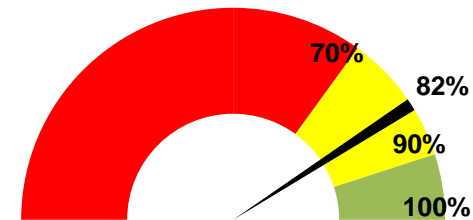


KPI-OSH Tool

Development and validation of a KPI-based method and a user-friendly software tool for resilience-focused measurement of OSH management system performance

Daniel Podgórski
 Central Institute for Labour Protection
 National Research Institute
 Warsaw, Poland



Outline

- **The consortium**
- **Project rationale**
- **Research objectives and methodology**
- **Current results:**
 - **a set of KPIs selected for measuring OSH management system operational performance**
 - **a software tool supporting implementation of KPIs**
- **Further steps within the project**

Project consortium

Partner organization	Country	Project teams	Funding requested from
 Central Institute for Labour Protection - National Research Institute	Poland	Daniel Podgórski, Anna Skład, Katarzyna Buszkiewicz-Seferyńska, Zofia Pawłowska, Małgorzata Pęciłło	Central Institute for Labour Protection - National Research Institute
 Finnish Institute of Occupational Health FIOH	Finland	Jarmo Vorme, Riikka Ruotsala	Finnish Institute of Occupational Health (FIOH) Ministry of Social Affairs and Health (MSAH), Finland
 Research & Innovation	Spain	Jesús Lopez De Ipiña Peña, Julien Negre	Instituto Vasco de Seguridad y Salud Laborales (OSALAN), Spain

Scientific Advisory Panel

Prof. Eric HOLLNAGEL	Denmark	University of Southern Denmark
Prof. Gerard ZWETSLOOT	The Netherlands	TNO - The Netherlands Foundation for Applied Scientific Research
Dr. Markku AALTONEN	Finland	Finnish Institute of Occupational Health
Mario CALDERÓN	Spain	AENOR - The Spanish Association for Standardisation and Certification

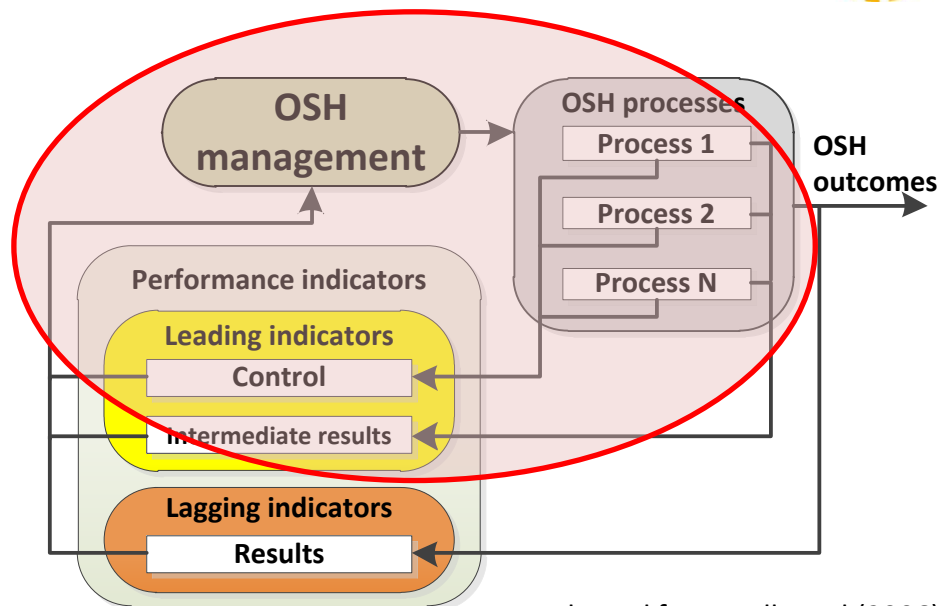
Project rationale

- OSH management systems (OSH MSs), based on OHSAS 18001, ILO-OSH 2001 or national specifications, are maintained in thousands of enterprises all over the world
- There is no sound evidence that OSH MSs are sufficiently effective in terms of preventing occurrence of accidents and diseases at work
- The problem of improving performance of OSH MS has been brought up by the ISO/PC 283 when developing the ISO 45001 draft standard
- The state of affairs calls for a revision of current approaches to OSH MS performance measurement and evaluation
- New resilience-based methods are needed, with a particular focus on the genuine improvement of system operational performance
- **The overall goal** of the project is to facilitate the improvement of effectiveness of OSH MSs by incorporating resilience features into those systems

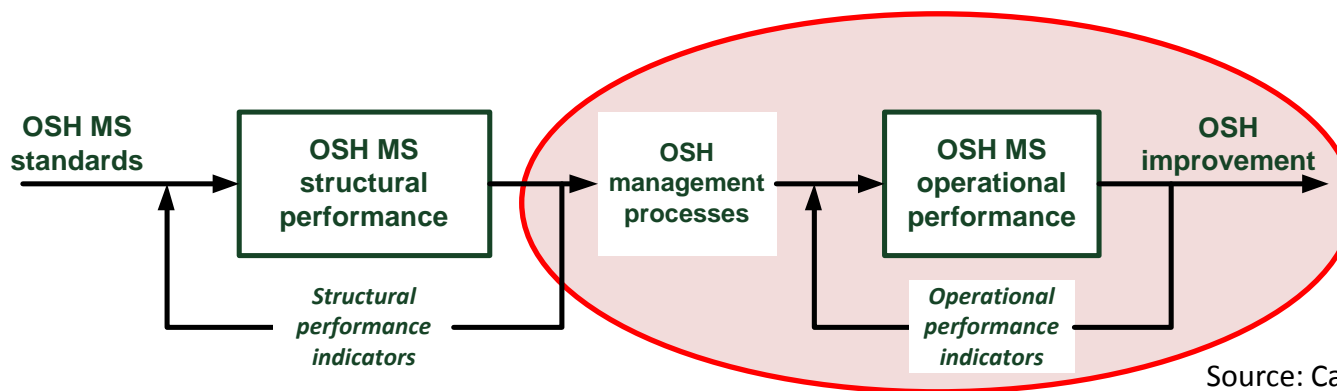
OSH MS operational performance measurement

