

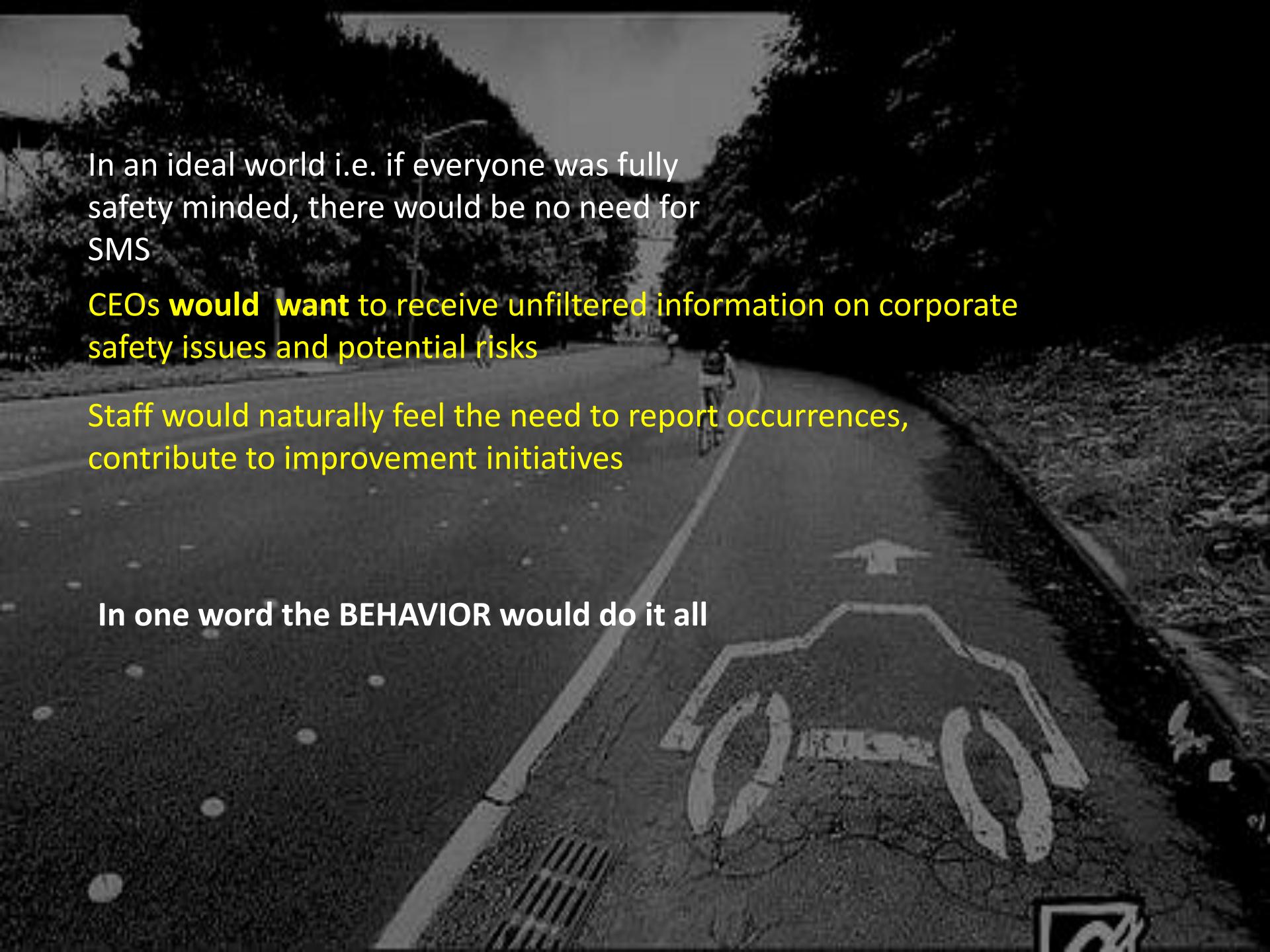


Advanced check:

*Where are we wrt
“certification”?*

Tool and example

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ESP Programme Manager



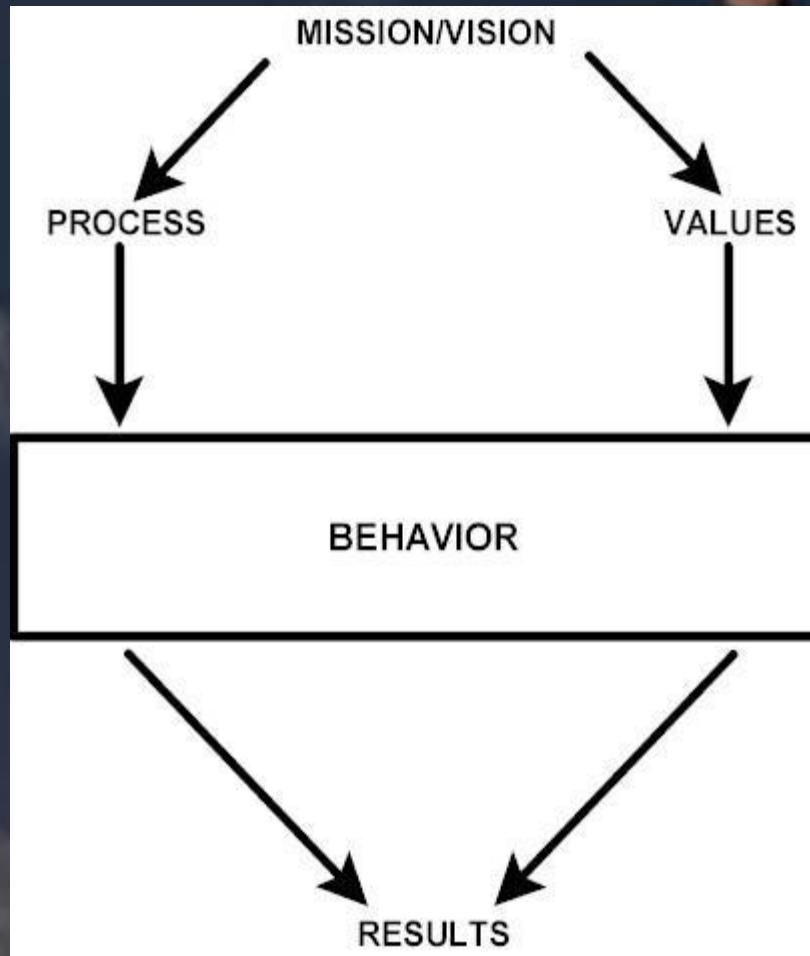
In an ideal world i.e. if everyone was fully safety minded, there would be no need for SMS

CEOs **would want** to receive unfiltered information on corporate safety issues and potential risks

Staff would naturally feel the need to report occurrences, contribute to improvement initiatives

In one word the BEHAVIOR would do it all

This is not the case so SMS must be supported by processes whilst developing its culture, in such a way the behavior is made of “mandatory” activities together with the culture existing at one moment in time in the company





**How can these two dimensions
be captured by a survey?**

The Transport Canada Approach

Classical approach looking for **WHAT** is in place would not work

Would asking ***“do you have a good safety culture in your mind”*** be a question likely to provide correct answers?

Only works for material

So the questions have to be more clever.....this is what Transport Canada has done

See an example

Principles of the approach

1. Describe precisely what you would wish to see or hear from auditees: the **EXPECTATIONS**

Expectations-Table B 1.1 – Safety Policy

Component	1.	Safety Management System Implementation
Element	1.1	Safety Policy
Expectations		
<ul style="list-style-type: none">▪ A safety policy is in existence.▪ The organisation has based its safety management system on the safety policy.▪ The safety policy is appropriate to the size and complexity of the organisation.▪ The safety policy states the organisation's intentions, management principles and commitment to continuous improvement in the safety level.▪ The safety policy is approved by the accountable executive.▪ The safety policy is promoted by the accountable executive.▪ The safety policy is reviewed periodically.▪ The safety policy includes a commitment to involve personnel at all levels in the establishment of the safety management system.▪ The safety policy includes a commitment to involve personnel at all levels in the maintenance of the safety management system.▪ The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.▪ There is a clear declaration of commitment to safety.▪ Senior management has a clear commitment to safety.▪ Senior management demonstrates their commitment to safety through active and visible participation in the safety management system.▪ The policy is implemented at all levels of the organisation.▪ The policy is clearly visible to all personnel and particularly throughout the safety-critical areas of the organisation.▪ The policy is included in key documentation and communication media.▪ Senior managers clearly articulate the importance of safety when addressing company personnel.▪ Verification that personnel have understood the message.▪ Senior executives have made a commitment to the development and ongoing improvement of the safety management system.		

cultural

cultural

understanding

Principles of the approach

2. Develop questions that look for cultural background and/or understanding: the QUESTIONS

Component	1.	Safety Management Plan
Element	1.1	Safety Policy

Questions

To the accountable executive:

No question to
the
Safety Manager

How would you summarise your safety philosophy and expectations from your company's safety management system? Are there any particular SMS policy initiatives with which you or your senior management are personally identified (show me)

How do you communicate your SMS performance expectations to the organisation? Are there any specific SMS issues that you expect to have a significant impact on your company's performance?

