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School of Business and Economics

SimLean Healthcare: Implementing Simulation and Lean for Improvement of Healthcare Systems

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Simulation has been used for more than 50 years in the investigation and improvement of healthcare systems. Since the early 1990s the level of work has grown rapidly. Brailsford et al (2009) estimate that there are as many as 30 papers being published every day on simulation and modeling in health. Much of this work, however, has little impact on practice. Key barriers to the implementation of simulation in healthcare are cost, time and stakeholder engagement.

Over the past decade lean thinking has emerged as an approach for improving healthcare systems. In a recent survey Radnor et al (2009) found that 80 out of 152 acute hospital trusts in England were employing lean principles to one extent or another. Albeit that lean is meeting with some success in the healthcare environment, sustaining its implementation is a key challenge.

Given that simulation and lean have a similar motivation, to improve processes, this work provides a methodology for bringing simulation and lean together in a healthcare environment. 'SimLean Healthcare' aims to improve the implementation of simulation and the sustainability of lean. At the centre of this approach is the rapid use of simulation in lean workshops.

Figure 1 outlines SimLean Healthcare, showing three modes of simulation use:

- **SimLean Educate**: using simulation to learn key lean principles
- **SimLean Facilitate**: rapid development of a dynamic process map during a lean workshop to facilitate discussion around process improvements
- **SimLean Evaluate**: post workshop detailed simulation modeling to more thoroughly evaluate the proposed process improvements

'The simulation was the turning point in the discussion.'

Peter Johnston, Lean Facilitator, St Helens and Knowsley NHS Trust

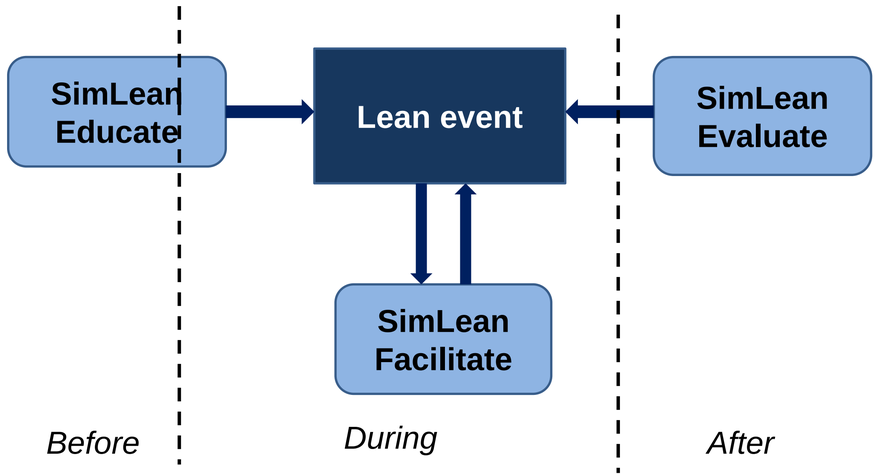

Figure 1 SimLean Healthcare

Benefits of SimLean Healthcare

- Reduced cost of simulation
- Only 1-2 days of modeler time for SimLean Educate and Facilitate
- Higher stakeholder engagement through lean workshops

SimLean Educate
Enhances learning about lean and improves participant input to lean workshops

SimLean Facilitate
Improves engagement with and impact of lean through dynamic process maps

SimLean Evaluate
Maintains the impact of lean over the longer term and possibly its sustainability

References

Brailsford, S.C., Harper, P.R., Patel, B. and Pitt, M. (2009a). An Analysis of the Academic Literature on Simulation and Modelling in Health Care. *Journal of Simulation*, 3 (3), pp. 130-140.

Radnor, Z.J., Davies, R. and Burgess, N. (2009). How much Lean are English Hospitals Implementing? *National Health Executive*, pp. 60-62.

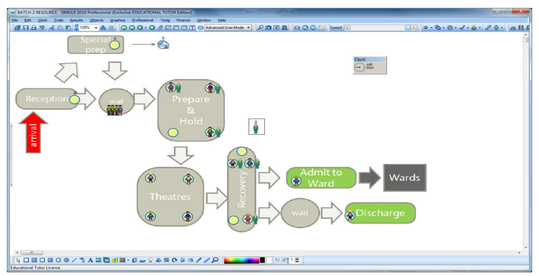

Figure 2 SimLean Educate Model: Theatres Process

SimLean Educate in Action

In August 2010 a one day workshop was held to look at patient flow through theatres. The hospital requested the use of SimLean Educate (figure 2) to consider the impact of the following upon patient flow:

- Batched arrivals vs. spreading patient arrivals across the day
- Prioritising patients
- Sharing resources vs. dedicated resources

The ideal of 'one-patient flow' was discussed but many of the participants felt that this was unrealistic. Despite this, as a result of the use of SimLean Educate, a move towards a 'staggered' approach to patient arrivals was seen as a positive step in improving patient flow.

SimLean Facilitate in Action

Figures 3 and 4 show an example of a process map created to imitate the flow of patients and resources (nurses and doctors) through a paediatric assessment unit. In this example, participants were struck by the complexity of patient flow and resource flow. One of the potential improvements they were considering was to 'protect a bed' for a particular kind of patient. In this example the nurses felt that to protect a bed would cause chaos in the unit and starve it of resources. As a 'rapid-experiment' the modeler was able to imitate the impact of 'protecting a bed' and showed that it wouldn't create the chaos the nurses had expected. Based on this evidence, it was agreed to trial the 'protect a bed' solution on the ward for a three week period. The model had given them a consensus of confidence to facilitate testing the idea in the paediatric assessment unit.

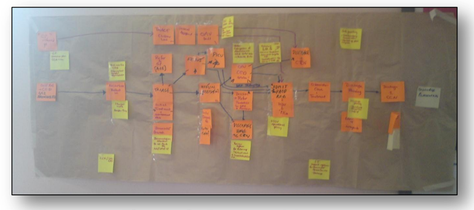

Figure 3 Process Map

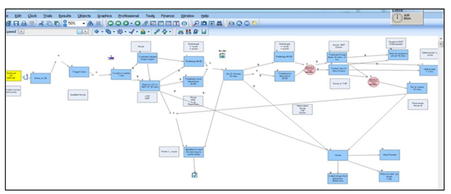

Figure 4 SimLean Facilitate Model of Process Map