Data-Driven Approaches to Identifying and Assessing Risk

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Agenda

- Development of data-driven key risk indicators (KRI$s$)
- Risk re-defined
- Ongoing quantitative assessment of:
  - Corporate risks
  - Risk categories and emerging risks
Why Data-Driven Indicators

- Risk assessment relies primarily on qualitative and subjective measures
- Corporate risk profile is time consuming to prepare and is typically only updated once a year
- Corporate risk profile does not allow you to examine organizational entity/activity impact on risk
- Corporate risk profile does not allow you to examine the different risk categories (e.g., financial, HR, operational, strategic, legal, technological, etc.)
Stakeholders

Audit
- Ongoing assessment of risks and controls
- Identification of specific audits; drilldown into risks; refine audit objectives
- Annual risk-based audit planning

Finance
- Financial monitoring and control testing
- Assessment of new opportunities
- Statement of assurance

Corporate Risk Officer
- Support for corporate risk profile
- Assessment of risk mitigation efforts
- Ongoing assessment of current and emerging risks
Benefits of Ongoing Risk Assessment

- Auditors can be more proactive in assessing corporate risks and emerging areas of risk.
- Predictive business performance measures will help drive productivity by 20% by 2017.
- Managers that persist in using historical measures miss the opportunity to capitalize on opportunities that would increase profit or fail to intervene to prevent an unforeseen event, resulting in a decrease in profit.
- ERM is more reliable and effective when ERM frameworks are shown to produce credible and useful risk-adjusted performance measures on an ongoing basis.
Data-driven Key Risk Indicators

Ideally the indicators:

- Quantitative (data-driven)
- By-product of operational systems (e.g., financial, HR systems)
- React to changes in risk levels
- Support the assessment risk at any organizational level
- Support annual and ongoing risk assessment process
- Easy to update (monthly/quarterly)
Quantitative Risk Indicators

Subjective/qualitative assessment

Risk -> Probability and Impact

Quantitative/data-driven assessment

Risk -> Variability, Complexity and Volume
Ongoing Assessment of Risks

**Objective:** the development and assessment of data-driven key risk indicators for ongoing assessments:

- **For each corporate risk:**
  - Assessment of *each organizational entity* to determine impact on corporate risk and to develop an overall risk ranking (Low, Medium, High).

- **For each risk category:**
  - Assessment of *each organizational entity* to determine impact on each risk category and to develop an overall risk ranking (Low, Medium, High).
Steps:

1. Ensure that your Audit Universe is aligned to Strategic Initiatives that are tied to Corporate Objectives
2. Develop KRIs for each corporate risk and for all corporate risk categories
3. Perform ongoing assessment of corporate risks and risk categories by audit entity or any slice of the organization
4. Select activities/entities to audit which have highest corporate or risk category ratings.
Quantitative Key Risk Indicators

Corporate Risks - example:

1. Risk the management or loss of Intellectual Property will damage ability to drive future revenue

2. Risk ......

X. Risk ......
## Developing Data-Driven Risk Indicators for Corporate Risk – Intellectual Property

<table>
<thead>
<tr>
<th>Risk Sub-category</th>
<th>Risk Result / Impact</th>
<th>Risk Indicator</th>
</tr>
</thead>
</table>
| **R&D** – failure to manage research and development projects. | • Project failure  
• Escalation in costs  
• Project delays | • Success rate  
• Expenditures / budget  
• Project status / Plan |
| **Safeguarding of IP** - failure to implement safeguards to prevent theft of IP by employees. | • Loss of IP  
• ? | • Percentage turnover  
• Number of grievances  
• Percentage use of outside / non fulltime employee  
• Geographic location of facilities |
| **IT Controls** – failure to implement IT controls to protect IP. | • Loss of data  
• System unavailable or unreliable  
• Control weaknesses | • Email attachments  
• # of unauthorized access attempts  
• System availability / downtime |
Overall Corporate Risk Rating

Combined assessment of risk across all corporate risks for each organizational entity.