Three possible approaches to the measurement of OSH MS performance:

- 1) result-based approach (using **lagging** indicators)
- 2) compliance-based approach (using **leading** indicators)
- 3) process-based approach (using **leading** indicators)



Adapted from Hollnagel (2006)



Source: Cambon et al. (2005)

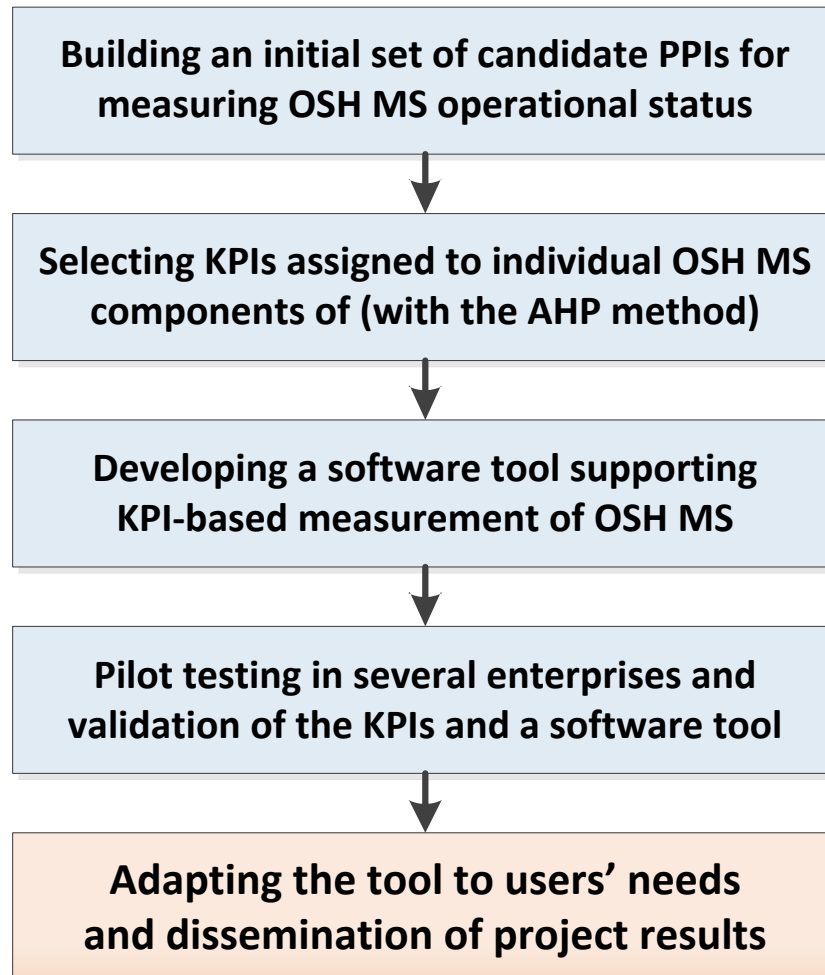
Assumptions for research methodology

- **Focus on OSH processes and operational performance**
- **The methods and tools developed so far for the measurement of OSH MS performance are characterized by large numbers (up to several hundreds) of leading performance indicators**
- **Practical application of such complex measurement systems involves large investment of time, the need for training personnel, a large volume of information to be processed, etc.**
- ***“... it is worse to measure too many things than it is to not measure anything at all.” (Brown, 1998)***
- **New solutions for OSH MS performance measurement should comprise a minimum number of performance indicators (KPIs)**

