Transforming an Audit into a KPI Tool to Promote Continuous Process and Project Improvements

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About Khatib & Alami and Myself

Early adoption of advanced technologies is part of K&A’s DNA

ENR: Khatib & Alami (K&A) is among the top 50 international design firms and the top 10 in the Middle East

Today, K&A is one of the leading GIS services and utility solutions providers in the Middle East, Gulf and North Africa

K&A was the first Esri Platinum Partner in the MENA region

“Hi!”

Senior Business Planning and Performance Analyst
- Business Operations Unit in the Geospatial Systems Integration (GSI) Department

MBA graduate with 10+ years of international experience in Business Planning, Strategic Management, Process Management & Improvement, and Marketing & Advertising.

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The Quality Assurance Process covers process and product audits at the project and organizational level.

The objectives of the Internal Process audit are to:

- Establish Compliance to the defined processes
- Determine ways to improve effectiveness of the deployed processes

The feedback given by the auditing process provides a self-correcting mechanism to improve the G-QMS.
Now we will walk you through it!

**START**

- Head QAG prepares the QA Plan for the EPG Plan
- Head QAG prepares the Audit Schedule
- Head QAG prepares the Audit Team
- Auditor prepares the relevant audit checklists

**Process Audits**

- Head QAG conducts the opening meeting
- Auditor conducts the audit
- Auditor submits NCR to auditee
- Auditee corrects the Non-Conformities
- Auditor conducts the Follow-up Audit

**Audit KPI Tool**

- Head QAG updates the NCR Log
- Head QAG calculates the Audit KPI results
- Head QAG conducts the closing meeting

**Conclusion**

- NCR Log
- Audit KPI Tool
- END

**Key**

<table>
<thead>
<tr>
<th>EPG</th>
<th>Engineering Process Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>NCR</td>
<td>Non-Compliance Report</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>QAG</td>
<td>Quality Assurance Group</td>
</tr>
</tbody>
</table>
The day the Audit KPI Tool was brought to life

**Purpose**

- Conceived and implemented in Q2-2016 (upgraded in Q4-2017)
- To reduce the high average of NCs per process audit
- Encourage proactive measures to improve and maintain our QMS

**Objectives**

**Impact on the Clientele** – Increase client satisfaction

**Impact on Quality** – Reduce the number of all types of defects

**Impact on Performance** – Improve a project team’s teamwork

**Impact on Productivity** – Link a team member’s metrics with their project’s metrics

**Impact on the Bottom Line** – Expand a project’s profit margin
### Evaluation Criteria

<table>
<thead>
<tr>
<th>Audit Ref.</th>
<th>Project</th>
<th>Audit Scope</th>
<th>Project Manager</th>
<th>Maj. NCs</th>
<th>Min. NCs</th>
<th>Resolved NCs</th>
<th>% Resolved</th>
<th>Pending NCs</th>
<th>Critical PMGT NCs closed?</th>
<th>Current Audit Closed on Time?</th>
<th>Previous Audit Closed on Time?</th>
<th># of PIs</th>
<th># of Positive Observations</th>
<th>Evaluation Ratio</th>
<th>KPI Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019-Q1</td>
<td>Project A</td>
<td>G-QMS</td>
<td>PM 1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>25%</td>
<td>2</td>
<td>No</td>
<td>No</td>
<td>6</td>
<td>0</td>
<td></td>
<td>1.31</td>
<td>Fail</td>
</tr>
<tr>
<td>2019-Q1</td>
<td>Project B</td>
<td>Start-up</td>
<td>PM 2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>100%</td>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td></td>
<td>3.00</td>
<td>Pass</td>
</tr>
<tr>
<td>2019-Q1</td>
<td>Project C</td>
<td>Requirements</td>
<td>PM 3</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>75%</td>
<td>4</td>
<td>No</td>
<td>No</td>
<td>0</td>
<td>0</td>
<td></td>
<td>1.04</td>
<td>Fail</td>
</tr>
<tr>
<td>2019-Q1</td>
<td>Project D</td>
<td>Application</td>
<td>PM 4</td>
<td>5</td>
<td>13</td>
<td>9</td>
<td>50%</td>
<td>0</td>
<td>Yes</td>
<td>No</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1.22</td>
<td>Pass</td>
</tr>
<tr>
<td>2019-Q1</td>
<td>Project E</td>
<td>Project Closure</td>
<td>PM 5</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>43%</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>4</td>
<td>0</td>
<td></td>
<td>1.36</td>
<td>Fail</td>
</tr>
<tr>
<td>2019-Q1</td>
<td>Project F</td>
<td>Configuration</td>
<td>PM 6</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>73%</td>
<td>15</td>
<td>Yes</td>
<td>No</td>
<td>2</td>
<td>1</td>
<td></td>
<td>0.71</td>
<td>Fail</td>
</tr>
</tbody>
</table>