How often do you critically review the standing SMS policy? Who is involved in this review?

How do you assess the extent to which safety policy and SMS processes are understood within your company?

How do you measure your company's SMS performance? How is the information from these performance appraisals used?

How has your safety policy influenced the development of your safety management system? Show me an example.

To functional department heads:

Open ended
questions

What expectations does your employer have with respect to you and your department's SMS performance? How are these expectations communicated to you? Can you explain your role in the development of your safety obligations and your department's SMS performance criteria?

How do you communicate SMS processes/obligations to personnel within your department? How do you assess the extent to which safety policy and SMS processes/obligations are understood within your department?

How are employees involved in the maintenance of the SMS?

To employees:

What is your understanding of management's expectations of you with respect to company SMS performance?

How would you characterise management's commitment to strong SMS performance?

How does management make you aware of the relationship between the safety policy and different safety initiatives?

Principles of the approach

3. Use of a scoring system: the RESULTS

Score-Table D 1.1 Safety Policy

Score	Criteria
1	Senior management does not demonstrate commitment to a SMS. Safety policies are not well developed and most personnel are not involved in SMS.
2	(3) less some aspects
3	A.A safety policy is in existence and appropriate to the size and complexity of the organisation. B.The organisation has based its safety management system on the safety policy. C.The safety policy is approved by the accountable executive. D.The safety policy is promoted by the accountable executive. E.The safety policy is reviewed periodically. F.The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.
4	All of (3) plus some aspects of (5)
5	All of 3 plus all of the following: There is a clear declaration of commitment to safety. The safety policy states the organisation's intentions, management principles and commitment to continuous improvement in the safety level. Senior management has a clear commitment to safety and demonstrates it through active and visible participation in the safety management system. Personnel at all levels are involved in the establishment and maintenance of the safety management system. The policy is implemented at all levels of the organisation. The policy is clearly visible to all personnel and particularly throughout the safety-critical areas of the organisation. The policy is included in key documentation and communication media. Senior managers clearly articulate the importance of safety when addressing company personnel. Verification that personnel have understood the message. Commitment of the organisation's senior executives to the development and ongoing improvement of the safety management system.

Experience of using the tool

In one organisation surveyed, all hard issues (PROCEDURES-ORGANISATION-JOB DESCRIPTIONS-TRAINING etc...) were perfectly addressed and covered

BUT the other “leg” of the SMS was the weakness.

The Survey revealed the soft issues: COMMUNICATION & TRUST

An exercise?

What would be your expectations with regards the “Non punitive reporting policy” e.g. to certify an ANSP?

What questions would you ask and to whom would you address them to build a picture of the “Non punitive reporting policy” at this ANSP?

Expectations

Element	1.2 Non-Punitive SMS Safety Reporting Policy
Expectations	
<ul style="list-style-type: none">• There is a policy in place that provides immunity from disciplinary action for employees that report safety deficiencies, hazards or occurrences.• Conditions under which punitive disciplinary action would be considered (e.g. illegal activity, negligence or willful misconduct) are clearly defined.• The policy is widely understood within the organization.• The organizations have letters of understanding between employees and/or third party contractors and management to document the disciplinary policy, and the manner in which it will be implemented.• Personnel express confidence and trust in the policy.• There is concrete evidence that the organization is applying the non-punitive safety reporting policy.	

Questions

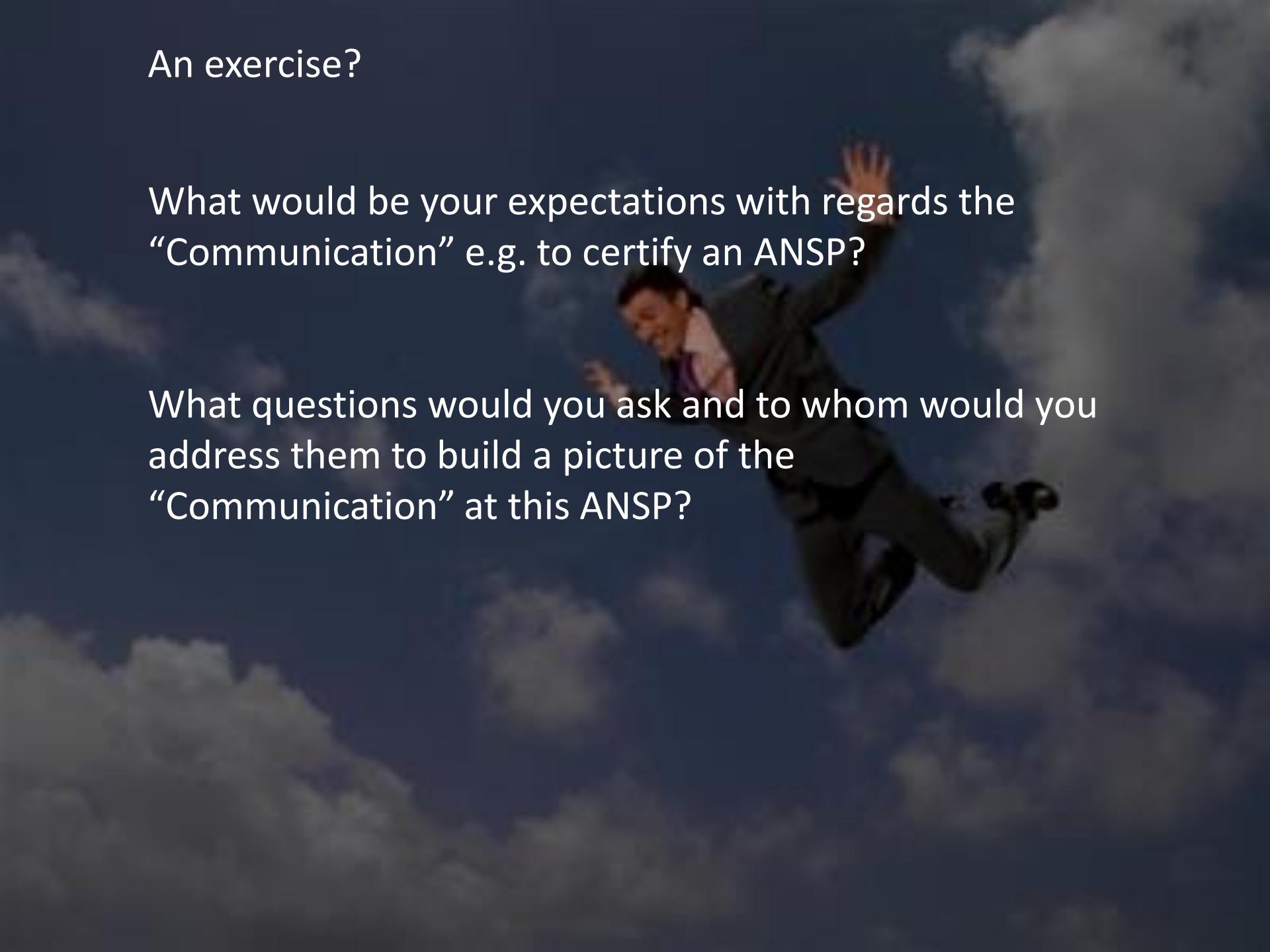
Element	1.2 Non-Punitive Safety Reporting Policy
Questions	
To accountable executive and department heads:	
(A)	Can you describe the disciplinary policy in regards to the SMS reporting system? Is it non punitive?
(BP)	How do you ensure that employees understand the policy?
(BP)	Has the organization established the conditions under which disciplinary action would be considered? (show me) How do you know that this is clearly understood by the personnel?
(BP)	Are there any formalized documents, such as letters of understanding, between employee groups / third party contractors and management?
To employees:	
(A)	Do you feel confident reporting safety deficiencies, hazards and occurrences? Explain

So definitely the questions are not limited to a “Do you have a non punitive reporting policy?” (if yes show me)

Scoring

Table D1.2 – Safety Management Plan – Non-Punitive Safety Reporting Policy

Score	Criteria
1	Safety-related reports or inadvertent errors result in punitive action being taken against individuals.
2	(3) less some aspects
3	A. There is a policy in place that provides immunity from disciplinary action for employees that report safety deficiencies, hazards or occurrences.
4	All of (3) plus some aspects of (5)
5	<p>All of 3, plus all of the following:</p> <p>Conditions under which punitive disciplinary action would be considered (e.g. illegal activity, negligence or willful misconduct) are clearly defined and documented.</p> <p>The policy is widely understood within the organization.</p> <p>The organizations have letters of understanding between employees and/or third party contractors and management. The purpose of these letters is to document the disciplinary policy, and the manner in which it will be implemented.</p> <p>Personnel express confidence and trust in the policy.</p> <p>There is concrete evidence that the organization is applying the policy.</p>

A dark, moody background image of a person falling through a cloudy sky, with their arms outstretched. This imagery serves as a metaphor for the lack of communication and the resulting consequences.

