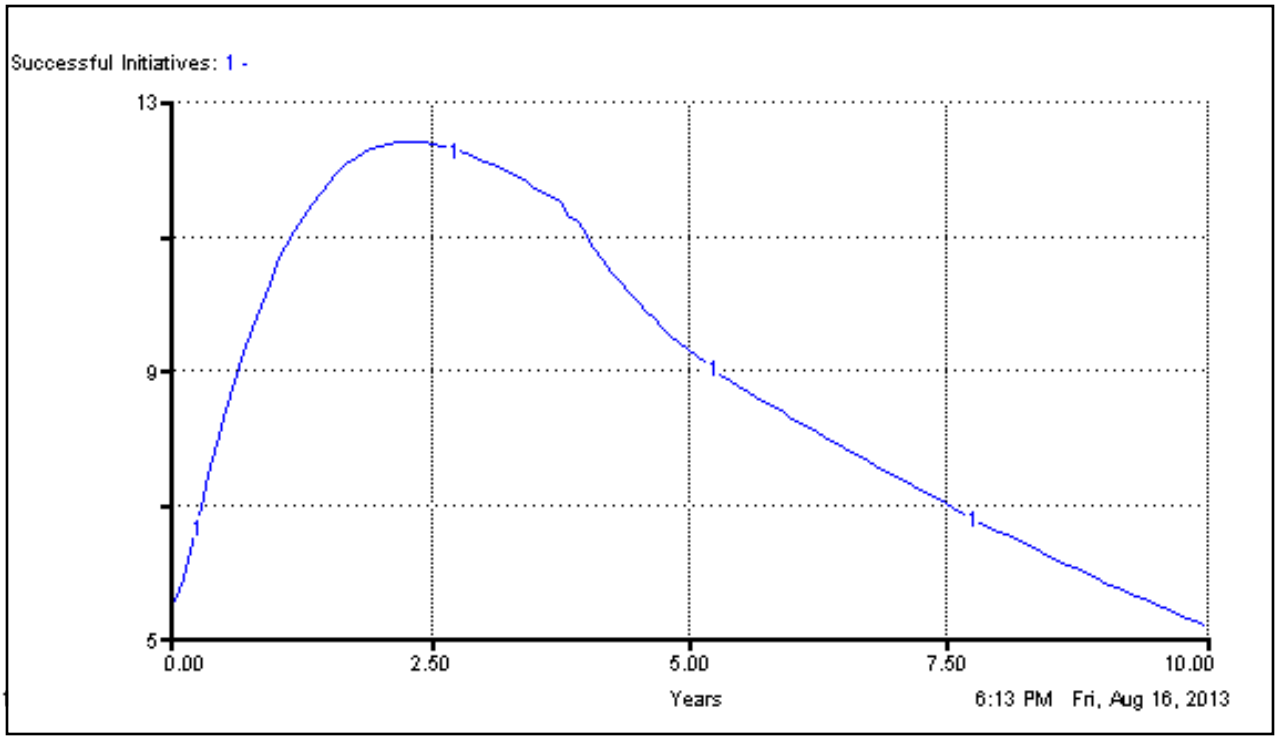
Table 1: Exogenous Variable Ranges and Setpoints for Scenarios 1-4.

User Input Variables:	Variable Range	Baseline Conditions	Scenario 1: Low Performing Organizations	Scenario 2: Moderate Performing Organizations	Scenario 3: Moderate Performing Organizations	Scenario 4: Robust Organizations (Dynamic Deployment Strategy)		
		YR1-10	YR1-10	YR1-10	YR1-10	YR1	YR2-5	YR6+
Initial Program Commitment - Staff	0-500	100	50-200	100-200	200	200	200	200
Initial Initiatives	0-20	5	5	5	5	5	5	5
Initial External Facilitators	0-20	0	0	2	2	2	2	2
Pool of Potential Facilitators	0-250	2	2	10-40	40	10	30	30
Total Employees/Staff	1000-10000	3000	3000	3000	3000	3000	3000	3000
Fraction of Employee/Staff Hours Allocated to Program	0-1.0	0.05	0.05	0.05	0.05	0.05	0.1	0.1
Annual Investment Fraction	0-1.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Portfolio Balance Level (Fraction Large Scale Initiatives)	0-1.0	1	1	1	1-.50	1	0.8	0.5

Program Performance under baseline conditions:

As shown in Figure 8 (below), in underperforming organizations, the number of successful initiatives peaks in Year 2 as lack of sufficient staff limits the initiative ramp as well as staff engagement. Additionally, the lack of trained facilitator capacity results in a high initiative failure rate, eventually reducing organizational commitment to the program, significantly impacting program results.