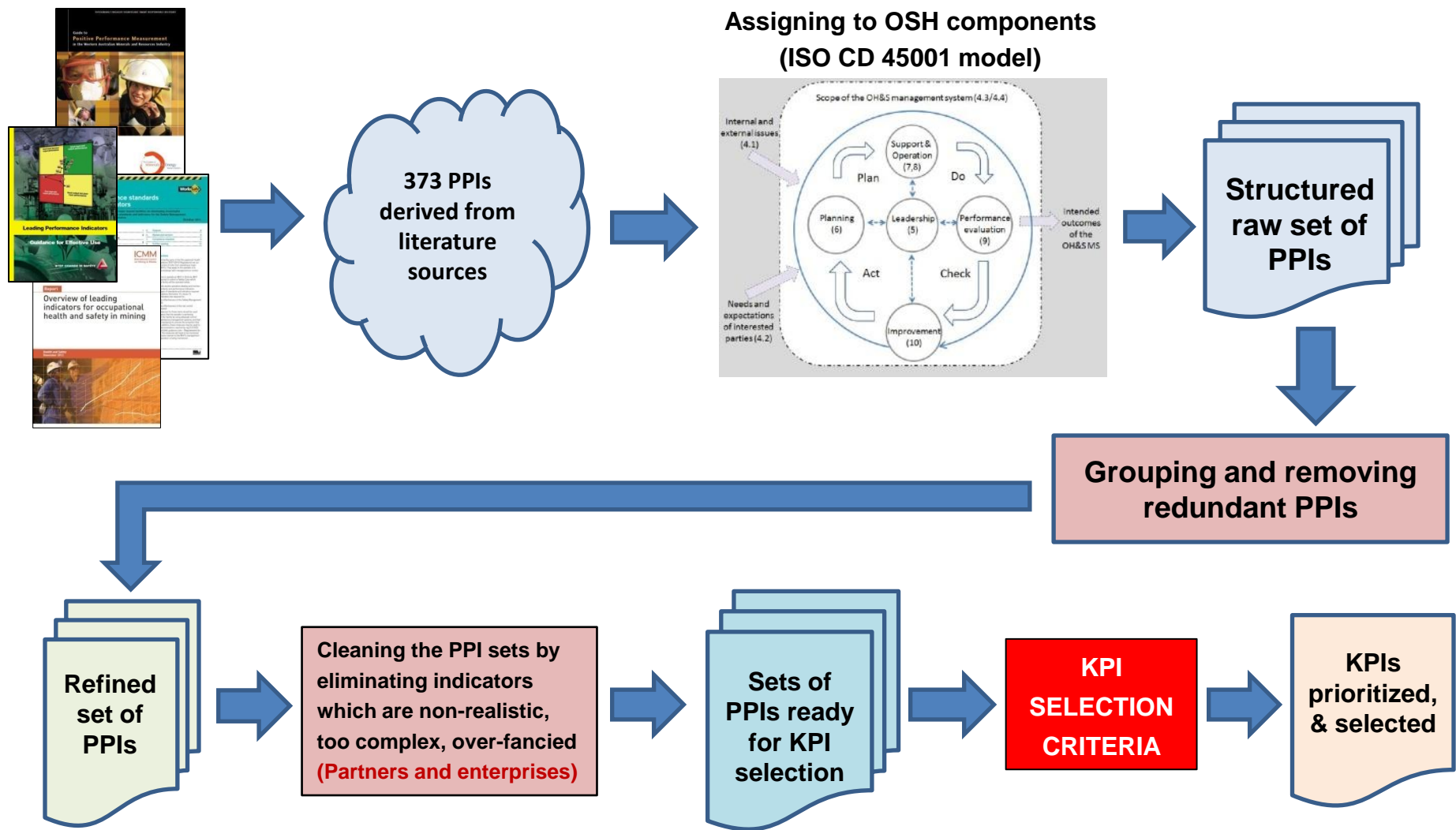
Research objectives

- To develop **a relatively small set of KPIs** (ca. 20-30) assigned to individual components of the OSH management system
 - The KPIs should allow the managers to measure on a daily basis the operational performance of the OSH MS
- To **validate a method for prioritization of PPIs** applied for measuring OSH MS operational performance
 - The proposed method may be adopted by enterprises for **determination of their own sets of KPIs**, which would be better tailored to their specific conditions

An overview of the project methodology



General overview of the process of building a set of KPIs



Examples of literature sources analysed

- Hinze J., Thurman S., Wehle A., 2013. **Leading indicators of construction safety performance.** Safety Science, 51, 23-28.
- Reiman T., Pietikäinen E., 2012. **Leading indicators of system safety - Monitoring and driving the organizational safety potential.** Safety Science 50, 1993–2000.
- Department of Employment and Workplace Relations, 2005. **Guidance on the Use of Positive Performance Indicators to Improve Workplace Health and Safety.** Office of Australian Safety and Compensation Council, Australia.
- Victorian WorkCover Authority, 2011. **Guidance Note. Performance standards and indicators.** WorkSafe Victoria Advisory Service.
- Step Change in Safety, 2003. **Leading Performance Indicators. Guidance for Effective Use.** Step Change in Safety, UK.
- WMC Resources Ltd, 2004. **Establishing EHS KPIs and KBIs Guideline.** WMC Resources Ltd., Australia.
- International Council on Mining and Metals (ICMM), 2012. **Overview of leading indicators for occupational health and safety in mining.** International Council on Mining and Metals (ICMM), London, UK.
- The Chamber of Minerals & Energy Western Australia, 2004. **Guide to Positive Performance Measurement in the Western Australian Minerals and Resources Industry.** The Chamber of Minerals & Energy, Western Australia.

Elimination of redundant indicators (grouping of PPIs)