An exercise?

What would be your expectations with regards the “Communication” e.g. to certify an ANSP?

What questions would you ask and to whom would you address them to build a picture of the “Communication” at this ANSP?

Expectations

Element	1.4 Communication
Expectations	<ul style="list-style-type: none">• There are communication processes in place within the organization that permit the safety management system to function effectively.• Communication processes are commensurate with the size and scope of the organization. (written, meetings, electronic, etc.)• SMS information is established and maintained in a suitable medium that provides direction in related documents.• There is a process for the dissemination of safety information throughout the organization.• There is a means of monitoring the effectiveness of the process for disseminating safety information within the organization.• Company wide, uncomplicated, reciprocal communications related to safety and quality issues are plainly evident.• All areas, including out-stations and outsource functions, are included in the communication network of the organization.• There is an established means of inter-departmental communication to spread information on SMS related matters.• There exists a formal means of communicating with experts in SMS so that advice can easily and quickly be obtained by personnel. The documentation should indicate where these experts could be located.• All personnel are informed as to who is their primary contact for aviation safety related matters.• There is a process for communication strategy that includes electronic communication, frequent meetings, SMS award systems, employee recognition system, SMS bulletins, etc.• There is a process for sharing safety related information with outside sources that might be impacted by this information.

Questions

Element	1.4 Communication
Questions	
To accountable executive and functional department heads:	
(A)	What communication processes or methods are in place within your organization? Explain how these processes help your SMS to function effectively?
(B)	How often are SMS meetings held? Who attends these meetings? Do you attend any SMS meetings? How often?
(C)	How does information flow relate to the documentation? How are these made available? (Give examples)
(D)	How is safety information shared within the organization? (horizontally and vertically throughout the organization) How do you know these methods/processes are working?
(D)	How is information on SMS related matters shared between departments? How do you ensure there is company wide, uncomplicated communications?
(BP)	What mechanisms are in place that allow reciprocal communications related to safety and quality issues? (horizontally and vertically throughout the organization)
(BP)	How do you know what the results of these meetings are? How are minutes or decision records kept? How are the results of these meetings communicated to personnel?
(BP)	How are all areas, including out-stations and outsource functions included in the communications network?
(BP)	How are personnel informed as to who is their primary contact for aviation safety related matters?
(BP)	How are best practices identified and shared across the organization?
To employees:	
(A)	How do you know SMS activities are going on within your organization? What evidence do you see that shows SMS is or is not working?
(B)	How often are meetings held? Who attends these meetings? Do you attend any SMS meetings? How often?
(C)	If you needed information related to safety issues, procedures or processes, how would you get it?
(C,D)	How is safety information communicated to you? How do you communicate safety information?
(BP)	Has there ever been a safety related or quality matter that you felt should be brought to the attention of management? How did you deal with this? What response did you receive from management?
(BP)	Who is your primary contact for aviation safety related matters? Do you feel comfortable bringing issues to this person? (explain how, why/why not)

Scoring

Table D1.4 – Safety Management Plan – Communication

Score	Criteria
1	The general exchange of information throughout the organization does not permit the system to function effectively. The organizational communication network does not include all personnel, out-stations and outsource functions.
2	(3) less some aspects
3	A. There are communication processes in place within the organization that permit the safety management system to function effectively. B. Communication processes (written, meetings, electronic, etc.) are commensurate with the size and scope of the organization. C. Information is established and maintained in a suitable medium that provides direction in related documents. D. There is a process for the dissemination of safety information throughout the organization and a means of monitoring the effectiveness of this process.
4	All of (3) plus some aspects of (5)
5	All of 3, plus all of the following: Company wide, uncomplicated, reciprocal communications related to safety and quality issues are plainly evident. All areas, including out-stations and outsource functions, are included in the communication network of the organization. There is an established means of inter-departmental communication to spread information on SMS related matters. There exists a formal means of communicating with experts in SMS so that advice can easily and quickly be obtained by personnel. The documentation should indicate where these experts could be located. All personnel are informed as to who is their primary contact for aviation safety related matters. There is a process for communication strategy that includes electronic communication, frequent meetings, SMS award systems, employee recognition system, SMS bulletins, etc. There is a process for sharing safety related information with outside sources that might be impacted by this information.

Final remarks

There are many detailed questions for the CeO and to a lesser extent Heads of Departments

Because they should lead the SMS

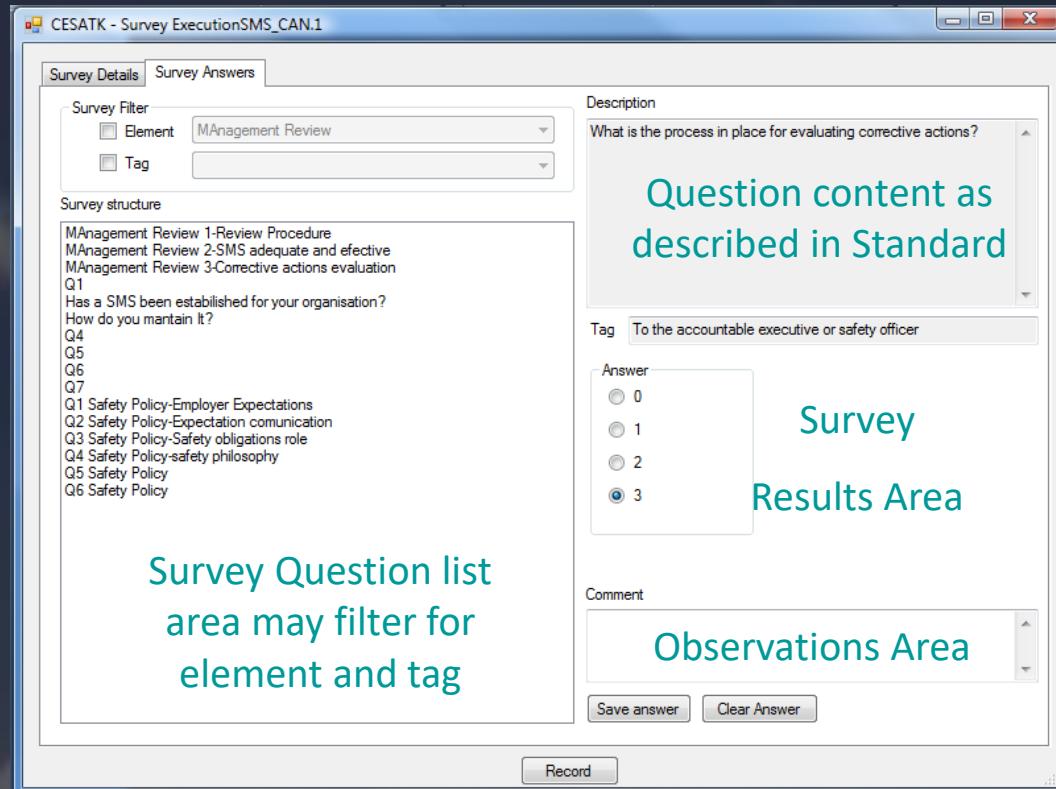
There are virtually no questions for the Safety Manager

Because if he has done his job well then the SMS is in place and understood, so no need to talk to him

There are always few simple “killer” questions for the Staff

Because this the means to verify that the SMS has “spread” all the way across the organisation