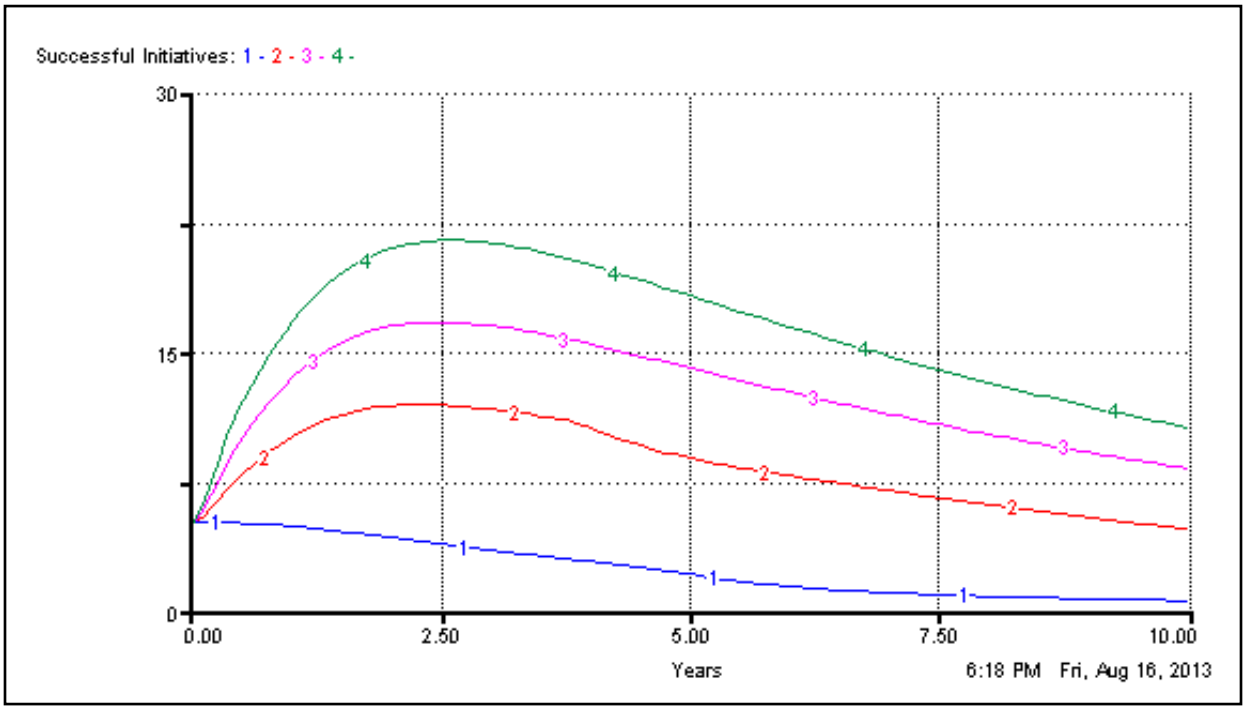
Figure 8: Count of Successful Initiatives by Year – Baseline Conditions



Scenario 1 – Low Performing Organization:

This scenario provides an evaluation of initial staffing levels on program results. Curve 1 represents baseline at an initial staff commitment of 50 staff at 5% time allocation. Subsequent curves represent increases to 100, 150 and 200 initial staff commitment. Note that higher staff levels enable an increase in initiative ramp over time, improving the number of successful initiatives in the first 2-3 years. However, this positive impact is eventually negated by a lack of facilitator capacity, reducing the effectiveness of program efforts and resulting in higher initiative failure rates. This eventually leads to reduced perception of program value, program commitment and staff engagement, resulting in the eventual significant reduction in initiative ramp and program results.