Comp. no.	PPIs derived from the literature	PPIs grouped with regard to their similar definition, structure and meaning, and being based on the same input data	Indicator representing PPIs of a given group
Leadership			
5.1. Leadership and commitment			
A.	<ul style="list-style-type: none"> - Workers' rating of supervisors/project management's commitment to OHS (6.18) - Percent of jobsite toolbox meetings attended by jobsite supervisors/managers (8.6) - Percent of jobsite pre-task planning meetings attended by jobsite supervisors/managers (8.7) - Frequency and quality of OHS reporting by or to senior management (10.2) - Employee perception of management commitment (10.26) - Perceptions of management commitment to safety (12.13) - Staff perceptions of management commitment to health (12.50) - Management commitment to OHS (staff perception) (14.27) - % of safety leadership acts carried out against target (14.47) - % managers attended OHS leadership training (15.2) - % managers participation in audits (15.3) - % of OHS training that is opened by a senior manager (15.4) - % of safety meetings attended by senior managers (15.5) - % of workers rating manager commitment to OHS as high or % of high ratings from overall findings (15.50) - % of safety meetings attended by senior managers (15.179) - % of managers participating in incident investigation (15.331) - % of managers leading an incident investigation (15.332) - % of audit results reviewed by senior management (15.346) 	<ul style="list-style-type: none"> - Workers' rating of supervisors/project management's commitment to OHS - Employee perception of management commitment - Perceptions of management commitment to safety - Staff perceptions of management commitment to health - Management commitment to OHS (staff perception) - % of workers rating manager commitment to OHS as high or % of high ratings from overall findings 	<p>A1. Employee perception of management leadership and commitment to OSH (rating resulting from the survey)</p>
		<ul style="list-style-type: none"> - Percent of jobsite toolbox meetings attended by jobsite supervisors/managers - Percent of jobsite pre-task planning meetings attended by jobsite supervisors/managers - % of safety meetings attended by senior managers 	<p>A2. % of safety meetings attended by senior managers</p>
		<ul style="list-style-type: none"> - % of safety leadership acts carried out against target 	<p>A3. % of safety leadership acts carried out against target</p>
		<ul style="list-style-type: none"> - % managers attended OHS leadership training 	<p>A4. % managers attended OSH leadership training</p>
		<ul style="list-style-type: none"> - % managers participation in audits - % of audit results reviewed by senior management 	<p>A5. % of audit results reviewed by senior managers</p>
		<ul style="list-style-type: none"> - % of OHS training that is opened by a senior manager 	<p>A6. % of OSH training that is opened by a senior manager</p>
		<ul style="list-style-type: none"> - % of managers participating in incident investigation - % of managers leading an incident investigation 	<p>A7. % of managers participating in or leading incident investigation</p>

Results: 120 PPIs in 23 subsets assigned to individual OSH MS components

Table for consulting PPIs with safety managers in enterprises

PPI No.	PPIs proposed for a given OSH MS component	Is this indicator already in use? If not, do you collect the data to calculate the of the indicator?	Will the indicator provide an added value to your OSH MS and be useful for the company?	Would you change your indicator into this new one?	How would you like to change (reformulate) this new indicator?	A timeframe in which the process being monitored may noticeably change	Frequency of measurements (weekly, monthly, quarterly etc.)
A.	LEADERSHIP AND COMMITMENT						
A1.	Employee perception of management leadership and commitment to OSH (rating resulting from the survey)						
A2.	% of safety meetings attended by senior managers						
A3.	% of safety-focused actions with demonstrated leadership carried out by managers against target						
A4.	% managers attended OSH leadership training						
A5.	% of audit results reviewed by senior managers						
A6.	% of OSH training that is opened by a senior manager						
A7.	% of managers participating in or leading incident investigation						
	Suggestions for other PPIs for component A:						

Results of consultations: 65 PPIs divided into 20 subsets

Examples of PPIs subsets prepared for KPI selection

3	Hazard identification
7.	% of hazards with control measures applied
8.	No of hazards related to particular groups
9.	No of hazard investigations for non-routine operations
10.	% hazard investigations reviewed
7	Competence
21.	% of OSH courses completed vs. plan
24.	OSH training effectiveness (survey)
26.	% of incidents with training contributing
9	Awareness
27.	No. workers' failures & braking safety rules reported
28.	Workers' involvement in OSH (safety culture level)
29.	No. near-misses reported by workers (e.g. per 10 workers)

Criteria for the selection of performance indicators

Examples found in the literature:

- **Wreathall J., 2001. *Final Report on Leading Indicators of Human Performance***, EPRI, Palo Alto, CA, and the U.S. Department of Energy, Washington, DC, USA.
- **Kjellen U., 2009. *The safety measurement problem revisited***. Safety Science, 47 (4), 486-489
- **Hale A., 2009. *Why safety performance indicators?*** Safety Science, 47 (4), 479-480
- **Hollnagel E., 2013. *The Resilience Analysis Grid (RAG)***
- **Step Change in Safety, 2003. *Leading Performance Indicators. Guidance for for Effective Use***.
- **SMART** (Specific, Measurable, Achievable, Relevant, Time-bound)

Comparison of the criteria for the selection of KPIs

Criterion	Wreathall (2001)	SCS (2003)	Kjellen (2009)	Hale (2009)	Hollnagel (2013)	SMART (McGerty, 2013)
Relevant	Simple to understand/worthy goals/face validity: The measures of the indicator will almost inevitably become the subject of management attention and effort. This attention should, in itself, move human performance in a desirable direction.	Relevant to the organisation or workgroup whose performance is being measured.	Valid and representative of what is to be measured.	Representative: does the set of KPIs cover all of the aspects which are relevant?	Meaningful: Indicators are relevant to production and safety and can be used to address what is happening to the system in a specific context. Indicators provide information that guides future actions.	Relevant: The KPI must give more insight in the performance of the organization in obtaining its strategy. If a KPI is not measuring a part of the strategy, acting on it doesn't affect the organizations' performance. Therefore an irrelevant KPI is useless.
Compre-hended		Understood and owned by the workgroup whose performance is being measured.	Indicators should be comprehended by those in charge with the responsibility of using them.		Inter-subjective verifiability: Indicators are understood in the same manner by different people either from the same technical community, or from society at large.	Specific: It has to be clear what the KPI exactly measures. There has to be one widely-accepted definition of the KPI to make sure the different users interpret it the same way and, as a result, come to the same and right conclusions which they can act on.
Measurable	Quantitative: The value of the indicator can be measured and trended so that it is possible to be aware that changes are taking place.		Quantifiable and permitting statistical analyses. Provide minimum variability when measuring the same conditions.		Measurable: The values of indicators can be rendered in a concise manner, either quantitative or qualitative.	Measurable: The KPI has to be measurable to define a standard, budget or norm, to make it possible to measure the actual value and to make the actual value comparable to the budgeted value.
Sensitive			Sensitive to change in environmental or behavioural conditions.	Sensitive: does it respond to changes in what it is measuring with sufficiently large changes in the indicator to become statistically significant over a reasonably short time?	Sensitive: Indicators provide a clear indication of changes over a reasonable time.	
Reliable		Providing immediate and reliable indications of the level of performance.		Reliable: does it give the same measurement when used by different people on the same situation, or on different occasions by one person on that same situation?	Reliable: Indicators lead to the same interpretations when is used by different people on the same situation.	