**Evaluation Ratio** = \[rac{\text{Organizational Standard} + 2 + 5 + 2 \times \text{Number of PIs} + 2 \times \text{Number of Positive Observations}}{\left(\text{Total Major NCs} + \frac{\text{Total Minor NCs}}{2} + 2 \times \text{Open NCs from current audit} + 2 \times \text{Open NCs from previous audit}\right)}\]

**Passing Criteria**
- At least 50% of current NCs have been resolved
- No unresolved NCs related to critical PMGT items
- Evaluation Ratio ≥ 1.00

### Key
- **G-QMS**: GSI – Quality Management System
- **KPI**: Key Performance Indicator
- **NC**: Non-Compliance
- **PI**: Process Improvement
- **PM**: Project Manager
- **PMGT**: Project Management

**For G-QMS Audits**: Organizational Standard = 5
**For Start-up Audits**: Organizational Standard = 10
**For all other Audits**: Organizational Standard = 25

**Knowing how to use the Audit KPI Tool**

1. **Evaluation Ratio**
2. **Passing Criteria**
3. **Knowledge**
4. **Impact**
5. **Conclusion**

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**Evaluation**

- Project A: G-QMS
- Project B: Start-up
- Project C: Requirements
- Project D: Application
- Project E: Project Closure
- Project F: Configuration

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**Evaluation**

- Project A: G-QMS
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- Project D: Application
- Project E: Project Closure
- Project F: Configuration
The Impact – First a Situational Analysis

- Total of 61 projects underwent process audits from 2015-Q2 to 2018-Q4
- 14 projects were selected for the Situational Analysis and split into the following:

Pre-Audit KPI Tool
- Six projects satisfied the following criteria:
  1. Life-cycle must be Full-Development
  2. Must have done at least 50% of the audits between 2015-Q2 and 2016-Q1
  3. Must have done at least 25% of the audits between 2016-Q2 and 2018-Q4
  4. Must have implemented the Waterfall Methodology

Post-Audit KPI Tool
- Eight projects satisfied the following criteria:
  1. Life-cycle must be Full-Development
  2. Must have done at least 50% of the audits between 2016-Q2 and 2018-Q4
  3. Must have implemented the Waterfall Methodology
The Impact on Non-Compliances and Profitability

Average Number of NCs per Project per Quarter

<table>
<thead>
<tr>
<th></th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-Q2</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>2015-Q3</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>2015-Q4</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>2016-Q1</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>2016-Q2</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>2016-Q3</td>
<td>17</td>
<td>15</td>
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<tr>
<td>2016-Q4</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2017-Q1</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>2017-Q2</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2017-Q3</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>2017-Q4</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>2018-Q1</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2018-Q2</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>2018-Q3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018-Q4</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Impacted KPIs

<table>
<thead>
<tr>
<th>KPI</th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. number of NCs per project per quarter</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>% of audits that resolved their NCs on time</td>
<td>6%</td>
<td>28%</td>
</tr>
</tbody>
</table>
The Impact on Non-Compliances and Profitability