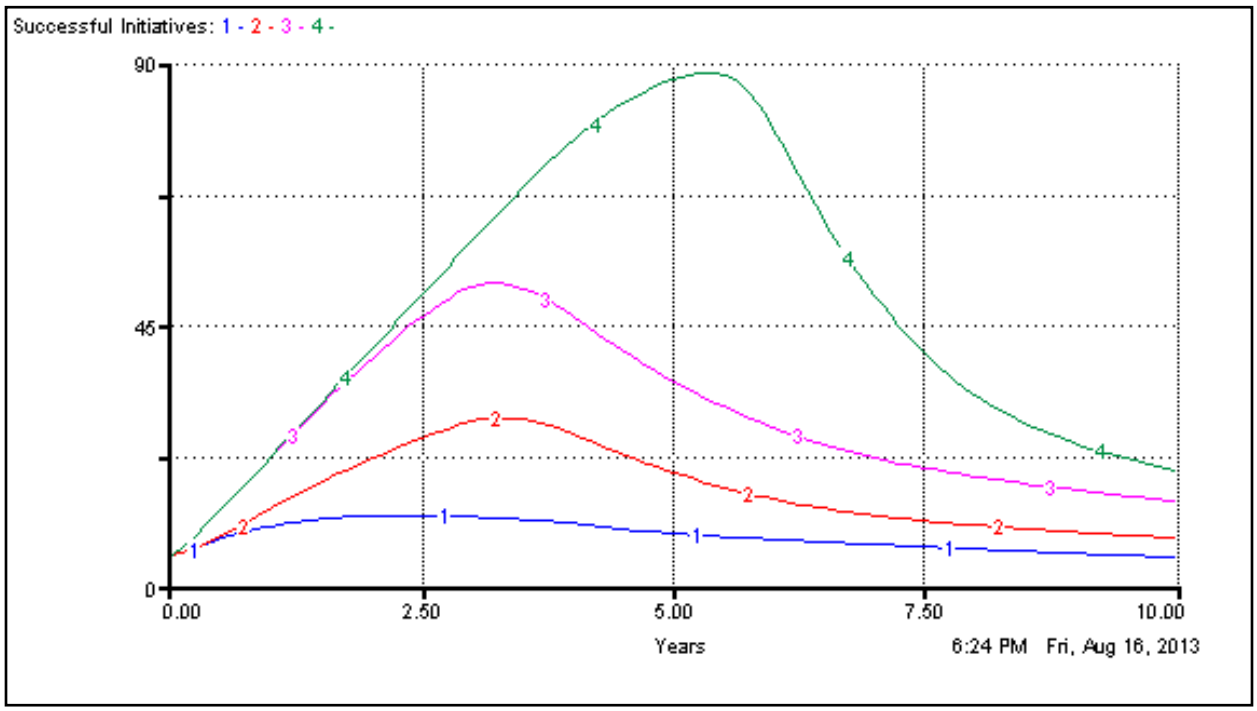
Figure 9. Count of Successful Initiatives by Year – Low Performing Organizations, Varying Staff Allocation



Scenario 2 – Moderate Performing Organization:

In an attempt to overcome initial staff and facilitator constraints highlighted in Scenario 1, an increase in initially available staff and facilitator capacity was evaluated in this scenario. Curve 1 represents the baseline results. Curve 2 represents an increase in facilitator capacity from 10 to 20 internal facilitators initially available. Curve 3 represents an increase in staff (200) and facilitator support (20). Curve 4 represents an increase in staff (200) and facilitator capacity (40). Note that in curve 3 and curve 4 the increase in initial staff capacity and internal facilitators results in a significant increase in initiative ramp over the 1st 3 years (curve 3) and 5 years (curve 4). However, this increase eventually also increases the complexity of the overall program (due to the portfolio balance of 100% Large Scale initiatives). This increase in complexity results in a decreased initiative effectiveness and lower program commitment, eventually significantly reducing the program results.