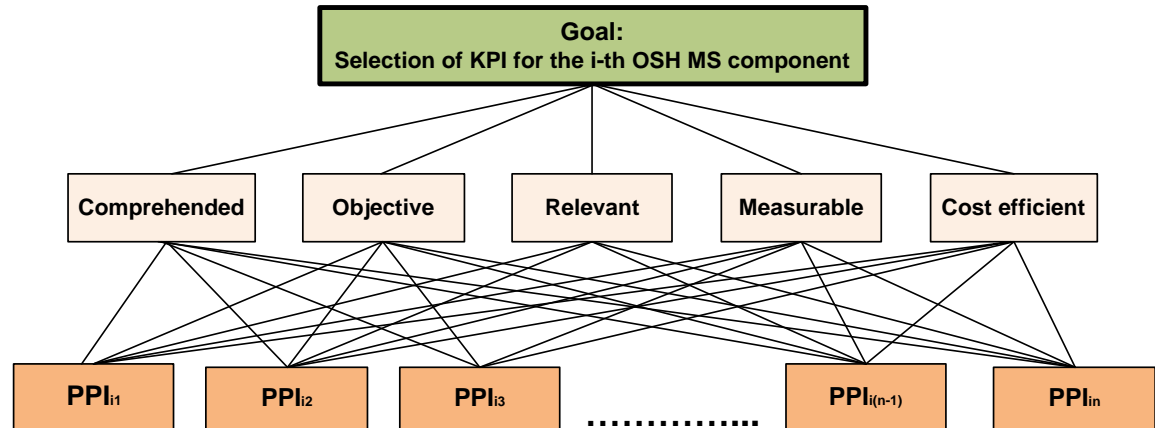
Criteria proposed for KPI-OSH Tool project

<p>Comprehended</p>	<ul style="list-style-type: none"> • Clearly defined to be easily understood and communicated by/to all persons participating in and/or supervising the process (communication power)
<p>Objective</p>	<ul style="list-style-type: none"> • Based on objective sources of data • It is impossible to manipulate its value without introducing real changes to OSH management processes
<p>Relevant</p>	<ul style="list-style-type: none"> • Representative for monitoring operational performance of a given OSH MS component • Providing information relevant for corrective/preventive action (potential for the improvement)
<p>Measurable</p>	<ul style="list-style-type: none"> • Data easy to be collected, measured and calculated • Sensitive to small changes of the working environment • Capable to measure process dynamics
<p>Cost efficient</p>	<ul style="list-style-type: none"> • Arrangements and resources necessary for the measurement are available • Benefits for OSH exceed the costs of measurements

Analytic Hierarchy Process - AHP

The AHP is implemented in four stages:

1. **Decomposition of a decision problem** by constructing a hierarchical model of criteria and decision variants
2. **Pairwise comparison of the criteria**, and generating the vector of weights for individual criteria
3. **Pairwise comparison of decision variants in relation to individual criteria**
4. **Creating the vector of global preferences of decision variants**



Ranking criteria by pairwise comparisons

MakeltRational Decision Sof... - makeitratonal.com

KPIs - Hazard Identification - MakeltRational Desktop, Release date: 2012-04-28, Updates

Project 1. Alternatives 2. Criteria 3. Evaluation 4. Results 5. Report

Evaluator 1
8/13/2014 2:16:13 PM

Save Evaluators

Evaluation context

- ✓ Prioritization of PPIs for operational performance of OSH MS comp
 - ✓ Comprehended [9,2 %]
 - ✓ Cost efficient [9,9 %]
 - ✓ Measurable [7,9 %]
 - ✓ Objective [7,8 %]
 - ✓ Relevant [0,5 %]

Pairwise comparisons in the context of: Prioritization of PPIs for operational performance of OSH MS comp