<table>
<thead>
<tr>
<th>Org Entity</th>
<th>Corp Risk 1</th>
<th>Corp Risk 2</th>
<th>......</th>
<th>Corp Risk n</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity 1</td>
<td>3.5</td>
<td>3.7</td>
<td></td>
<td>2.3</td>
<td>Low</td>
</tr>
<tr>
<td>Entity 2</td>
<td>3.5</td>
<td>4.5</td>
<td></td>
<td>4.6</td>
<td>High</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entity X</td>
<td>4.8</td>
<td>2.8</td>
<td></td>
<td>4.4</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Risk Categories - Example

- External environment
- Legal and regulatory
- Strategy
- Governance
- Operational

- Information
- Human resources
- Technology
- Financial and administrative
## Developing Data-Driven Risk Indicators for HR Risk Category

<table>
<thead>
<tr>
<th>Risk Sub-category</th>
<th>Risk Result / Impact</th>
<th>Risk Indicator</th>
</tr>
</thead>
</table>
| **Recruiting** – failure to attract people with the right competencies. | • Lack of resources  
• Lack of skills  
• ? | • Vacancies  
• Acting appointments  
• ? |
| **Resource Allocation** – failure to allocate resources in an effective manner to support the achievement of goals and objectives. | • Inappropriate resources for tasks  
• ? | • Type of employee  
• Employee classifications  
• Status of employee  
• Unions |
| **Retention** – failure to retain people with the right competencies and match them to the right jobs. | • Demographics  
• Low experience levels  
• Turnover | • Years of pensionable service  
• Average age  
• Average years in position |
| **Work environment** – failure to treat people with value and respect. | • Unhappy workforce  
• High sick leave | • Average sick leave/vacations  
• Percentage departures  
• ? |
HR Risk Category Data-Driven Indicators

Volume / Size
- # of employees

Variability/Change
- Avg age; avg age of senior managers
- Avg years of pensionable service; % who can retire < 2 years
- Experience – years in dept / position / classification
- % Fulltime employees; % affected by org change
- % acting; % new hires
- Leave: total leave taken; avg sick; avg vacation; avg unpaid

Complexity
- # types of employee; # classifications; # locations; # unions
- % employee with non-std hours

Other
- % Sex (M/F); % FOL (Eng/Fr/Span)
## Objective:
To support the assessment of HR risk category for each audit entity.

<table>
<thead>
<tr>
<th>Audit Entity</th>
<th>Volume</th>
<th>Variability/Change</th>
<th>Complexity</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity 1</td>
<td>304</td>
<td>5 6 12% 1</td>
<td>12 4 28%</td>
<td>Medium</td>
</tr>
<tr>
<td>Entity 2</td>
<td>281</td>
<td>13 2 13% 2</td>
<td>16 6 32%</td>
<td>High</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entity X</td>
<td>463</td>
<td>28 6 21% 4</td>
<td>9 8 14%</td>
<td>Low</td>
</tr>
</tbody>
</table>
## Developing Data-Driven Risk Indicators for Finance Risk Category

<table>
<thead>
<tr>
<th>Risk Sub-category</th>
<th>Risk Results / Impact</th>
<th>Risk Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Failure to establish a proper financial framework</td>
<td>• Errors and corrections</td>
<td>• % JV and reversals</td>
</tr>
<tr>
<td></td>
<td>• Losses</td>
<td>• % Losses</td>
</tr>
<tr>
<td></td>
<td>• Suspense transactions</td>
<td>• % Suspense account</td>
</tr>
<tr>
<td>• Failure to establish budgeting and forecasting processes</td>
<td>• Over expenditures</td>
<td>• Actual &gt; Planned</td>
</tr>
<tr>
<td></td>
<td>• Late expenditure decisions</td>
<td>• % expenditures period 12+</td>
</tr>
<tr>
<td></td>
<td>• Poor commitment accounting</td>
<td>• % not referencing a commitment or PO</td>
</tr>
<tr>
<td></td>
<td>• ?</td>
<td></td>
</tr>
<tr>
<td>• Failure to manage financial structure</td>
<td>• Complex financial structure</td>
<td>• # of funds / fund centres</td>
</tr>
<tr>
<td></td>
<td>• Discretionary expenses</td>
<td>• Use of Internal orders / WBS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• # of currencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• % discretionary expenses</td>
</tr>
</tbody>
</table>
Finance Risk Category Data-Driven Indicators

Volume
  - Total Expenses, Revenue and Assets

Variability/Change
  - Percentage of discretionary spending
  - Percentage of expenditures in Period 12, 13+
  - Total and number of JVs / Suspense account transactions
  - Total and number of Reversal documents / Loss transactions

Complexity
  - Number of Funds / Fund centres / Cost centres
  - Number of Economic object categories / GLs
  - Number of Currencies / Document types
  - Use of Internal Orders / Purchase orders / Fund reservations
  - Use of Materiel and Asset numbers / Real estate blocks / WBS
  - Number of employees
  - Number of P-Cards
## Risk Factor Weighting

