

# Marathons and Sprints: Insights from Institutionalising System Dynamics Practice

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## Introduction / Abstract

This paper explores observations from an academically trained (European Master in System Dynamics) practitioner of System Dynamics methodology in a financial institution in the UK. It discusses the lessons learned from the experience of using System Dynamics as an internal capability to support strategic and operational decision making in the organisation. The paper aims to contribute to the existing body of knowledge by providing a perspective "from within". The overall reflection is that institutionalising System Dynamics (SD) in a large organisation is about being able to win both marathons and sprints. It requires the appropriate training, dedication and experience to perform over long distances, but at the same time calls attention to the emerging practice of agile project management with its familiar analogy of sprints. These observations are based on recent project experience as well as feedback received by the author's team about past System Dynamics projects. The reflections extend earlier published work on the institutionalisation of System Dynamics and will be of interest to academic researchers and practitioners alike.

## Problem Statement

The topic of institutionalising SD as a capability within organisations is a relatively niche topic in the field that has received limited attention in the literature. It therefore presents an opportunity to explore the topic from a perspective of a practitioner who is part of an internal SD capability in one of the financial institutions in the UK. The team was formed around 3 years ago. While there is understanding of the method's capability and support from senior leadership for the team specifically, it took time for SD insights to support strategic decision making, or for the developed models to be continuously used by decision makers.

Andreas Größler (Größler, 2007) outlined several reasons why SD projects fail to make a change. One reason that resonates with the focus of this paper is that "without being institutionalised by means of formal training and official recognition, SD will not be used continuously". Eckert and Wieck in their master thesis (Eckert & Wieck, 2018) have analysed several SD intervention projects to explore what needs to be in place to institutionalise SD as a change method. One of their findings suggest that for new knowledge to become a "business as usual" behaviour, SD capability needs to integrate with existing practices or close a process gap in the organisation.

Existing literature (Vennix, 1996), (Andersen & Richardson, 1994), (Andersen et al., 2007) suggests that Group Model Building is an effective approach for introducing SD interventions in organisations. Reflecting on factors that influence long-lasting organizational effects from Group Model Building Herrerra et al. (Herrera et al., 2020) suggest that "one-off facilitated modelling interventions are unlikely to have high impact

unless they are part of the organisation's ongoing strategic management processes. Follow-up activities should be included as part of the modelling intervention".

This paper aims to contribute to the existing body of knowledge by suggesting that in addition to aforementioned prerequisites for institutionalising SD in an organisation, it also requires using Group Model Building (GMB) (or another facilitated stakeholder engagement process) as a framework to support the intervention. It also aims to provide insights and lessons learned from several case studies on institutionalising SD as a change method.

## Case Studies

The observations are based on the analysis of three case studies that could be characterised with the following features:

	Was the problem owner on board? (Größler, 2007)	Was the process problem addressed? (Eckert & Wieck, 2018)	Was GMB used?
Project A	Yes	No	No
Project B	Yes	Yes	No
Project C	Yes	Yes	Yes

### Project A.

The aim of the project was to develop a model to help the decision maker understand how soon the organisation will be able to achieve its gender diversity ambition. The project was initiated by a senior manager who identified this as a high priority. At the time, SD capability was rather new in the organisation, thus model building was outsourced to an external consultant. The model was built to answer a specific question; however, the SD intervention was not explicitly attached to an organisational process or need to close a gap in an existing routine or process. Most of the modelling efforts were completed "behind the scenes", and interactions with subject matter experts (SME's) and stakeholders were limited to a few workshops spread-out throughout the project timeline. Despite the fact that the initial modelling efforts resulted in valuable structure-behaviour insights, changes in priorities and leadership (also mentioned as one of the challenges by Größler (2007)), as well as practical difficulties in sharing the insights with stakeholders who had not participated in the modelling process, led to the modelling intervention being shelved.

