Issue 4.1.2: Providing Integration of Condition Indicators for Road Assets as a Whole

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Acknowledgement

The hard working members of Technical Committee 4.1
"Management of Road Infrastructure Assets"

Why Do We Have Indicators ?

- **The objective of defining indicators is to measure the achievement of the alignment between organisational activities and pre-defined objectives and goals,**
- **Typical Goals – Accessibility, Safety, Environment, etc**

Goals and demands stipulated by the principal (Government)

| Activities | Changes | Outcomes | Follow up | Evaluation |

Key performance Indicators (KPI)

- **Following Stakeholders Identified:**
  - ➜ The **OWNER** of the road assets in terms of primary responsibility for the road infrastructure i.e. MOT;
  - ➜ The **MANAGER** of the road assets in terms of managing the road network i.e. Road Agency;
  - ➜ The **OPERATOR** in terms of the condition and configuration of the network i.e. Concessionaire;
  - ➜ The **USER** in terms of the levels of service such as comfort, safety, travel time, etc
  - ➜ The **COMMUNITY** which include residents living near roads whose living environment may be adversely affected by noise, air quality and congested accesses.

Previous PIARC Work

- **Numerous Technical Indicators Identified**
  - ➔ Very Technical in nature;
  - ➔ Require specialised equipment for measurement that is not generally available throughout the world, and
  - ➔ Not generally understandable to road user or community.

- **Need identified to define a hierarchy for performance indicators relating detailed technical indicators used by Engineers on the one end of the scale to a simple indicator understood by the user or community at the other end.**
  - ➔ Information Quality Levels (IQL)

# Information Quality Levels (IQL) in Asset Management

- **5 Levels Identified:**

  ➔ **IQL-1**: Represents a level of detail typical in many engineering research, laboratory and detailed project level data collection where many attributes may be measured or identified i.e. Roughness using ASTM Class 1 Profiler;

  ➔ **IQL-2**: Represents a level of detail typical of many engineering analyses for a project-level decision with less attributes being measured i.e. Roughness using ASTM Class 2 Profiler;

  ➔ **IQL-3**: A simple level of detail (simpler than IQL 1 or IQL 2), typically two or three attributes, which might be used for large tasks such as network-level surveys or where simpler data collection methods are appropriate i.e. Roughness using Bump Integrator;
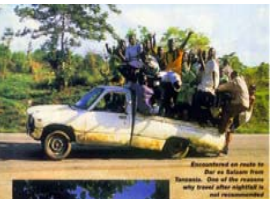
  ➔ **IQL-4**: A summary or key attribute which has use in planning, senior management reports, or alternatively in low effort data collection i.e. Roughness using Panel Rating, and

  ➔ **IQL-5**: Represents a top level such as key performance indicators, which typically might combine key attributes from several pieces of information. Still higher levels can be defined when necessary.