The following table shows the risk factor weighting for various metrics. By default, all risk factors are weighted equally. Enter the desired risk factor weight.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Expenses</td>
<td>Number of object categories</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>Number of funds</td>
</tr>
<tr>
<td>Total Assets</td>
<td>Number of Cost Centres</td>
</tr>
<tr>
<td>Number of Invoices</td>
<td>Number of GLs</td>
</tr>
<tr>
<td>Number of FRIs</td>
<td>Number of currencies</td>
</tr>
<tr>
<td>Number of acquisition cards</td>
<td>Number of document types</td>
</tr>
<tr>
<td></td>
<td>Number of Internal Orders</td>
</tr>
<tr>
<td></td>
<td>Number of POs and FRs</td>
</tr>
<tr>
<td></td>
<td>Number of material documents</td>
</tr>
<tr>
<td></td>
<td>Number of Assets</td>
</tr>
<tr>
<td></td>
<td>Number of real estate blocks</td>
</tr>
<tr>
<td></td>
<td>Number of WBS documents</td>
</tr>
<tr>
<td></td>
<td>Pct Overtime to Salary</td>
</tr>
<tr>
<td></td>
<td>Pct Invoice Date Errors</td>
</tr>
</tbody>
</table>

**Weights:**
- Total Expenses: 1.0
- Total Revenue: 1.0
- Total Assets: 1.0
- Number of Invoices: 0.7
- Number of FRIs: 1.0
- Number of acquisition cards: 1.0
- Pct discretionary spending: 1.0
- Pct period 12 or later: 1.3
- Number of JVs: 1.0
- Number of suspense rece: 1.0
- Number of loss rece: 1.0
- Number of reversal rece: 1.0
- Number of object categories: 1.0
- Number of funds: 1.0
- Number of Cost Centres: 1.3
- Number of GLs: 1.0
- Number of currencies: 1.0
- Number of document types: 1.0
- Number of Internal Orders: 1.0
- Number of POs and FRs: 1.0
- Number of material documents: 1.0
- Number of Assets: 1.0
- Number of real estate blocks: 1.0
- Number of WBS documents: 1.0
- Pct Overtime to Salary: 1.0
- Pct Invoice Date Errors: 1.2
# Financial Risk Category Rating

## Financial risk rating:
- Overall rating;
- By volume;
- By variability; and
- By complexity

Not only can you assess which entity has the highest overall risk, but you can also determine whether it is because of volume, variability or complexity.