1.1- Record the survey observations, results and recommendations

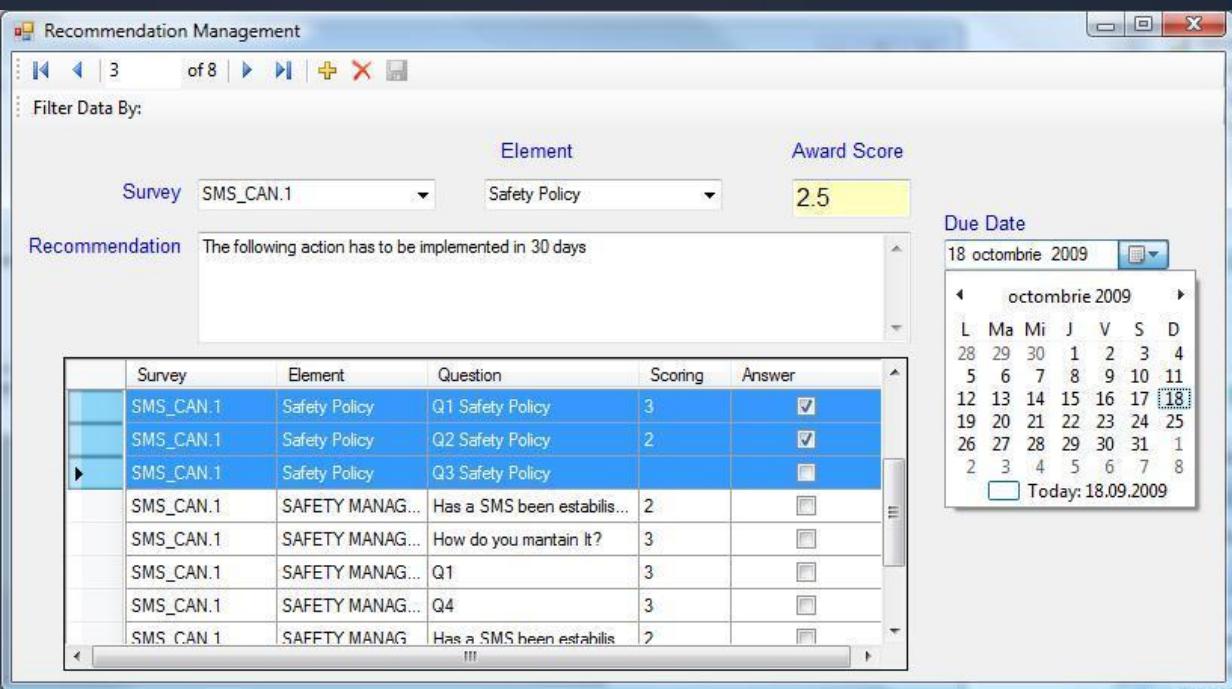


Observations and
Results
Recommendations

Results and Observations recorded at the survey time or later at the review time for each question

Survey results automatically mapped between sessions

1.2- Record the survey observations, results and recommendations



The screenshot shows a software window titled 'Recommendation Management'. At the top, there are buttons for navigation (back, forward, search, etc.) and a dropdown for 'Survey' set to 'SMS_CAN.1' and 'Element' set to 'Safety Policy'. An 'Award Score' of '2.5' is displayed. Below this, a 'Recommendation' section states: 'The following action has to be implemented in 30 days'. A large table lists survey data for 'SMS_CAN.1' across various elements and questions, with a 'Scoring' column and an 'Answer' column containing checkboxes. A calendar is overlaid on the right side of the table, showing the month of October 2009 with the 18th highlighted. The calendar also displays the text 'Today: 18.09.2009'.

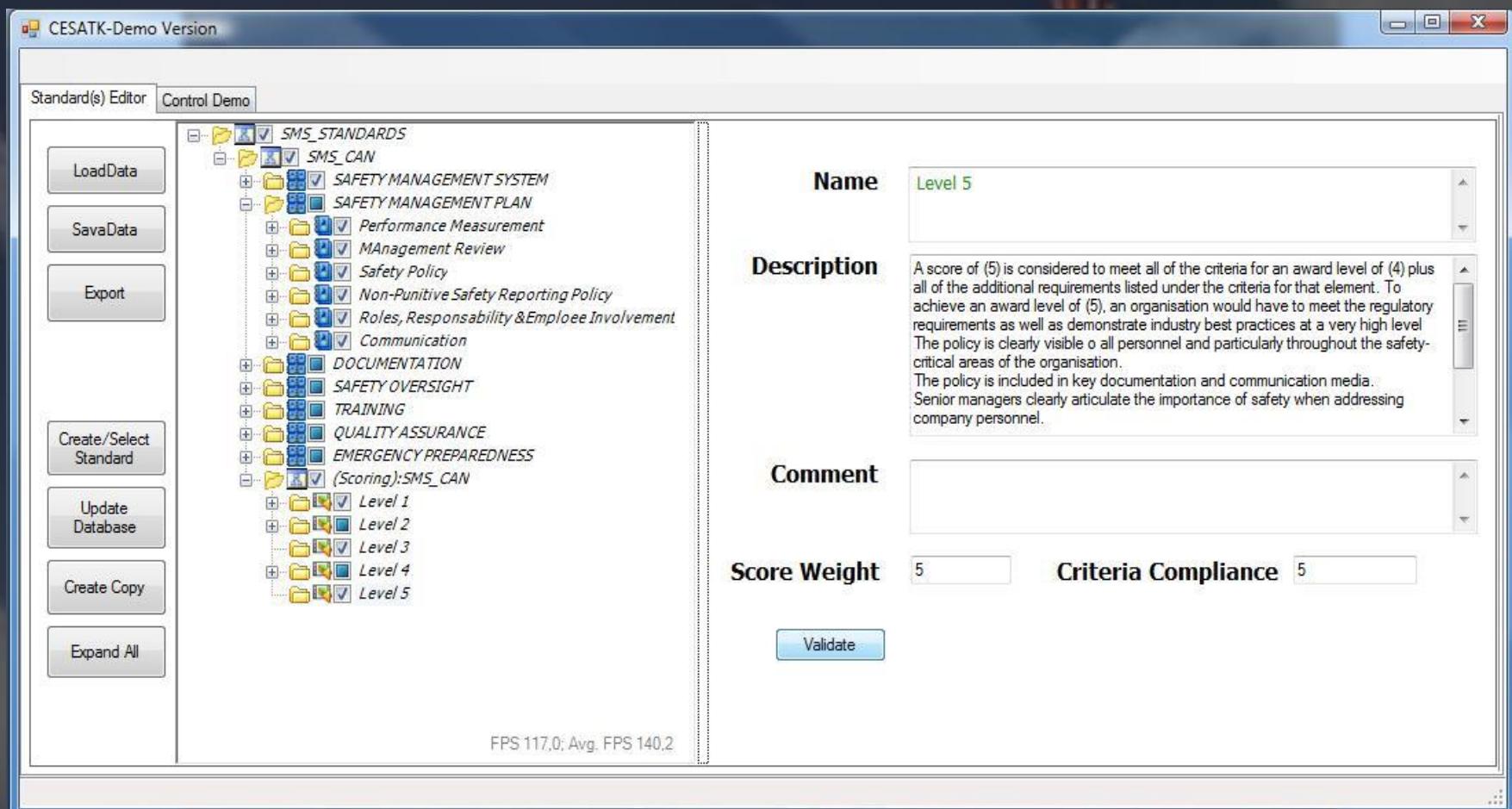
Survey	Element	Question	Scoring	Answer
SMS_CAN.1	Safety Policy	Q1 Safety Policy	3	<input checked="" type="checkbox"/>
SMS_CAN.1	Safety Policy	Q2 Safety Policy	2	<input checked="" type="checkbox"/>
SMS_CAN.1	Safety Policy	Q3 Safety Policy		<input type="checkbox"/>
SMS_CAN.1	SAFETY MANAG...	Has a SMS been estabilis...	2	<input type="checkbox"/>
SMS_CAN.1	SAFETY MANAG...	How do you mantain it?	3	<input type="checkbox"/>
SMS_CAN.1	SAFETY MANAG...	Q1	3	<input type="checkbox"/>
SMS_CAN.1	SAFETY MANAG...	Q4	3	<input type="checkbox"/>
SMS_CAN.1	SAFETY MANAG...	Has a SMS been estabilis...	2	<input type="checkbox"/>