Information Quality/Stakeholder Concept
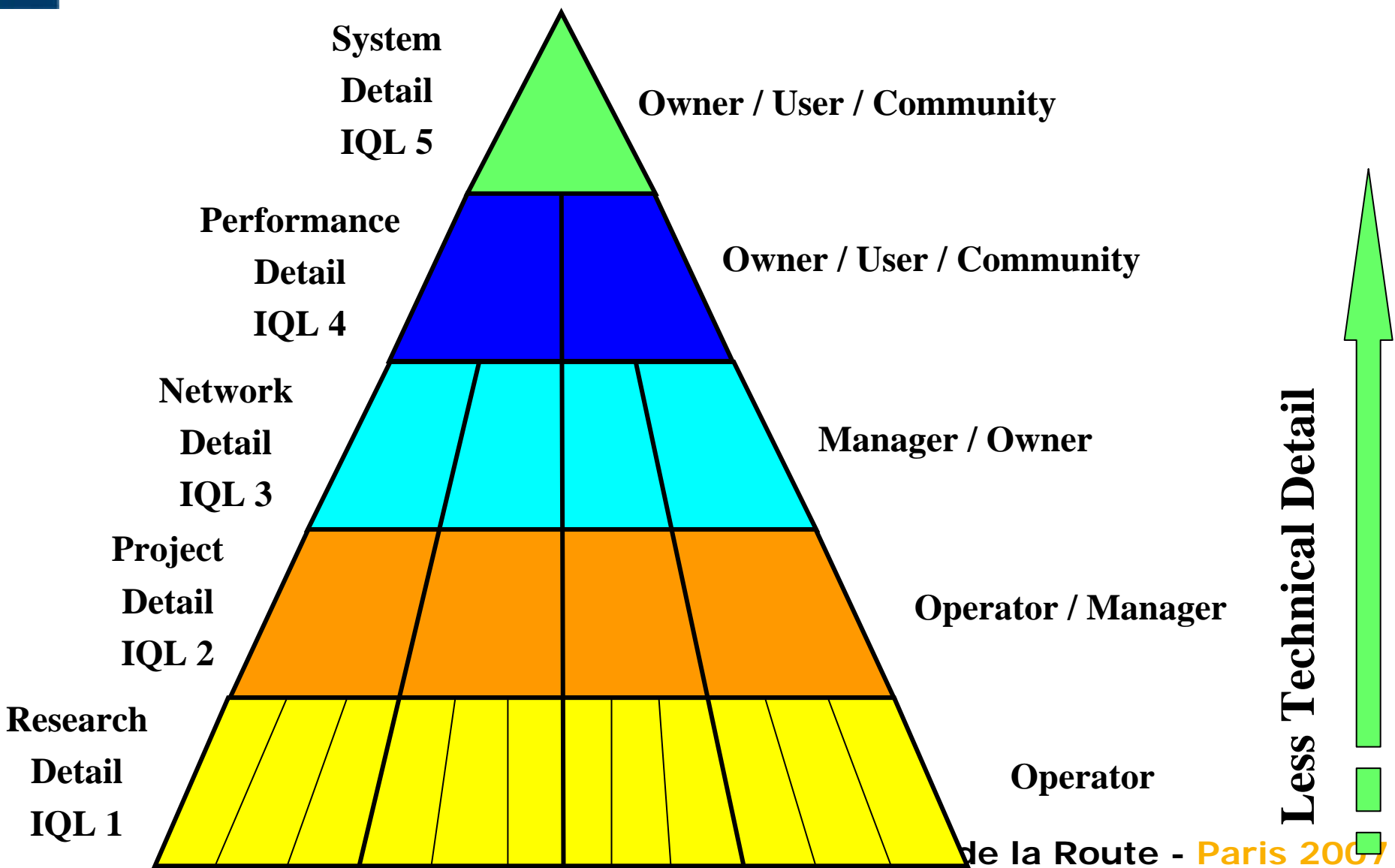
Drawer Concept

- **Large number of Indicators that need to be managed at different IQL levels**
- **Drawer Concept:**
  - ➔ Define the logical relationship between the possible myriad of non-technical performance indicators.
  - ➔ Allows users to organise indicators in a customised manner according to their specific needs.
- **Identified Example Drawers:**
  - ➔ Environment,
  - ➔ Financial,
  - ➔ Human Resources,
  - ➔ Information,
  - ➔ Travel Time,
  - ➔ Safety,
  - ➔ Sustainability,
  - ➔ Social, and
  - ➔ "Technical".

Relationship between Stakeholders, Drawers and Performance Indicators

DRAWER / Stakeholder	Environment		
	Noise	**Air Quality**	**Landscape**
Owner / User /Community	-Community satisfaction with Noise	-Community satisfaction with Air quality	-Community satisfaction with Landscape
Manager	-Achievement rate of required levels	-Achievement rate of required levels	-Visual Impact -Visual comfort when driving
Operator	-Noise level of road -Noise level during road works	-Air quality -Air quality by location	-Landscape -Grass cutting -Litter

Relationship between Stakeholders, Drawers and Performance Indicators

DRAWER / Stakeholder	Financial	Human Resources	Information
Owner / User /Community	-Community satisfaction with Road Condition	-Demography of technical functions -Efficiency of HR	-Community satisfaction with Information
Manager	-Maintenance Effectiveness -Backlog	-Turnover/ Job satisfaction -Recruitment -Ratio Outsourcing/Non outsourcing -Staff/length network	-Reliability -Relevancy
Operator	-Cost/km -C/B Ratio -IRR	-Education & Training -Documented Knowledge	-Reaction Time