<table>
<thead>
<tr>
<th>F_Area</th>
<th>Overall rating</th>
<th>Volume rating</th>
<th>Variability rating</th>
<th>Complexity rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>9112</td>
<td>2.10</td>
<td>0.89</td>
<td>0.31</td>
<td>0.90</td>
</tr>
<tr>
<td>9805</td>
<td>2.09</td>
<td>0.52</td>
<td>0.99</td>
<td>0.58</td>
</tr>
<tr>
<td>9999</td>
<td>1.73</td>
<td>1.00</td>
<td>0.21</td>
<td>0.52</td>
</tr>
<tr>
<td>9122</td>
<td>1.70</td>
<td>0.78</td>
<td>0.27</td>
<td>0.65</td>
</tr>
<tr>
<td>9668</td>
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<td>0.95</td>
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<td>0.45</td>
<td>0.48</td>
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<tr>
<td>9612</td>
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<td>0.20</td>
<td>0.29</td>
<td>1.60</td>
</tr>
<tr>
<td>9888</td>
<td>1.37</td>
<td>0.00</td>
<td>1.00</td>
<td>0.37</td>
</tr>
<tr>
<td>9212</td>
<td>1.29</td>
<td>0.57</td>
<td>0.22</td>
<td>0.50</td>
</tr>
<tr>
<td>9856</td>
<td>1.18</td>
<td>0.36</td>
<td>0.09</td>
<td>0.73</td>
</tr>
<tr>
<td>9422</td>
<td>1.07</td>
<td>0.28</td>
<td>0.26</td>
<td>0.53</td>
</tr>
<tr>
<td>9532</td>
<td>1.04</td>
<td>0.01</td>
<td>0.77</td>
<td>0.26</td>
</tr>
<tr>
<td>9321</td>
<td>0.98</td>
<td>0.02</td>
<td>0.75</td>
<td>0.21</td>
</tr>
<tr>
<td>9022</td>
<td>0.96</td>
<td>0.29</td>
<td>0.18</td>
<td>0.49</td>
</tr>
<tr>
<td>9511</td>
<td>0.94</td>
<td>0.00</td>
<td>0.78</td>
<td>0.16</td>
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<tr>
<td>9000</td>
<td>0.87</td>
<td>0.49</td>
<td>0.03</td>
<td>0.35</td>
</tr>
<tr>
<td>9421</td>
<td>0.87</td>
<td>0.02</td>
<td>0.69</td>
<td>0.16</td>
</tr>
<tr>
<td>9111</td>
<td>0.84</td>
<td>0.15</td>
<td>0.33</td>
<td>0.36</td>
</tr>
<tr>
<td>9531</td>
<td>0.84</td>
<td>0.01</td>
<td>0.63</td>
<td>0.20</td>
</tr>
<tr>
<td>9522</td>
<td>0.80</td>
<td>0.12</td>
<td>0.19</td>
<td>0.49</td>
</tr>
<tr>
<td>9859</td>
<td>0.80</td>
<td>0.09</td>
<td>0.11</td>
<td>0.60</td>
</tr>
<tr>
<td>9713</td>
<td>0.79</td>
<td>0.00</td>
<td>0.67</td>
<td>0.12</td>
</tr>
<tr>
<td>9012</td>
<td>0.70</td>
<td>0.07</td>
<td>0.19</td>
<td>0.52</td>
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<tr>
<td>9512</td>
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<td>0.17</td>
<td>0.45</td>
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<tr>
<td>9412</td>
<td>0.75</td>
<td>0.15</td>
<td>0.15</td>
<td>0.45</td>
</tr>
<tr>
<td>9835</td>
<td>0.73</td>
<td>0.04</td>
<td>0.13</td>
<td>0.56</td>
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<tr>
<td>9611</td>
<td>0.71</td>
<td>0.13</td>
<td>0.09</td>
<td>0.49</td>
</tr>
<tr>
<td>9865</td>
<td>0.66</td>
<td>0.09</td>
<td>0.37</td>
<td>0.20</td>
</tr>
<tr>
<td>9886</td>
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<td>0.01</td>
<td>0.39</td>
<td>0.14</td>
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<tr>
<td>9334</td>
<td>0.52</td>
<td>0.04</td>
<td>0.41</td>
<td>0.23</td>
</tr>
</tbody>
</table>
Combined assessment of risk across all risk categories for each organizational entity.

<table>
<thead>
<tr>
<th>Org Entity</th>
<th>Financial</th>
<th>HR</th>
<th>......</th>
<th>Operational</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity 1</td>
<td>3.2</td>
<td>3.2</td>
<td></td>
<td>4.3</td>
<td>Low</td>
</tr>
<tr>
<td>Entity 2</td>
<td>6.5</td>
<td>5.5</td>
<td></td>
<td>3.6</td>
<td>High</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entity X</td>
<td>4.3</td>
<td>1.8</td>
<td></td>
<td>4.4</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Overall Corporate Risk Rating

![Overall Corporate Risk Rating Diagram]

- Corp Risk 1
- Corp Risk 2
- Corp Risk 3
- Corp Risk 4
Corporate Risk 2 – Rating by Indicator
Entities A - K
Overall Risk - by Entity by Risk Category
HR Risk Rating – by Region by Indicator

Volume
Variability
Complexity
HR Risk Rating - Complexity by Entity

[Spider chart with various metrics indicated by different colors and labels: Num_EmpTypeR, Num_ClassR, Num_RegionR, Num_UnionR, Pct_NoStdWWR.]
Steps:

- Extract detailed transactions
- Prompt for entity – slice or organization
- SUMM on %v_entity% Subtotal Amount – totals for each entity
- Relate %v_entity% indicator summaries – combine indicator factors
- Normalize (0-1) each indicator factor – STAT (Max and Min)
- Multiply by weighting factor
- Indicator – add normalized indicator factors (e.g., %OT, %P12+)
- Overall – add normalized indicator ratings (e.g., Fin + HR + ....)
Conclusions

Data-driven risk indicators:

- Use operational system information
- Quantitative (data-driven) and can easily be updated (e.g., monthly/quarterly)
- Provide relative risk ranking for each org entity
- Support the risk identification and assessment process
- Support ongoing assessment of risk management and mitigation activities
- Support the ongoing update of the risk profile
- Support the ongoing assessment of risks for new initiatives
THANK YOU

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