- 64% of the projects made a profit with an average of 11 NCs per project per quarter
- 36% of the projects made a loss with an average of 27 NCs per project per quarter
- Projects A and E incurred a loss while projects B, C, D, and F made a profit
- Projects G, H, K, M, and N made a profit and projects I, J, and L

<table>
<thead>
<tr>
<th>Project</th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project A</td>
<td>32</td>
<td>21</td>
</tr>
<tr>
<td>Project B</td>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>Project C</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Project D</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Project E</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Project F</td>
<td>7</td>
<td>*</td>
</tr>
<tr>
<td>Project G</td>
<td>7</td>
<td>*</td>
</tr>
<tr>
<td>Project H</td>
<td>6</td>
<td>*</td>
</tr>
<tr>
<td>Project I</td>
<td>34</td>
<td>*</td>
</tr>
<tr>
<td>Project J</td>
<td>28</td>
<td>*</td>
</tr>
<tr>
<td>Project K</td>
<td>11</td>
<td>*</td>
</tr>
<tr>
<td>Project L</td>
<td>18</td>
<td>*</td>
</tr>
<tr>
<td>Project M</td>
<td>10</td>
<td>*</td>
</tr>
<tr>
<td>Project N</td>
<td>12</td>
<td>*</td>
</tr>
</tbody>
</table>

* = Ongoing Project

<table>
<thead>
<tr>
<th>Impacted KPIs</th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Projects that made a Profit</td>
<td>50%</td>
<td>66%</td>
</tr>
</tbody>
</table>
An increase in Process Improvements

**Impacted KPIs**

<table>
<thead>
<tr>
<th>Avg. number of valid PIs per quarter</th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**THE IMPACT**

**SELECTED PROJECTS**

- **2015-Q2**
- **2015-Q3**
- **2015-Q4**
- **2016-Q1**
- **2016-Q2**
- **2016-Q3**
- **2016-Q4**
- **2017-Q1**
- **2017-Q2**
- **2017-Q3**
- **2017-Q4**
- **2018-Q1**
- **2018-Q2**
- **2018-Q3**
- **2018-Q4**

**CONCLUSION**

- Process Improvements
Increase in the passing rate and reducing bugs

<table>
<thead>
<tr>
<th>Impacted KPIs</th>
<th>Pre-Audit KPI Tool</th>
<th>Post-Audit KPI Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPI Status: Avg. % of audits that passed</td>
<td>22%</td>
<td>55%</td>
</tr>
<tr>
<td>Avg. number of bugs per project</td>
<td>68</td>
<td>26</td>
</tr>
<tr>
<td>Impacted KPIs</td>
<td>Pre-Audit KPI Tool</td>
<td>Post-Audit KPI Tool</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Average number of NCs per project per quarter</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Percentage of audits with on-time fully resolved NCs</td>
<td>6%</td>
<td>28%</td>
</tr>
<tr>
<td>Percentage of Projects that made a Profit</td>
<td>50%</td>
<td>66%</td>
</tr>
<tr>
<td>Average number of valid PIs per quarter</td>
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<td>1</td>
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</tr>
</tbody>
</table>

Conclusion – Bringing it all together
Conclusion – Lessons Learned and Beyond...

**What went wrong:**
- Resistance to Change and new staff need time to adjust to our QMS
- Lack of Automation
- Data integrity

**What went right:**
- Results from the Audit KPI Tool are factored in an employee’s annual evaluation
- The Audit KPI Tool became a gateway to push for CMMI Level 4 and Level 5
- Sense of ownership within project teams have increased

**Future Developments:**
- Automate the Auditing Process and the Audit KPI Tool
- Develop a Generic KPI Dashboard to include Audit Results:
  - Submitting deliverables on time e.g. actual v/s planned time
  - Reducing rework in order to reduce cost
  - Increase rate of first-time approval from clients
Congratulations...

...you made it through the presentation!