Relationship between Stakeholders, Drawers and Performance Indicators

DRAWER / Stakeholder	Travel Quality	Safety
Owner / User /Community	-Information on planned measures (pre-trip and on-trip) -Average speed (also consistency of speed) -Reliability of expected speed	-Number of fatalities in traffic accidents differentiated over different categories of road users -Number of fatalities in traffic accidents differentiated over measures taken
Manager	-Road works (also concerning deviations) -Congestion (statistics) -Necessary traffic control measures (alternative routing)	-Accident rates -Number of fatalities in traffic accidents differentiated over different categories of road users -Number of fatalities in traffic accidents differentiated over measures taken
Operator	-Surface conditions (road status) -Road weather conditions (ice or snow, flooding) -Road works -Number of physical obstructions -Unexpected speed limits	-Speed limits -Traffic intensity -Road type -Geometry of the road -Pavement condition (Technical indicators)

Relationship between Stakeholders, Drawers and Performance Indicators

DRAWER / Stakeholder	Social		Sustainability
	Mobility	**Aesthetics and Historical Heritage**	**Sustainability**
Owner / User /Community	-Community Satisfaction for Mobility	-Community Satisfaction for Aesthetics and Historical Heritage	-Economic -Social -Environmental -Safety
Manager	-Accessibility to Necessary Functions -Accessibility from Origin to Destination -Structural Soundness -Risk Assessment -Usage of Public Transport	-Evaluation of Aesthetics and Historical Heritage (Network)	-Use or resources -Energy Balance -Recycling -Operability (ease of movement for traffic and pedestrians)
Operator	-Bottle Neck of Traffic Intervention -Health Index of Structure -Closure caused by Natural Hazard -Connection to Public Transport -Traffic Control	-Evaluation of Aesthetics and Historical Heritage (Road Section)	-Energy consumption -Recycling

DRAWER TEMPLATE

Name of the Indicator:	IQL Level: 1-5
Name of the Drawer:	

What to measure
What do we intend to measure with this indicator?   What is the purpose of the indicator?   By measuring this indicator what aspect of road management do we intend to manage?
How to measure
No formulas as such.   What are important components of the indicator?   Describe in detail the possible measurement method.
Qualifications
This item can be used to describe any specific topic on the indicator.   If Owner/Resident/User level is concerned we should give some explanation.   Accuracy is also to be considered.   Give an appreciation of the degree of importance of the concerned indicator with regard to a global approach.
Recommendations for use
What is the frequency for measurement?   How easily can the indicator be used?   The aspect of Developing Countries and Countries in Economic Transition is to be treated here.

DRAWER – EXAMPLE

Name of the indicator: Turnover	IQL Level: 1/2/3
Name of the drawer: Human Resource Management	

What to measure

In any organisation people come and go. It is important to know the number of people leaving the organisation and the reasons why this is happening. Turnover can be either positive or negative: positive because it means that the organisation is developing people who are attractive to other employers, negative when the employees are leaving as a result of bad working conditions.

How to measure

Turnover can be measured by counting the number of staff leaving as a percentage of the total number of staff employed. It is also possible to calculate the average length time employees stay within an organisation. It is possible to bench-mark this data with other organisations carrying out similar functions.
The reasons for staff turnover can be measured through the use of "exit" interviews, which can be used to better understand the reasons for leaving. The results of these interviews can be analysed in order to identify trends and influence the development of remedial action.

Qualifications

There are no specific qualifications for this indicator.
This indicator has no direct impact on the Owner/User or Resident.

Recommendations for use

This indicator is only relevant for organisations where turnover is a problem. Measuring it can be postponed as long as there are no problems. Other indicators are most certainly of greater importance.

FUTURE RECOMMENDED WORK

- Development of non-technical performance indicators for inclusion in an integrated asset management system.

- Reinforcement of information transfer and indicators for developing countries.

- Definition of basis for international benchmarking.

- Asset management and sustainable development.