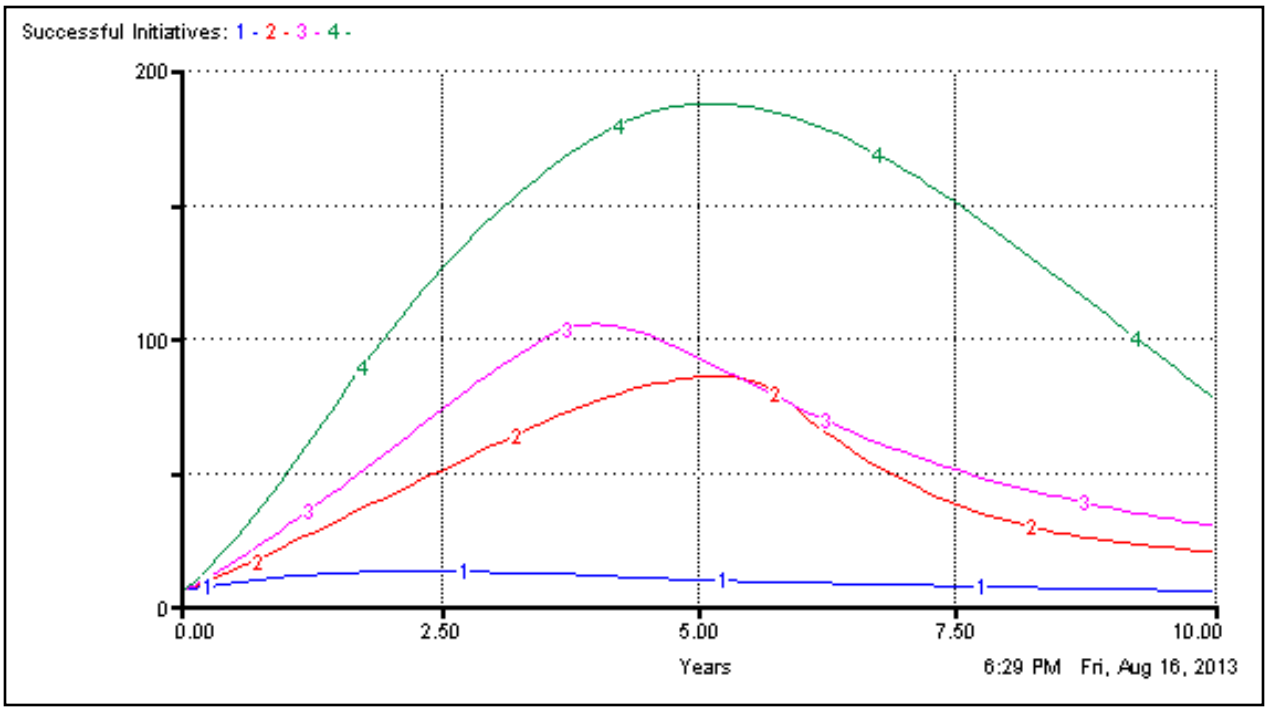
Figure 10. Count of Successful Initiatives by Year – Moderate Performing Organizations, Varying Staff and Facilitator Allocation



Scenario 3 – Moderate Performing Organization**:**

This scenario attempts to evaluate the impact of the program portfolio balance (Large Scale vs. Small Scale initiatives) on program performance. Curve 1 represents the baseline. Curve 2 results were based on initial staff and facilitator levels were set to the maximum from Scenario 4 (200 staff, 40 facilitators), but at a program portfolio that represents 100% Large Scale Initiatives. Curve 3 represents 200/40 staff/facilitators, but at a program portfolio that represents 80% Large Scale/20% Small Scale Initiatives. Curve 4 represents 200/40 staff/facilitators, but at a program portfolio level that represents 50% Large Scale/50% Small Scale Initiatives. Note that at the more balanced program portfolio levels (80/20, 50/50), initiative ramp is significantly improved due to reduced support levels and time to completion for small scale initiatives, resulting in improved program results. Additionally, smaller scale initiatives do not contribute as significantly to the program complexity, allowing more stable initiative effectiveness. However, in Year 6, due to the significant number of initiatives, program complexity does increase beyond the capability and capacity of the program organization, resulting in eventually significant decrease in program results.