### Project B.

The goal of the project was to explore the relationships between a system of delivering digital changes to customer journeys and a set of principles and practices that aim at improving the delivery system. The challenge was that the adoption and practicing of those principles had been limited throughout the organisation, thus the leadership were interested in identifying the blockers and enablers for promoting the best practice organisation-wide. In this project, compared to Project A, a process problem had been identified that the model could support with. The interactions with SME's were more regular, however there was still no formal engagement framework by which they could actively participate in modelling. Project B resulted in greater success compared to

Project A: the team was sharing the insights more widely, which led to greater awareness about SD capability in the organisation. However, the model itself did not progress into a detailed validation and policy testing phase and is yet to be used as a planning tool by decision makers.

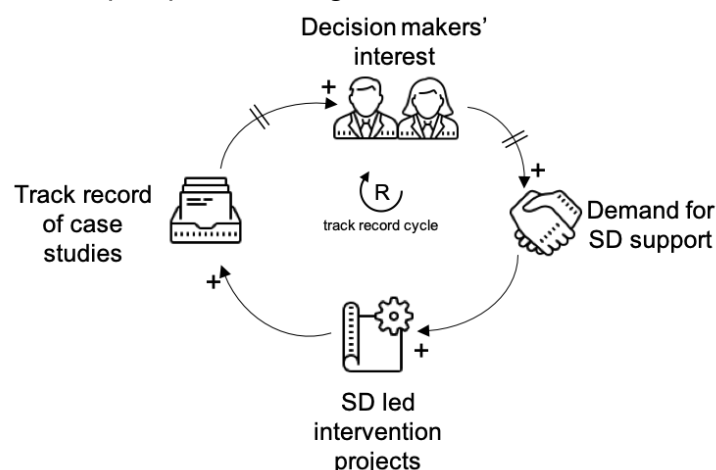
### Project C.

The project picked up the topic of Project A, a few years later. Not only the leadership team and the problem owners had changed, but the SD team was known more widely within the organisation. The project objective this time was slightly different: the stakeholders were interested in not only understanding how likely the organisation is to achieve its diversity ambitions, but also have a way of assessing potential effectiveness of the decisions to accelerate the change i.e. policy testing. The project had both an explicit process gap and buy-in and sponsorship from senior management. In addition, after notable advocacy efforts by the SD team, Group Model Building was adopted as the guiding framework for the intervention. The project resulted in new structure-behaviour insights being provided to stakeholders as well as the problem owner team being interested in taking the ownership of the model. This triggered a whole new process which the SD team needed to develop: this was the model and knowledge handover process, something which had neither been possible nor required in the organisation before.

The Projects A, B and C are mentioned in chronological order. Projects A and B provided important lessons that were then applied in Project C. Alongside the evolved ways of working for the SD team, these lessons are believed to have contributed to a higher success of Project C, particularly due to the role of GMB in increasing model ownership and disseminating SD capability within the organisation.

### Observations from practice

The immediate challenge in Project A was something any new change capability faces in an organisation and can be summarised as a chicken and egg problem driven by a reinforcing feedback loop captured in Figure 1.



*Figure 1. Challenge of getting started*

In order to gain interest and thus sponsorship from senior leaders on a piece of work to include SD capability, it required a track record of case studies in the organisation where the method has been applied and can demonstrate some useful results. However, without projects where SD has been used as a change method, it's not possible to draw on such

a repository of case studies. This is where the process of embedding SD within the organisation can be said to be akin to marathon training: before the method can be embedded there is a long way to go, building an internal network, educating people in various parts of the organisation about the advantages and requirements of the methodology, and how it can help in supporting decision making. This was addressed by the SD team's widespread education and training campaign that aimed at promoting awareness about the method across the organisation and creating strategic partnerships that could lead to projects where the SD team could contribute. Another challenge that the SD team had faced during this project was that a data owning team appeared to be suspicious of a new analytical method where they were unfamiliar with how the data would be used, and at first were reluctant to cooperate, thus complicating the data collection process. The lesson learned from these challenges was that other parts of the organisation (even when they are not directly related to the problem owners) also need to be involved in the GMB process as they represent existing capabilities and processes (or ways of working) and may become key at later stages in the process, even if it's not evident in an initial stakeholder mapping exercise.