Observations and
Results
Recommendations

Recommendations recorded later at the evaluation for each Element in a distinct module

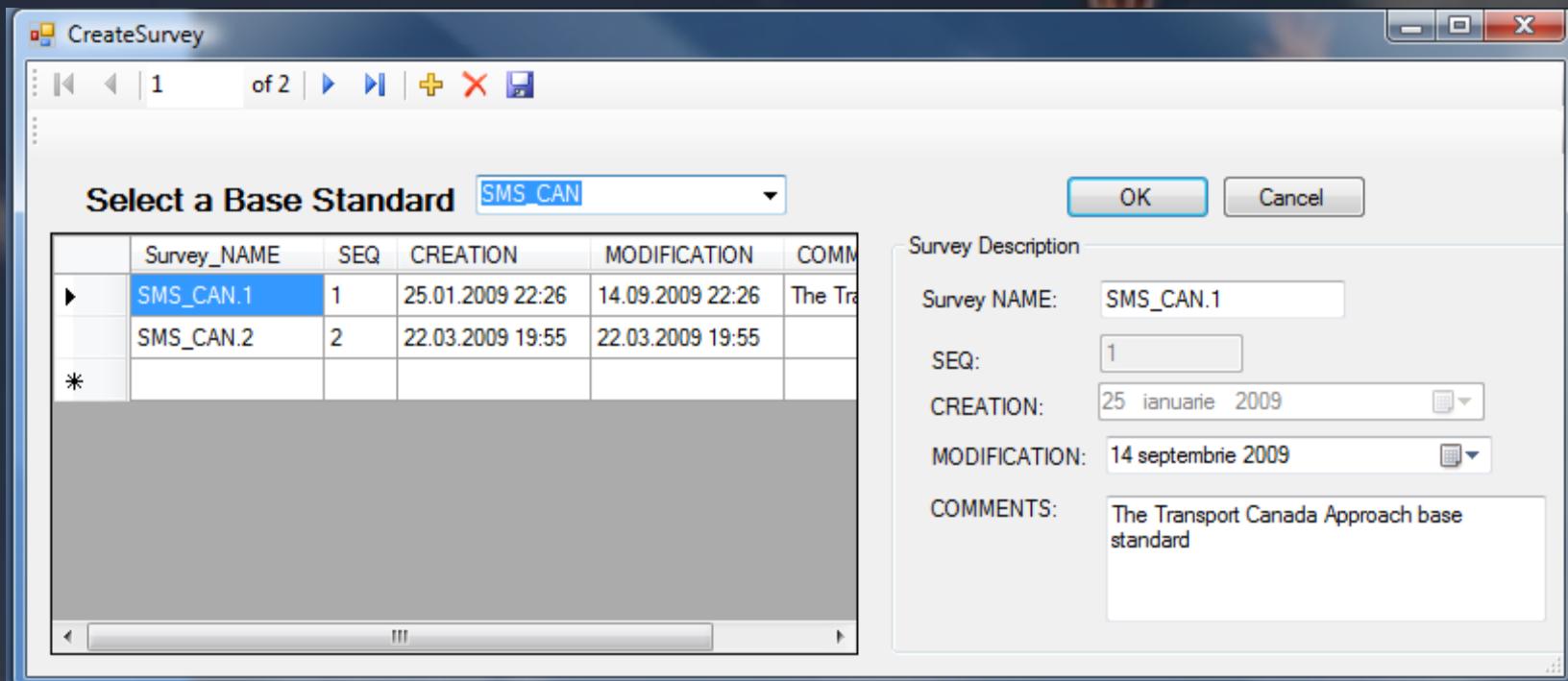
Survey questions, results and observations also included to provide consistency with scoring (Award score assignment) and follow-up actions

2.1 Surveyors trained to use the same approach in a consistent manner



Standard Definition: Tree map organisation of Components, Elements, Questions, Criteria, Scoring in a graphical manner

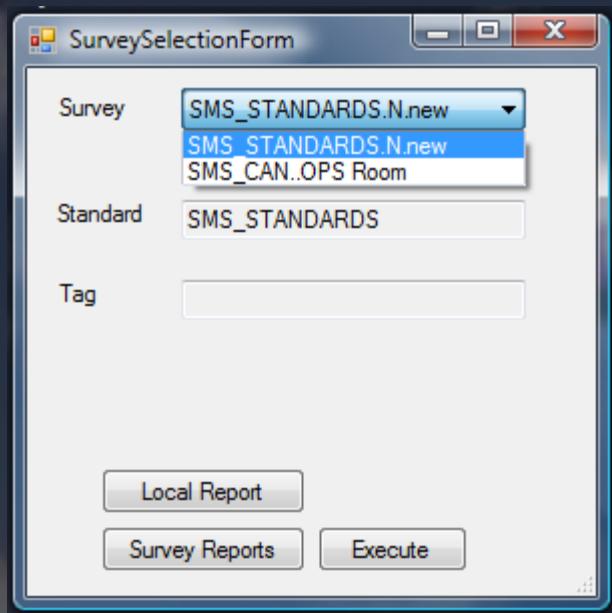
2.2 Surveyors trained to use the same approach in a consistent manner



Selection of a base standard to create a **Survey Definition**.

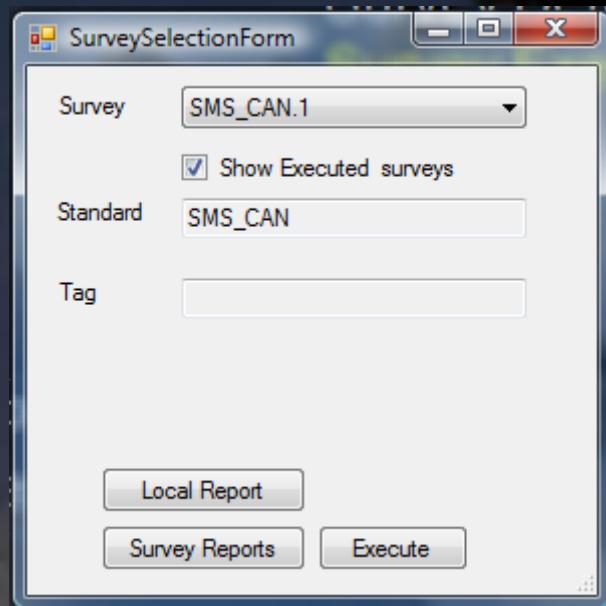
All attributes of the standard are inherited to enable a consistent approach to survey execution

2.3 Surveyors trained to use the same approach in a consistent manner



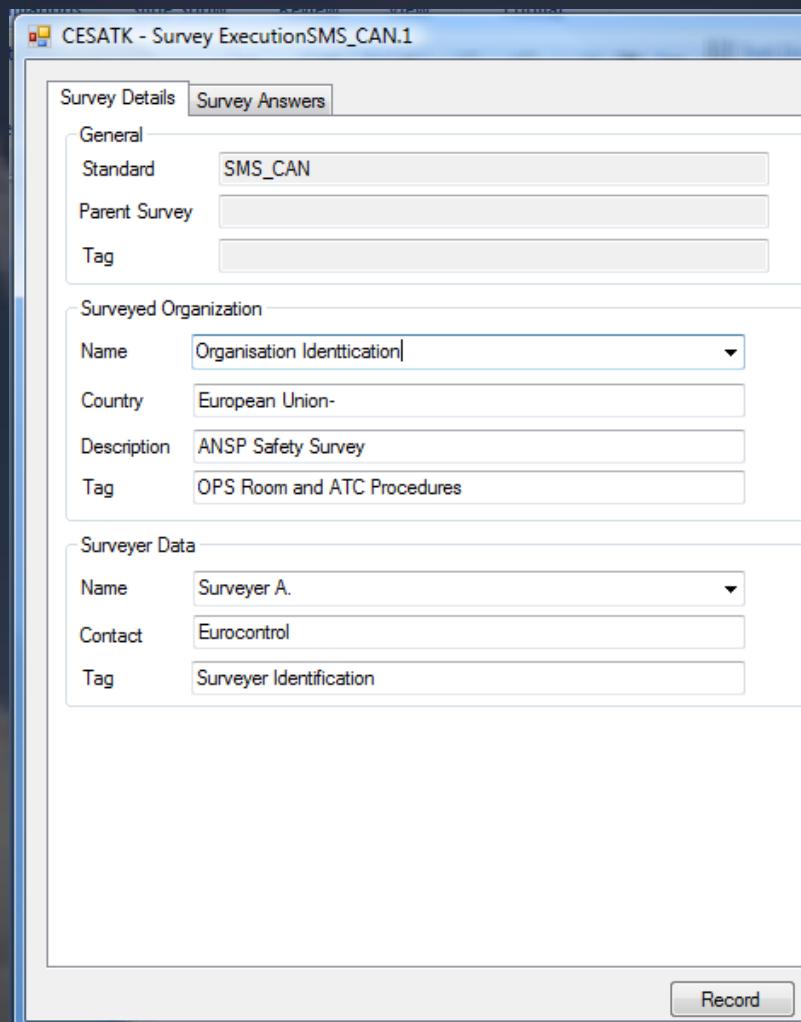
Standard definition
Survey Definition
Survey Execution Selection