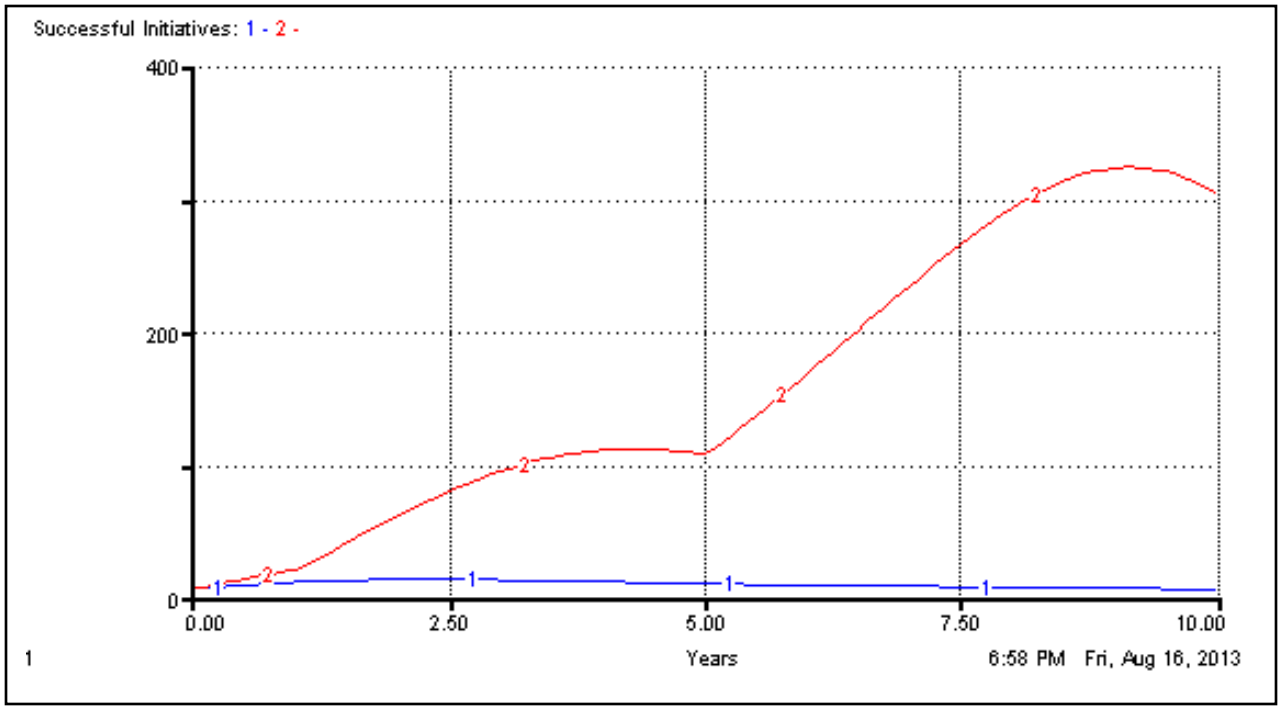
Figure 11. Count of Successful Initiatives by Year – Moderate Performing Organizations, Varying Portfolio Balance Levels



Scenario 4 – High Performing Organization:

The work done by Hagg, et al. (2013) indicates that high performing organizations utilized highly dynamic program implementation strategies, often adjusting initial staff and facilitator capacity as well as external facilitator capacity and portfolio balance levels in response to current program performance. In this scenario, exogenous variables were adjusted on an annual basis, based on prior year results, in order to optimize the staff, facilitation capacity, and the portfolio balance in order to maximize program results over time and sustain program performance beyond Year 10. Curve 1 represents the baseline results. Curve 2 represents staff and facilitator capacity levels adjustments on annual basis to gradually increase capacity without significantly increasing the program complexity. Additionally, the portfolio balance was adjusted on an annual basis, starting at 100% Large Scale Projects for YR1, 80%/20% Large scale/small scale from YR 2-5, 50%/50% for YR 6+. Note the close match to the initial dynamic hypothesis.

Figure 12. Count of Successful Initiatives by Year – High Performing Organizations utilizing a Dynamic Deployment Strategy



Challenges/Next Steps:

The next steps for this work are to:

- Continue to identify and test strategies to reduce the deployment timeline while improving long term sustainability of transformational Lean Enterprise programs.