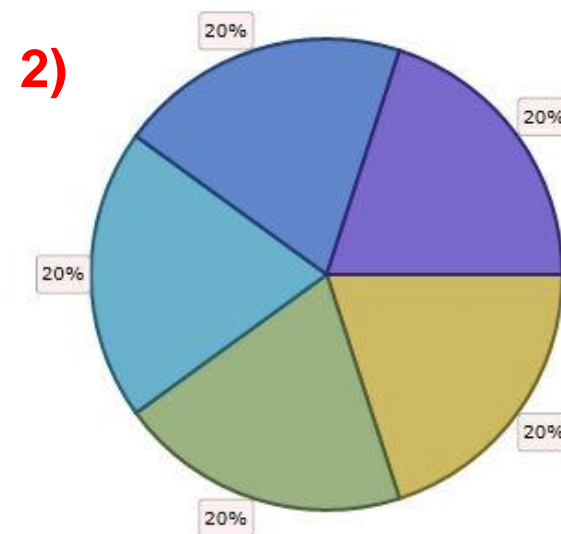
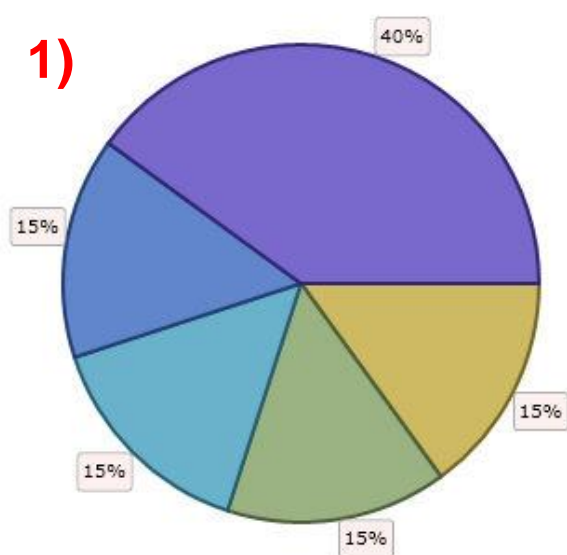
Expand all Hide descriptions

<p>Cost efficient</p> <ul style="list-style-type: none"> - Resources necessary for the measurement are available - The cost can be acceptable for the enterprise - Benefits for OSH management are higher than costs 	<p>Comprehended</p> <ul style="list-style-type: none"> - Clearly defined to ensure uniform interpretation - Understood by the people working within the process - Understood by people monitoring the process
<p>Measurable</p> <ul style="list-style-type: none"> - Data to conduct measurement are technically available - Provides up-to-date and reliable information on the process - Sensitive to small changes in environment and behaviours - Ensures only minor deviations of the measured parameter - Allows for statistical analysis and estimating future trends 	<p>Comprehended</p> <ul style="list-style-type: none"> - Clearly defined to ensure uniform interpretation - Understood by the people working within the process - Understood by people monitoring the process
<p>Measurable</p> <ul style="list-style-type: none"> - Data to conduct measurement are technically available - Provides up-to-date and reliable information on the process - Sensitive to small changes in environment and behaviours - Ensures only minor deviations of the measured parameter - Allows for statistical analysis and estimating future trends 	<p>Cost efficient</p> <ul style="list-style-type: none"> - Resources necessary for the measurement are available - The cost can be acceptable for the enterprise - Benefits for OSH management are higher than costs
<p>Measurable</p> <ul style="list-style-type: none"> - Data to conduct measurement are technically available - Provides up-to-date and reliable information on the process - Sensitive to small changes in environment and behaviours - Ensures only minor deviations of the measured parameter - Allows for statistical analysis and estimating future trends 	<p>Objective</p> <ul style="list-style-type: none"> - Value determined on the basis of objective sources - Non-manipalatable without changes in OSH MS

AHP comparisons supported by **MakeltRational** tool (makeitratonal.com)

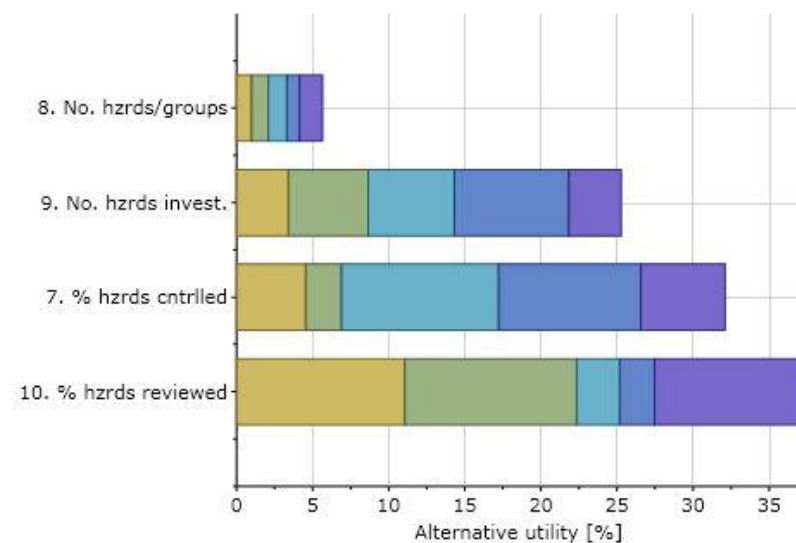
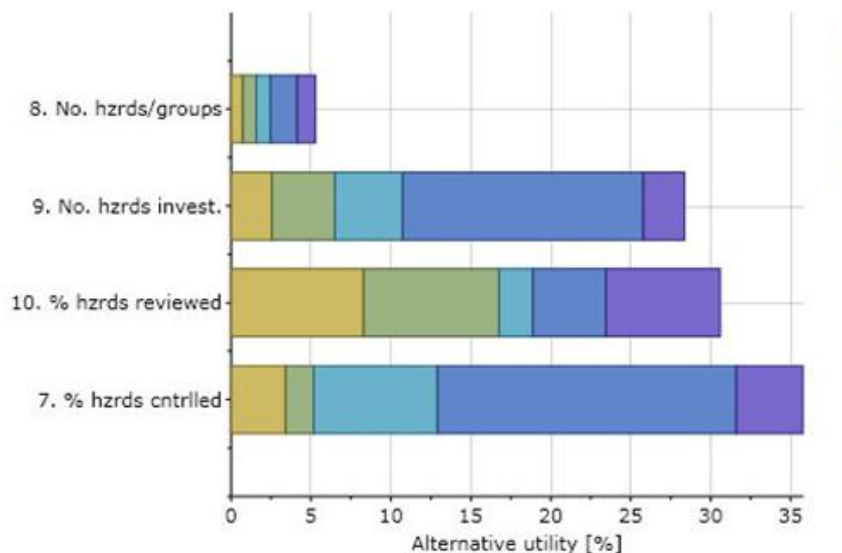
Weights of the criteria - two parallel approaches