Select Prepared not executed surveys



Review executed surveys

2.4 Surveyors trained to use the same approach in a consistent manner



The screenshot shows a software window titled 'CESATK - Survey ExecutionSMS_CAN.1'. The window has two tabs: 'Survey Details' (selected) and 'Survey Answers'. The 'Survey Details' tab contains sections for 'General' (Standard: SMS_CAN, Parent Survey: empty, Tag: empty), 'Surveyed Organization' (Name: Organisation Identification, Country: European Union, Description: ANSP Safety Survey, Tag: OPS Room and ATC Procedures), and 'Surveyer Data' (Name: Surveyer A., Contact: Eurocontrol, Tag: Surveyer Identification). A 'Record' button is at the bottom right.

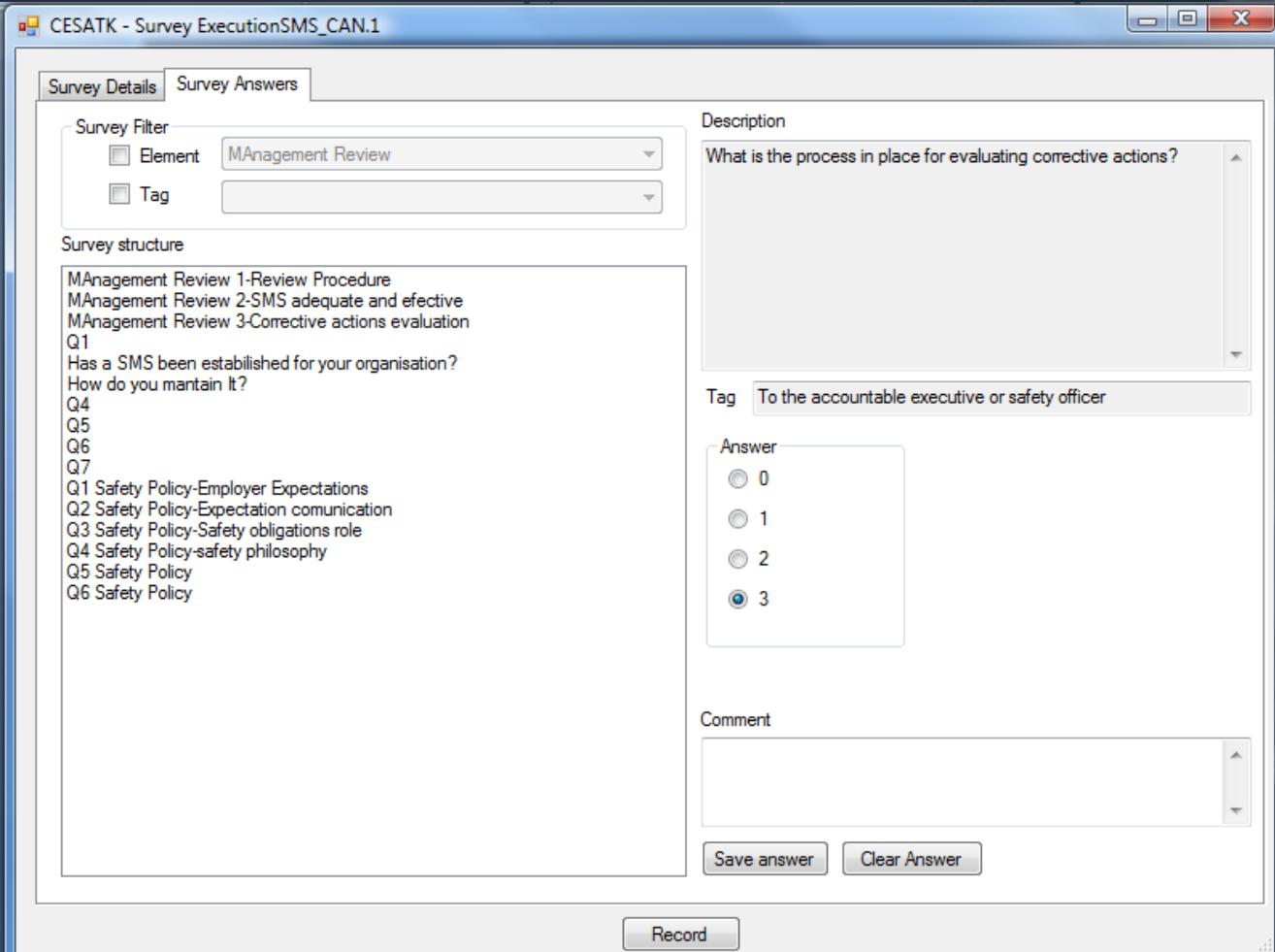
Standard definition Survey Definition **Survey Execution Selection**

Additional data sections to be added for survey identification:

- General Data
- Target Organisation
- Surveyor identification

Multiple attributes for each section, database self recording

2.5 Surveyors trained to use the same approach in a consistent manner



The screenshot shows a software window titled "CESATK - Survey ExecutionSMS_CAN.1". The window has two tabs: "Survey Details" (selected) and "Survey Answers".

Survey Details Tab:

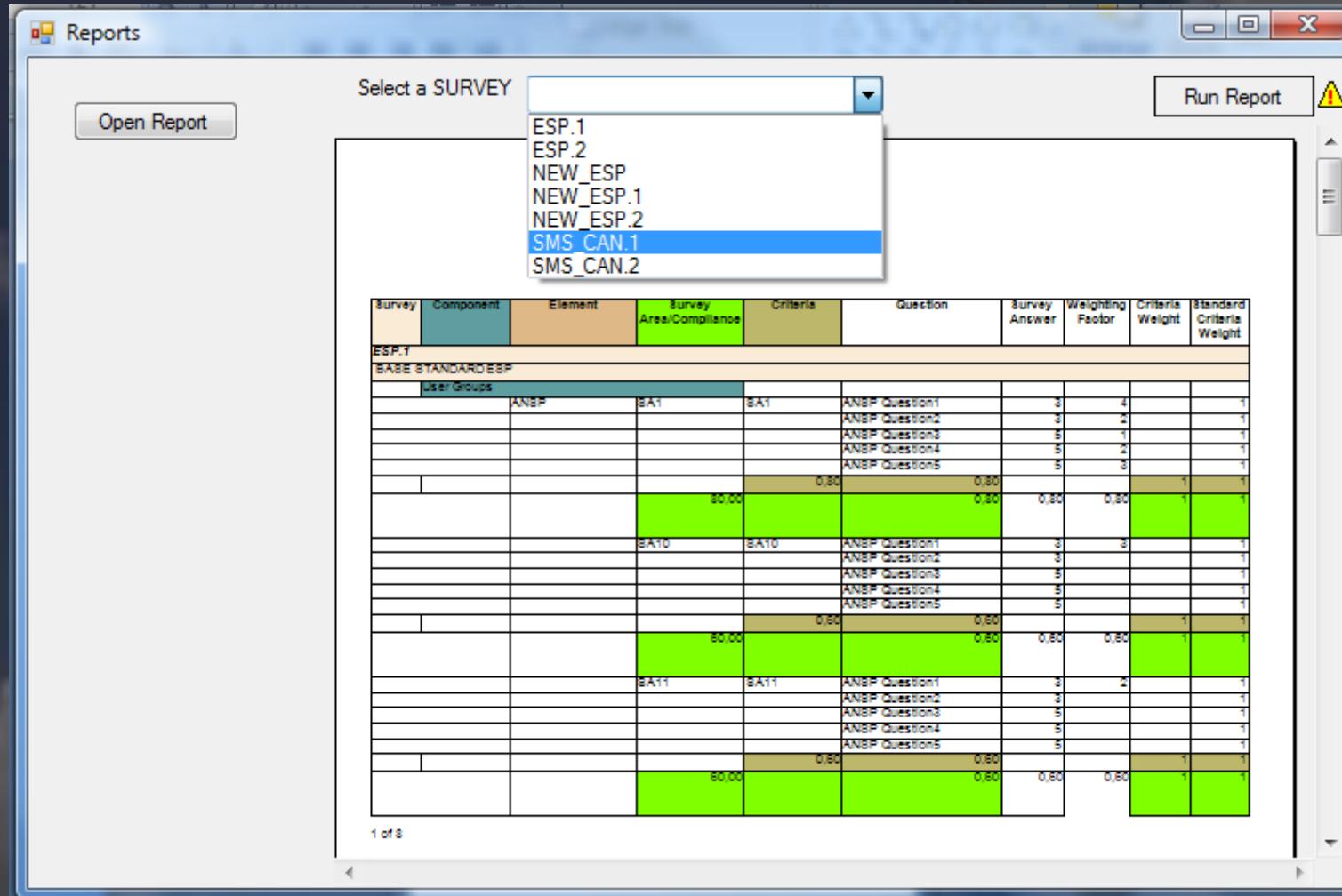
- Survey Filter:**
 - Element: MAnagement Review
 - Tag: (empty)
- Survey structure:**
 - MAnagement Review 1-Review Procedure
 - MAnagement Review 2-SMS adequate and efective
 - MAnagement Review 3-Corrective actions evaluation
 - Q1: Has a SMS been established for your organisation?
How do you mantain It?
Q4
Q5
Q6
Q7
 - Q1 Safety Policy-Employer Expectations
 - Q2 Safety Policy-Expectation comunication
 - Q3 Safety Policy-Safety obligations role
 - Q4 Safety Policy-safety philosophy
 - Q5 Safety Policy
 - Q6 Safety Policy