Building on the lessons learned from Project A, and utilising the stronger network within the organisation the team then got to work on project B which was able to achieve a deeper level integration in supporting decision making using insights derived from SD modelling. The modelling process for Project B included consulting with SME's relevant to the study, however it took a long period of time before the SD team was confident in sharing its insights as the team was focused on perfecting a model built "behind the scenes". The feedback received from the stakeholders was that the insights were presented in a complicated way and it was difficult to understand the "so what's" and identify actionable take-away messages. In addition, as time passed, other projects received higher priority, so model development in Project B was put on pause. The lessons learned from this project were such that it may be necessary to look at model building and SD interventions to be more like running sprints, rather than a marathon, and being able to supply bite sized pieces of insights to stakeholders at regular intervals, as well as improve on the storytelling for communicating SD insights.

By the time of Project C, the SD team had been established in the organisation for several years, had built a repository of case studies that demonstrated value delivered through application of SD, extended the network and connections within the organisation, learned the lessons from earlier previous projects, and evolved their way of working. Project C arose from an existing connection within the organisation and picked up on the topic of Project A. The modelling team were integrated into the project scoping phase meaning that the SD team could influence how the project would run. The decision was to adopt Group Model Building as the guiding framework after a great deal of advocacy and discussion. Kim Warren (Warren, 2015) has discussed the application of the agile approach to the SD model building process, however the application of this method to GMB is not widely covered in literature, so it was decided to experiment with some of the agile principles to address the need identified in Project B for generating "bite size" insights over regular sprints. The project group therefore agreed to split the project into 2 iterations (qualitative and later, if proved necessary, quantitative). Being aware that modern online and digital technologies are appropriate to facilitate GMB (Wilkerson et al., 2020), the whole project was run as a series of virtual workshops using MS Whiteboard as the primary tool for the qualitative step using Causal Loop Diagrams (CLDs). Even though the modelling team has access to and regularly uses specialist SD modelling

software, it was explicitly decided to not use it while creating qualitative CLDs during the workshops. This allowed the facilitator to remove some cognitive load from the participants by having a blank page and hand drawing the diagram, without them being distracted by the icons and tooling of the software. One of the initial workshops was dedicated to a rapid training of the project working group in SD, to familiarise them with the concepts and introduce to the method terminology, as is standard in GMB practice (Hovmand et al., 2013).

The agile approach to project management allowed the modelling team to discuss with the stakeholders the feasibility and desirability of adjusting the workshop cadence, which led to shorter breaks between the GMB sessions. The project consisted of a total of 11 workshops using a 1.5-hour weekly session. Such frequent interactions allowed the modelling team to proceed at pace, quickly analysing the results of each session and planning the next steps for the workshop ahead. The online format of the facilitated workshops and short periods between sessions ensured stakeholder commitment, and because Whiteboard was used it was possible to share the results of the CLD development with the working team straight away. In this way the model evolved in front of the eyes of the project working group. In between the workshops, participants were given “homework” located on the same whiteboard that was used to build the CLD, which allowed a smooth transition from a workshop to offline contributions, back to next workshops. The workbook (or the storyboard, as it was called in the project) was only used to capture the main insights of each workshop, making it lighter and demanding less input from the stakeholders in between the sessions. The agile way of managing the SD project also allowed the team to adjust to ad hoc challenges, such as staff turnover (Größler, 2007). In this instance, 90% of the project working group members had changed by the end of the quantitative iteration (including 40% of the SD modelling team) due to a combination of internal redeployment and a standard rate of leavers and joiners to the organisation.

Building on the lessons learned from Project B, incremental approach to value delivery allowed the modelling team to make sure model insights were shared on a regular basis. Including the data owners in the working group and having them as participants in the GMB process addressed the reluctance observed during Project A when data collection and data sharing requests were made. The modelling team has also experimented with different ways of storytelling tested out during Project B to communicate insights that resulted from each iteration. One of the learnings from this was that graphs may often not be the best way to tell a story, even when it may seem obviously advantageous for someone with SD training. In an organisational setting, especially when working with senior decision makers, a mastery of storytelling in communicating insights driven by SD interventions is key. What proved to work is having a smaller model (a conceptual version of the actual model being developed) that replicated the problem and allowed policy testing with limited detail. This was powerful enough to communicate the insights as demonstrated by stakeholder feedback, and was not too overwhelming for the decision makers who on previous projects had said they had become. In addition, Power BI was adopted to share insights and represent some of the modelling outputs which proved more user friendly than interfaces that can be designed in specialist SD modelling software.