1. **Specific distinction of the Relevant** criterion by giving it the weight of 40%, and equal weights of 15% for the remaining ones
2. All five criteria with equal weights (20% each)



Example results of prioritization of PPIs

Hazard Identification



Diversified weights of criteria (40% + 4 x 15%)

Equal weights (5 x 20%)

OSH MS component	Recommended KPIs	
	1st choice	Alternative
3. Hazard identification	% of hazards with control measures applied (against the total no. of identified hazards) (7)	% of hazard investigations reviewed (against the total no. of investigations) (10)

List of selected KPIs (1/3)

20 main KPIs + 7 alternative

OSH MS area	No.	Acronym		KPI definition	OSH MS component	Meas. frequency
Leadership	1.	AR	AudRevd	Percentage of internal audit reports reviewed by senior managers (against the number of audits conducted in a given reporting period)	<i>Leadership and commitment</i>	Yearly
	2.	LP1	LeadPerc(1) (alternative)	Workers' perception of management leadership and commitment to OSH (rating resulting from a survey)	<i>Leadership and commitment</i>	Yearly
	3.	LP2	LeadPerc(2) (alternative)	Percentage of workers positively evaluating management leadership and commitment to OSH (against total number of workers, rating resulting from a survey)		
	4.	JA	JobsAssd	Percentage of job descriptions reviewed and updated in a given reporting period for their compliance with OSH management system requirements (against the total number of jobs planned to be reviewed)	<i>Organizational roles, responsibilities, accountabilities and authorities</i>	Quarterly
Planning	Risk management	5.	HC	HazCntrl	<i>Hazard identification</i>	Quarterly
		6.	HR	HazRevd (alternative)		Quarterly
		7.	RA	RiskAssd	<i>Assessment of OSH risks</i>	Quarterly
		8.	RC	RiskCntrl	<i>Planning to take action</i>	Monthly or weekly
	OSH plans	9.	OA	ObjAchvd	<i>Planning to achieve OSH objectives</i>	Yearly

List of selected KPIs (2/3)

20 main KPIs + 7 alternative


OSH MS area	No.	Acronym		KPI definition	OSH MS component	Meas. frequency
Support	10.	TC	TrainCmpld	Percentage of OSH training courses completed according to the plan in a given reporting period	Competence <i>Part1: Training effectiveness</i>	Quarterly
	11.	TE	TrainEffctv (alternative)	OSH training effectiveness and appropriateness (based on findings from surveys conducted among the workers)		Quarterly
	12.	PR	PermRevd	Percentage of permits to work reviewed and positively assessed with regard to OSH requirements in a given reporting period (against the total number of work permits subject to periodic reviews)	Competence <i>Part 2: Monitoring workers' competences</i>	Quarterly or Monthly
	13.	WT	WrksTrained (alternative)	Percentage of workers trained in accordance with OSH training plan (against the total number of workers to be trained in a given reporting period)		Quarterly
	14.	NM	NearMiss	Number of near-misses reported by workers (per 10 workers) in a given reporting period	Awareness Participation, consultation and representation	Quarterly
	15.	SM	SmgrMtgs	Number of meetings between senior managers and workers in a given reporting period, at which senior managers presented to and discussed with workers information on OSH issues	Information and communication	Every 6 months
	16.	WP	WrkrPart	Percentage of workers involved in making proposals for OSH improvements in a given reporting period (against total number of workers)	Participation, consultation and representation	Every 6 months
Operations	17.	EC	EqpmtCost	Cost of failures of the equipment related to ensuring safety conditions at the workplace against the number of equipment items subject to repair or a replacement	Operational planning and control	Monthly
	18.	PM	PrevMaint (alternative)	Percentage of preventive maintenance activities performed in a given reporting period against the total number of activities planned in this period		Monthly

List of selected KPIs (3/3)