- Integrate emergence of additional mechanisms associated with specific strategies into the base iThink model and assess the impact of these emergent strategies on the program results over time.

- Assess the impact of contextual elements on overall program deployment strategy.

Conclusions:

In order to better understand the emergent nature of enterprise-level Lean deployment strategies within healthcare organizations, we have developed a dynamic hypothesis and initial System Dynamics model that integrates strategies for sustained, enterprise-wide transformation utilizing Lean deployment methods.

These five strategies work together to generate sustained momentum for the transformation efforts, or "pull." An organizational culture supporting *Respect for People* ensures that internal capacity and capability is developed at the staff, coaching/facilitation and leadership levels. *Strategic Alignment* methods provide transparency throughout the organization with respect to organizational goals and metrics, as well as the transformation program results in meeting those goals. A balanced portfolio between Large-Scale, System Level and Small-Scale, Local Level initiatives ensures that program results sustain without significantly increased complexity within the Lean program. *Strategic deployment* mechanisms ensure that the transformational initiatives are tangible and relevant to the front-line staff members.

Additionally, we have created an SD model representing this transformational deployment that has been used to test specific deployment scenarios typical of low, moderate and high performing organizations. Through the use of this model, we have confirmed the effectiveness of dynamic deployment strategies on the performance and sustainability of Lean Deployment Programs.

Subsequent work will focus on utilizing the model to understand the emergent nature of specific mechanisms on long-term program sustainability through transitional phases as well as exploration of contextual impacts on program deployment strategies.