Survey Answers Tab:

- Description:** What is the process in place for evaluating corrective actions?
- Tag:** To the accountable executive or safety officer
- Answer:**
 - 0
 - 1
 - 2
 - 3
- Comment:** (empty)
- Buttons:** Save answer, Clear Answer, Record

Survey Execution: Survey questions and all necessary information in a single form

2.6 Surveyors trained to use the same approach in a consistent manner



The screenshot shows a Windows application window titled "Reports". At the top left is a "Select a SURVEY" dropdown menu with the following options: ESP.1, ESP.2, NEW_ESP, NEW_ESP.1, NEW_ESP.2, SMS_CAN.1, and SMS_CAN.2. The option "SMS_CAN.1" is highlighted with a blue selection bar. To the right of the dropdown is a "Run Report" button. Below the dropdown is a large table titled "ESP.1 BASE STANDARD JESP". The table has columns: Survey, Component, Element, Survey Area/Compliance, Criteria, Question, Survey Answer, Weighting Factor, Criteria Weight, and Standard Criteria Weight. The table is divided into three main sections: "User Groups", "BA10", and "BA11". Each section contains a table with rows for ANBP, BA1, BA10, and BA11, followed by rows for ANBP Question1 through ANBP Question5. The "Survey Area/Compliance" column for the first row in each section is highlighted in green. The "Criteria" column for the first row in each section is highlighted in brown. The "Survey Answer" column for the first row in each section is highlighted in green. The "Weighting Factor" column for the first row in each section is highlighted in brown. The "Criteria Weight" column for the first row in each section is highlighted in green. The "Standard Criteria Weight" column for the first row in each section is highlighted in brown. The table also includes a "0.80" value in the "Criteria" column for the first row in each section. The table has a footer with the text "1 of 8".

Reports: Dynamic tabular off-line reports stored outside database, standard reporting language

2.7 Surveyors trained to use the same approach in a consistent manner

SMS_CAN								
							Survey	Criteria Mapping
SAFETY MANAGEMENT PLAN	⊕ MAnagement Review (5)	4.72	⊖ Level 3 (3:3)	2.3	A	MAnagement Review 1	0.6666666666666667	2 3
					B	MAnagement Review 1	0.6666666666666667	2 3
			⊕ Level 5 (5:)	5		MAnagement Review 2	1	3 3
		2.25					1	3 5
	⊕ Safety Policy (5)	4.31	⊕ Level 3 (3:3)	3			0.944099378881988	10 14
			⊕ Level 5 (5:)	4.2			0.8333333333333333	5 10
		4.39					0.862938596491228	11 16
	6						0.891039426523297	21 30
SAFETY MANAGEMENT	⊕ SAFETY MANAGEMENT	4.08	⊖ Level 3 (3:3)	2.6			0.8666666666666667	13 15

Reports: Web-style predefined dynamic reports stored outside database, standard reporting language, single survey detail

2.8 Surveyors trained to use the same approach in a consistent manner

The screenshot shows the DataExporter application window. On the left is a DataGridView containing survey data. The columns are: Standard, Components, Criteria, Elements, Questions, SEC, Crit, Crit, and Eler. The rows show various survey items, such as 'SAFETY MANAGEMENT PLAN' and 'SAFETY MANAGEMENT SYSTEM', with their respective details and scores.

Standard	Components	Criteria	Elements	Questions	SEC	Crit	Crit	El
SMS_C...	SAFETY MANA...	B	MAnagement Review	MAnagement Revie...	66	3	1	
SMS_CAN	SAFETY MANAGEMENT PLAN	B	MAnagement Review	MAnagement Review 2	67	3	1	
SMS_C...	SAFETY MANA...	B	Safety Policy	Q1 Safety Policy	7	3	3	
SMS_CAN	SAFETY MANAGEMENT SYSTEM	B	SAFETY MANAGEME	Has a SMS been established for your organisation?	5	3	3	
SMS_C...	SAFETY MANA...	Bes...	Safety Policy	Q2 Safety Policy	70	5	5	
SMS_CAN	SAFETY MANAGEMENT PLAN	Best Practic	Safety Policy	Q3 Safety Policy	76	5	5	
SMS_C...	SAFETY MANA...	Bes...	SAFETY MANAGEME	Q5 SYSTEM	73	5	5	
SMS_CAN	SAFETY MANAGEMENT	Best	SAFETY MANAGEME	Q6	74	5	5	

Exports

- Excel
- Pdf
- Html

Find

Print

- Print Preview
- Print

Show print dialog

Other

- Open Settings
- Refresh Grid
- UI Permissions

Xml Persistence Location
This is the folder where all of your changes made to the DataGridView control will be persisted in Xml format.
C:\Users\Eduard\Documents\Visual Studio 2008\Projects\CESATK_R\CESATK_R

Exporters Location
All of your export assemblies are located in the folder shown below.
C:\Users\Eduard\Documents\Visual Studio 2008\Projects\CESATK_R\CESATK_M\CESATK SVNRepository\CESATK_R