Project C progressed to a stage where none of the previous SD projects in the organisation had progressed before: the stage where the problem owners expressed their

desire to own the SD model to also channel the demand for insights from the wider organisation towards them. For the SD team the lesson learned from this project was that a true institutionalisation of SD in the organisation would mean both increased demand for more SD modelling projects (following the reinforcing loop from Figure 1) and that the problem owners would want to take over the model and be responsible for generating the insights from using it. This highlighted a whole new process of model and knowledge transfer to teams that previously did not have SD capability: this is something that the SD team are developing internally, but is also a topic that would benefit from academic study on best practices for delivering such an outcome.

## Conclusions

Based on the lessons learned from the case studies described, the following conclusions can be made. These support existing Group Model Building practice as well as advance the discourse on the institutionalisation of SD.

First, the process of embedding a capability which is new to an organisation may manifest itself in a chicken and egg problem: one needs a repository of internal case studies showing how the application led to positive outcomes to secure new projects, but in order to create such a repository, it requires having delivered such projects within the organisation in the first place. In this way the institutionalisation of SD cannot be seen to be a quick process, but more like a marathon that requires building internal networks and developing relationships with stakeholders, creating campaigns that increase awareness of and interest in the methodology, and subsequently building a projects repository to enable the continuous integration of the capability within the organisation.

Second, the comparison of case studies presented in the paper also have proved that in addition to prerequisites highlighted in existing literature on the success of embedding SD as an internal capability, a facilitated stakeholder engagement framework (viz. Group Model Building) is actually a "must have" rather than a "nice to have". This is not only due to the ability of GMB to incorporate a wider knowledge base and increase model ownership, but also because it allows SD professionals to build a network within the organisation, gain buy-in not only just from senior decision makers, but also from other key parts of the organisation that will enable crucial stages of the modelling process, such as data collection.

Third, an agile project management approach to GMB allows for continuous involvement of stakeholders and continuous production of insights. This ensures participants' engagement levels, curiosity and willingness remain high, even when priorities change and there is staff turnover affecting the project. The knowledge built during the process of GMB creates a momentum that allowed the team to overcome these challenges and continue with the project into the quantitative stage.

Fourth, using a smaller model that captures the dynamics of the main model enabled the team to gain recognition among a wider range of senior decision makers. This increased both the profile of the project and awareness of the SD capability within the organisation. Adopting the best practices from the storytelling and design fields when communicating insights also proved powerful, as it compliments other traditional ways of describing causal relationships by walking through a CLD. A recommendation to academic researchers and other SD practitioners is to explore tighter integration with these disciplines to tap into the richness of group facilitation experience and open a new level of communicating SD insights to wider audiences. This can also mean collaborating with design specialists on integrating SD outputs with more user-friendly ways of communicating insights driven by SD models, like animations and visualisations, and the use of Power BI.

Fifth, the institutionalisation of SD within an organisation does not end having developed a model for a problem that supports an existing process or closes a process gap. It also means the increase in demand for SD expertise from other parts of the organisation, as well problem owners taking ownership of SD models and the responsibility to analyse

them to derive further insights. To achieve this, a suitable handover process requires a transfer not only of the model and the technical capability, but also of the knowledge base that supports interaction with the model and the interpretation of it. This paper therefore makes another recommendation to the SD community for developing a repository similar to Scriptapedia (Hovmand et al., 2013) for collating best practices for embedding SD knowledge within teams with no background in SD and delivering successful model handovers. This stage in the process would also likely be a topic of interest for academic research.

Finally, the findings of this paper present advice for SD practitioners within an organisation to i) build a repository of internal case studies as soon as possible to prove the credibility of the method, and ii) adopt GMB as a facilitating framework, as it can speed up the "chicken and egg" loop by increasing awareness of the potential for SD through the experiences of participating during SD workshops.

The overarching picture presented by the findings in this paper is that institutionalising SD is about running marathons and sprints at the same time, but that it can be achieved, and is a rewarding journey that yields many opportunities for SD research topics and practice along the way.



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