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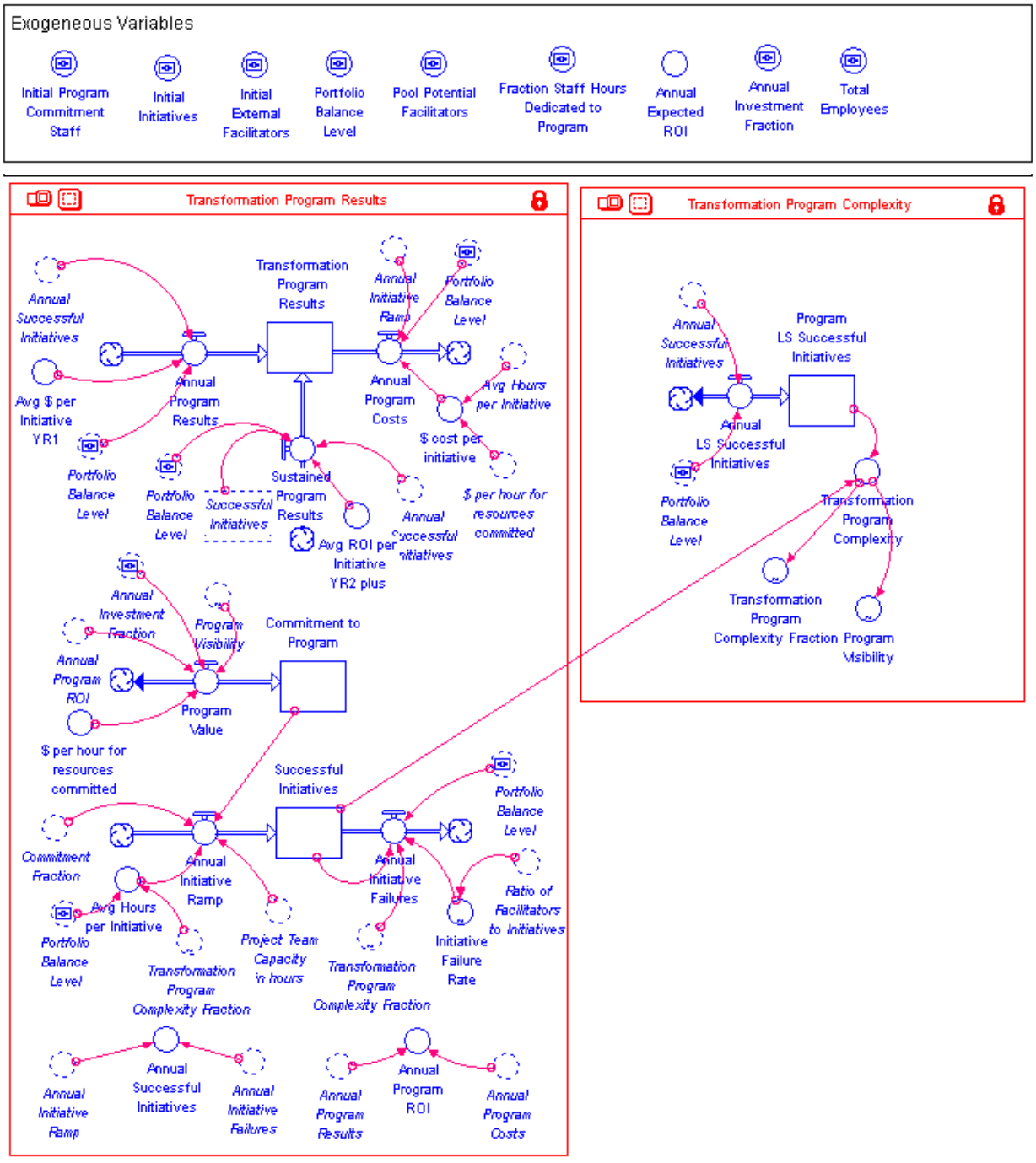
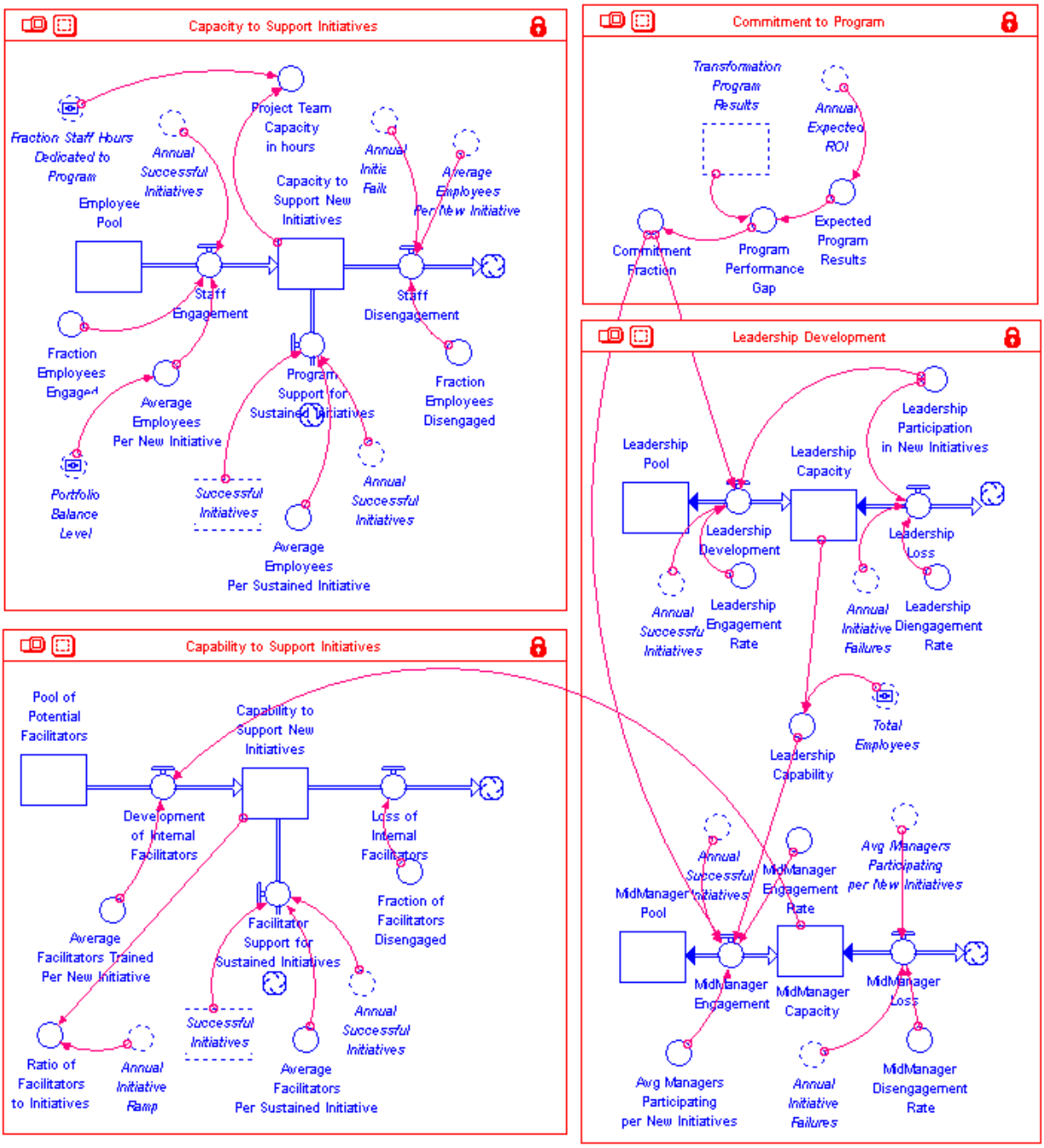
Appendix A: System Dynamics Model




