Performance measurement is a fundamental concept in process management that is critical for organizations to identify and maintain competitive advantage through superior processes.

1. Organisational Measurement to Supply Chain Measurement

Various measurement and benchmarking techniques and methodologies such as Balanced Score-card, EVA model and ISO certification have emerged over the last decade to help managements assess their capabilities and shortcomings, and accordingly develop their strategies to enhance their competitive positions. Most of these initiatives have focused on developing performance measurement and control systems for organizational-level processes and have been very successful in process improvement in many companies.

However, technological advances have brought to the fore new opportunities for inter-organizational collaboration and greater efficiency in supply chains. Unfortunately, there are no techniques or methodologies to aid in the systematic measurement and benchmarking of these inter-organizational supply chain processes. To address this issue, we wish to develop and define techniques and methodologies for measurement of supply chain performances, which will be able to guide organizations in their quest for improvement in today's highly connected supply chain networks.

2. A methodology to measure Supply Chain Capability

The organizational-centric methodologies for performance evaluation are inadequate to capture the complex and dynamic nature of interactions between supply chain partners, because they focus solely on the internal processes of organisations.

The trick then to measuring the performance of entire supply chains is to extend these techniques to

1) Define a methodology for measuring inter-organizational or B2B processes.
2) Define a methodology for measuring the performance of a supply chain by encapsulating the capability of the constituent organisations of the chain and the

\[
\text{Overall capability of this business relationship} = \text{Capability of A} + \text{Capability of B} + \text{Capability of B2B Process}
\]
capability of the processes between them.
Even though, the capability of a business relationship may be defined as explained above, it will happen that the capabilities measured from one end will differ from that measured at the other, due to the differing characteristics and impacts of the B2B processes in either of the directions. Hence, the measurement of the capability will always be subjective to the choice of the location at which the performance is being measured. It is also to be mentioned that the exact techniques for the capability measurement of individual businesses and B2B processes will be similar to those currently prevalent.

Furthermore, within any given supply chain at any given point three capabilities can be measured - the capabilities of the in-bound processes, the capabilities of the organization it-self and finally the capabilities of the out-bound processes.

The capabilities of the in-bound processes can be evaluated from the capabilities of all the supply chain participants upstream and the capabilities of the B2B upstream processes between them. The capability of the supply chain participant can be evaluated using techniques similar to those that are commonly practiced now. As regards the capabilities of the out-bound processes they can be determined from the capabilities of the supply chain partners downstream and their B2B processes running downstream.

This concept can be further extended such that at the customer end, all supply chain processes can be deemed to be in-bound processes and the capability of the entire supply chain can be determined from the capability of the in-bound processes at the customer end.

3. **Levels of Maturity**

Having characterized the capabilities of a given supply chain using the methodology given above, it would be helpful to classify them into certain levels of maturity, as such a classification can aid in identifying areas or processes for improvement relevant to the particular level of maturity. Hence, such a classification would aid companies in identifying a road map in their evolution up the maturity ladder. One of the commonly used models in Software development is the Capability Maturity Model from Carnegie
Mellon University. We propose to adapt such a model for our use in the classification and characterization of organizational and B2B processes in a supply chain. Various factors will be considered during the classification of the supply chain processes. Some of the important issues to be considered are:

1) Effectiveness and Efficiency of Processes as measured from performance metrics such as number of defect-less deliveries, ROC etc.
2) Organisation Structure and the responsiveness of the organization.
3) Human Resource Capabilities and the fit between the people manning the processes.
4) Learning and Strategy Development Capabilities and the ability to transform.

Based on the above analysis the supply chain and B2B processes can be characterized into any one of the 5 capability levels described here.

<table>
<thead>
<tr>
<th>Level 5: World Class</th>
<th>Recognized as best of breed, flexible, nurtures core competencies and has learning capability.</th>
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<tbody>
<tr>
<td>Level 4: Best-in-Class</td>
<td>All processes are effective, efficient, benchmarked, and defect-free.</td>
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<tr>
<td>Level 3: Effective and Efficient</td>
<td>Well-defined, cost-effective processes that accomplish end user satisfaction efficiently.</td>
</tr>
<tr>
<td>Level 2: Effective</td>
<td>Processes are well defined and customer requirements are met, but may not be met efficiently.</td>
</tr>
<tr>
<td>Level 1: Chaotic</td>
<td>Processes are not well defined and not well managed. Run by traditions and experiences; no consistency or repeatability.</td>
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4. Application to a typical scenario

Consider a typical business network given below, where all the partners collaborate on delivering value to the customer. The capability levels of the various providers and the B2B processes can be individually determined as shown below.
Subsequently, such a Supply-chain capability map can be used to
1) Determine weak links in the supply chain that need to be improved and simultaneously identify the steps to be taken to strengthen the links.
2) Determine the overall capability level offered to the customer by a supply network.
3) Determine how to configure the supply-chain to achieve a higher level of competence.

5. Summary

This document presents a conceptual framework to define a capability maturity model for a supply chain network. The two equally important aspects of such an undertaking are the characterization of individual organisations and inter-organizational B2B processes and the encapsulation of this characterization into the capabilities for a group of organisations working together. Some of the issues that need to be considered in the characterization include the organization structure, the human resource and learning capabilities of the organisations in the supply chain network.

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