Identifying and constructing leading indicators for monitoring and controlling performance of engineering projects

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Identifying and constructing leading indicators for monitoring and controlling performance of engineering projects

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**PMSs (Performance measurement systems)**

**PMSs classical models:**
- Performance Measurement Matrix (1989);
- Performance Pyramid System (1991);
- Balanced Scorecard (1992, 1996);
- Integrated Performance Measurement System (1997);

**Gap analysis:**
1) Balanced scorecard has been used across the world, whereas many other frameworks have tended only to have regional appeal;
2) The practices in industries are not following the rapid academic rhythm.

**Capabilities of Support softwares**
- Multi-perspectives; Connected to Multiple data sources;
- Balanced; integrated; strategy-relevant; stakeholders focus;
- Dynamic (PPMS; SCPMM; OM-PMSs; PMSs for SMEs);
- High fitting rates (≥ 60%)
- Low fitting rates (<60%)

**SEM (Systems engineering measurement)**

**Characteristics:**
- Providing **visibility** into expected project performance and potential future states;
- Providing **predicative analysis** based on trend information or significant correlation.

**18 SE Leading indicators**

<table>
<thead>
<tr>
<th>Requirements Trends</th>
<th>Risk treatment trends</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Definition Change Backlog Trend</td>
<td>Systems engineering staffing and skills trends</td>
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<tr>
<td>Interface Trends</td>
<td>Process compliance trends</td>
</tr>
<tr>
<td>Requirements Validation Trends</td>
<td>Technical Measurement Trends</td>
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<td>Requirements Verification Trends</td>
<td>Facility and equipment availability trends</td>
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<td>Work Product Approval Trends</td>
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<tr>
<td>Review Action Closure Trends</td>
<td>System affordability trends</td>
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<tr>
<td>Technology Maturity Trends</td>
<td>Architecture trends</td>
</tr>
<tr>
<td>Risk Exposure Trends</td>
<td>Schedule and cost pressure</td>
</tr>
</tbody>
</table>

**Model input**

**Indicators input**

**Improving Project Performance Measurement**

**10 Knowledge areas (PMBoK)**

Relationship between lagging and leading indicators

Lagging indicators are dominant in the PPM, but leading indicators are not yet well developed.

**Preliminary mapping result after reading through**

It can be concluded that it’s feasible to apply some measurement methods in Systems Engineering like SE leading indicators in the general project management.