Capacity to Support Initiatives
Fraction Staff Hours Dedicated to Program
Annual Successful Initiatives
Employee Pool
Project Team Capacity in hours
Capacity to Support New Initiatives
Annual Initiative Failure
Average Employees Per New Initiative
Staff Engagement
Staff Disengagement
Fraction Employees Engaged
Average Employees Per New Initiative
Program Support for Sustained Initiatives
Fraction Employees Disengaged
Portfolio Balance Level
Successful Initiatives
Annual Successful Initiatives
Average Employees Per Sustained Initiative
Commitment to Program
Transformation Program Results
Annual Expected ROI
Commitment Fraction
Program Performance Gap
Expected Program Results
Leadership Development
Leadership Pool
Leadership Capacity
Leadership Participation in New Initiatives
Leadership Development
Leadership Loss
Annual Successful Initiatives
Leadership Engagement Rate
Annual Initiative Failures
Leadership Disengagement Rate
Total Employees
Leadership Capability
Annual Successful Initiatives
MidManager Engagement Rate
Avg Managers Participating per New Initiatives
MidManager Pool
MidManager Engagement
MidManager Capacity
MidManager Loss
Avg Managers Participating per New Initiatives
Annual Initiative Failures
MidManager Disengagement Rate
Capability to Support Initiatives
Pool of Potential Facilitators
Capability to Support New Initiatives
Development of Internal Facilitators
Loss of Internal Facilitators
Average Facilitators Trained Per New Initiative
Facilitator Support for Sustained Initiatives
Fraction of Facilitators Disengaged
Successful Initiatives
Annual Successful Initiatives
Ratio of Facilitators to Initiatives
Annual Initiative Ramp
Average Facilitators Per Sustained Initiative

Appendix B: Constant Model Parameter Listing

Constant Model Parameter:	Variable Setpoint	Source/Reference
Average ROI per initiative (initial project year)	$300,000	Hagg, et al (2013)
Average ROI per initiative (subsequent project years)	$100,000	Hagg, et al (2013)
Average Cost per hour for staff resources	$40/hour	Stakeholder estimates
Average # of total manhours to complete each new large scale initiative (pre-sustain)	1000	Stakeholder estimates
Average # of employees participating in each new large scale initiative	10	Hagg, et al (2013)
Average # of employees participating in each initiative in sustainment	0.25	Stakeholder estimates
Average # of facilitators supporting each new large scale initiative	2	Hagg, et al (2013)
Average # of facilitators supprting in each initiative in sustainment	0.1	Stakeholder estimates
Average # of mid-level managers participating in each new large scale initiative	1	Hagg, et al (2013)
Average # of executive leaders participating in each new large scale initiative	0.25	Hagg, et al (2013)
Employee engagement rate per initiative	0.4	Stakeholder estimates
Mid-Manager engagement rate per initiative	0.5	Stakeholder estimates
Executive Leadership engagement rate per initiative	0.5	Stakeholder estimates