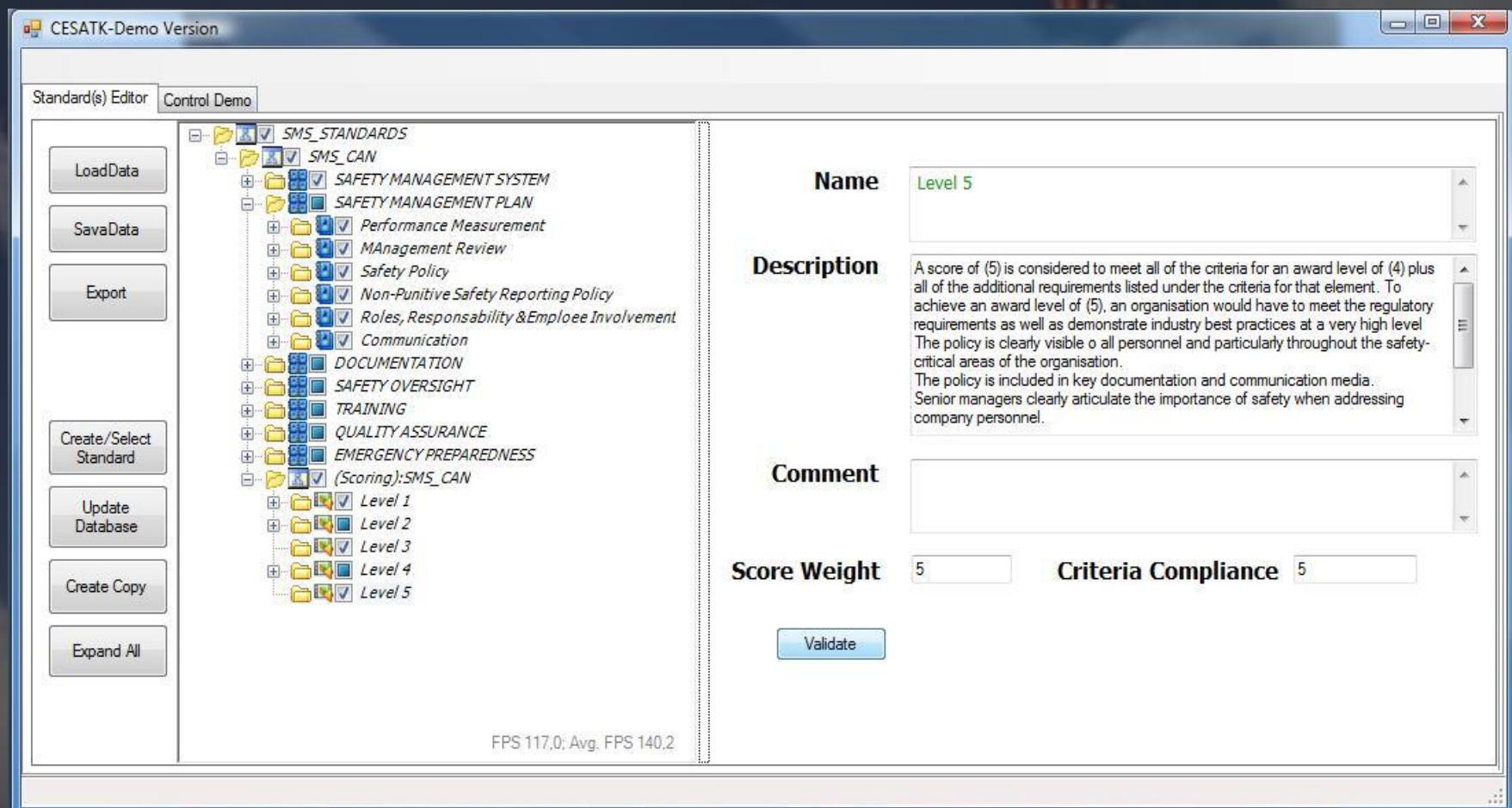
Support functions Preview, Export/Import, Print, with full user customised options

3.1 Define your own survey "standard" based on what you are going to survey : SMS, OPS Room, Equipment , etc

Flexible Standard structure to enable different Survey types and complexity in definition

Component	Node containing other components or children element nodes
Element	Node containing question nodes and a single element scoring node
Question	Node that contains Criteria nodes
Global Scoring	Node that is unique for each standard and contains global criteria
Global criterion	Child node of global scoring and element scoring nodes which are used to compute the score and contain element criteria nodes
Element Scoring	Unique child node of an element node that contains element criteria nodes
Element criterion	Node that appears under the Global Criteria nodes

3.2 Define your own survey "standard" based on different survey structure,



Standard Definition: Graphical mapping of database objects identifying survey structure

4. Present the results so as to identify trends, good practices and less good practices

Multi-survey Reports

Survey									
SMS_CAN.1	SAFETY MANAGEMENT PLAN	<input type="checkbox"/> Management Review (5)	4.72					0.944099378881988	10
		<input type="checkbox"/> Safety Policy (5)	4.31	<input type="checkbox"/> Level 3 (3)	3			1	6
				<input type="checkbox"/> Level 5 (5)	4.2	Best Practices	Q2 Safety Policy	0.6666666666666666	2
							Q3 Safety Policy	1	3
		8.5						0.891039426523297	21
	SAFETY MANAGEMENT SYSTEM	<input type="checkbox"/> SAFETY MANAGEMENT SYSTEM (5)	4.08	<input type="checkbox"/> Level 3 (3)	2.6			0.8666666666666666	13
				<input type="checkbox"/> Level 5 (5)	4			0.8	8
		4						0.81631419939577	21
		12.5						0.850491803278689	42
SMS_CAN.2	8.0							0.419047619047619	33

Reports: Web-style predefined dynamic reports side-by-side surveys based on standard selection for comparison automatic scoring computation

5.1- User requirements to Functional requirements mapping

Essential Requirements

- Flexibility
- User friendliness
- Versatility
- Adaptability
- Performance
- Cost effectiveness
- Portability

Functional Requirements

- Modularity
- Centered around a relational database
- Efficient HMI
- Open interfaces: e.g. XML Interface for easy exchange of data

CESATK Architecture

- **Human Machine Interfaces**: allows a human operator to interact with the business applications layer.
- **Data processing layer**: provides the core functionality, providing HMIs with services and data.
- **Database layer**: provides access through queries to the relational database.
- **Hardware & Operative System**: represents the physical world (not shown on the diagram).

5.2- User requirements to Functional requirements mapping

CESATK Architecture

- Human Machine Interfaces
- Data processing layer
- Database layer
- Hardware & Operative System



CESATK Modules

- HMI Manager

Graphical Components

- Standard(s) Template Editor
- Survey Template Editor, etc

User Customization Component

- User Configuration Files

Action Mapping to graphical components, etc.

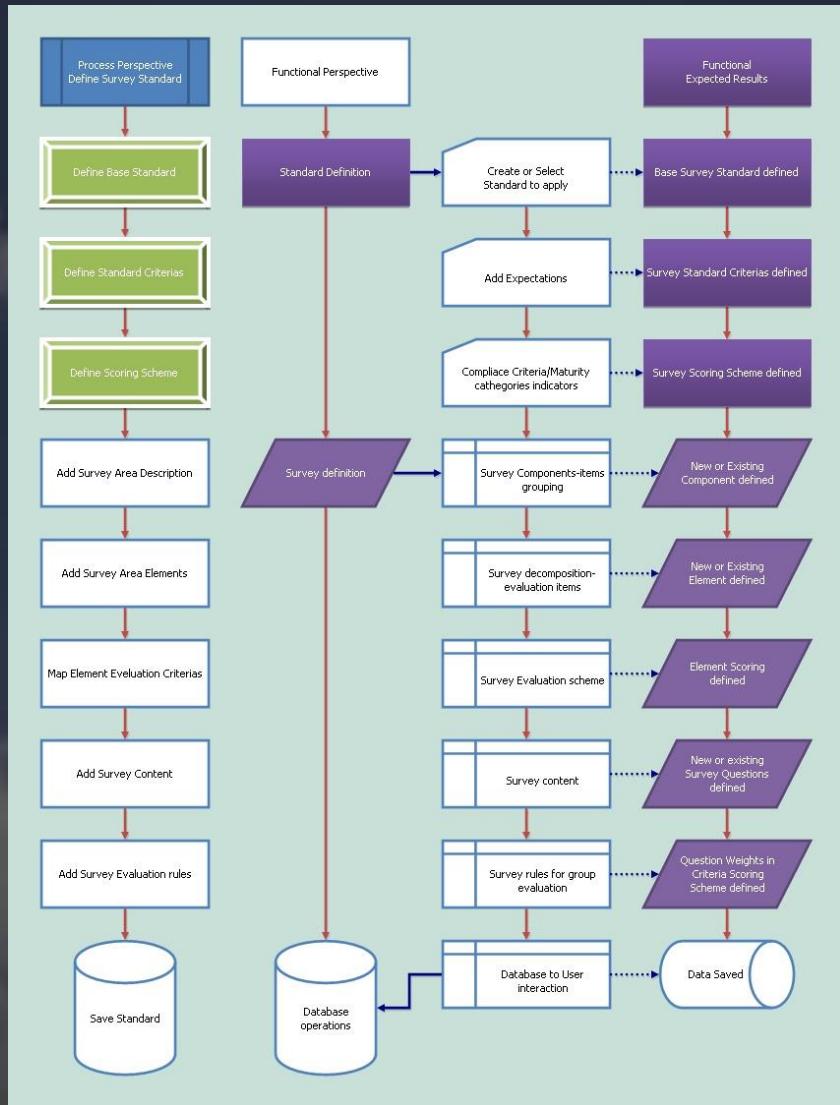
- Database mapping module

- Data Access Connections
- Application Data Mapping
- XML Data Mapping
- Connectors for graphical components

-Hardware & Operative System

Integrated OS environment (.NET)

5.3- User requirements to Functional requirements mapping



Process Flow

Example: Define Standard Survey

Mapping between:

- Process perspective
- Functional perspective
- Functional decomposition
- Implementation results