20 main KPIs + 7 alternative

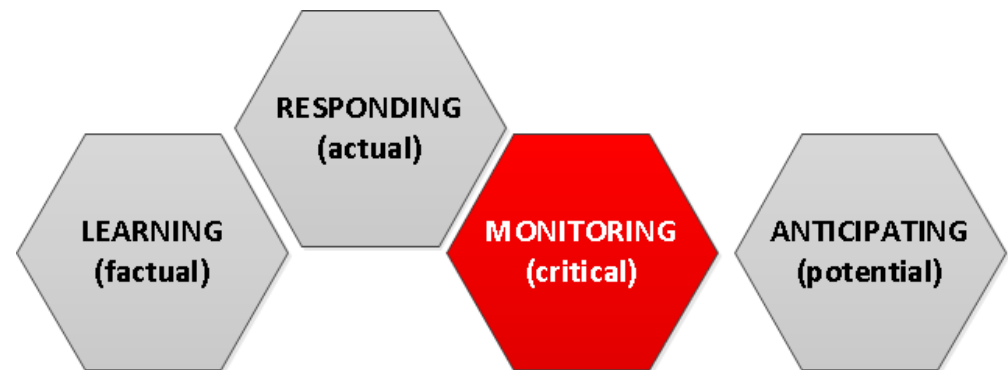
OSH MS area	No.	Acronym		KPI definition	OSH MS component	Meas. frequency
Operations	19.	PS	ProcSpec	Percentage of specifications with reference to OSH requirements when purchasing new equipment or contracting services (against the total number of specifications applied in a given reporting period)	<i>Procurement</i>	Every 6 months
	20.	CM	ContrMtgs	Number of joint meetings with contractors on OSH issues (against the total number of contractors providing services to an organisation in a given reporting period)	<i>Contractors</i>	Every 6 months
	21.	ER	EmrgResp	Percentage of workers trained in emergency preparedness, response and coordination per unit (against total number of workers in a given reporting period)	<i>Emergency preparedness and response Competence</i>	Every 6 months
Performance evaluation	22.	MC	MntrgCmpld	Percentage of monitoring and measurement activities completed according to schedule in a given reporting period	<i>Monitoring, measurement, analysis and evaluation</i>	Monthly
	23.	AN	AudNocnf	Number of non-conformities and areas for potential improvement identified as a result of OSH management system internal audits in a given reporting period (against the total number of internal audits)	<i>Internal audit process</i>	Every 6 months
	24.	AC	AudCndct (alternative)	Percentage of internal audits conducted according to a schedule in a given reporting period		Quarterly
	25.	MR	MsysRevd	Percentage of OSH management system issues reviewed by top management according to schedule in a given reporting period	<i>Management review</i>	Yearly
Improvement	26.	CA	CrctvActn	Percentage of corrective/preventive actions completed according to a schedule in a given reporting period	<i>Incident, nonconformity and corrective action</i>	Quarterly
	27.	IM	ImpMntrg	Percentage of monitoring and measurement activities that produced results positively exceeding target values (against the total number of monitoring and measurement activities performed in a given reporting period)	<i>Continual improvement</i>	Monthly



<p>5. HC HazCntrl [1] Acronym:</p>	<p>[2] KPI name: Percentage of hazards with control measures applied (against the total number of new hazards identified in a given reporting period)</p>	
<p>[3] OSH MS component: 6.1.2. Hazard Identification</p>		
<p>[4] Necessary data to calculate the KPI:</p> <p>X_i - No. of newly identified hazards¹ in i-th unit, in respect to which appropriate control measures have been implemented according to schedule² within a given reporting period;</p> <p>Y_i - Total no. of newly identified hazards in i-th unit, in respect to which appropriate control measures should have been implemented within a given reporting period;</p> <p>N - No. of units conducting hazard identification and collecting data on newly identified hazards.</p> <p>¹Hazards identified at new workstations, in new processes/machines, or hazards identified as new ones at existing workstations/processes. The number of newly identified hazard may refer to hazards identified prior or within a reporting period.</p> <p>²The length of the period required for planning and the implementation of control measures after the identification of a hazard can be specified (e.g. no. of days) or unlimited.</p>		<p>[5] Calculation formula:</p> $HC_i = X_i / Y_i \cdot 100\%$ $HC = \left(\sum_{i=1}^N HC_i \right) / N$
<p>[6] Source of data: Internal reports or records resulting from risk assessment/management processes, which include the identification of hazards in individual units of the enterprise (maintained by heads of the units and/or by the safety manager/OSH department).</p>		
<p>[7] Measurement frequency: Quarterly</p>	<p>[8] Graphical representation: HC current value: semicircular speedometer (with colour policy) HC_i current values: vertical bars (one for each unit³, but ≤ 10) HC historical values: vertical bars for X past reporting periods³ ³ No. of bars for units & periods should be set up by the user (no. ≤ 10).</p>	<p>[9] Colour policy: Red: HC < 70% Yellow: 70% ≤ HC ≤ 90% Green: HC > 90%</p>
<p>[10] The method of the KPI implementation in the enterprise:</p> <ul style="list-style-type: none"> - Reviewing procedures, reports and other OSH MS documents related to hazard identification, risk assessment and implementation of control measures aimed at elimination/reduction of risks; - Identification of units/positions which are responsible for conducting and documenting results of hazard identification and risk management procedures; - Modification of respective procedures to ensure ongoing identification and regular reporting a number and types of newly identified hazards to a responsible OSH unit. 		

KPIs from the resilience perspective

- How can the use of KPIs contribute to four basic capabilities of the resilient organisation?
- **Resilience:** *The intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions*
- **Selected KPIs should contribute to all four basic abilities of the resilient system**



Source: Hollnagel (2013)

Example: potential KPI impact on the resilience

EmrgResp: Percentage of workers with valid training in emergency preparedness, response and coordination

EmrgResp contribution to four essential abilities of a resilient system:

Responding: The KPI provides information on the performance of organisational arrangements aimed at ensuring appropriate emergency preparedness and response. Thus, the KPI indicates the level of operational readiness to respond to any incidents, emergencies and major hazards.

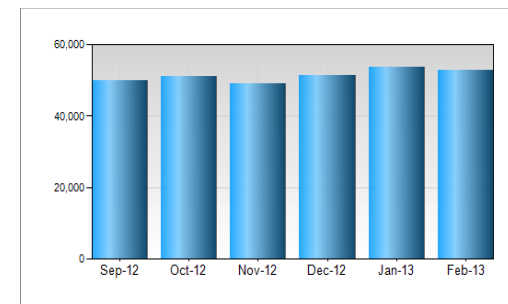
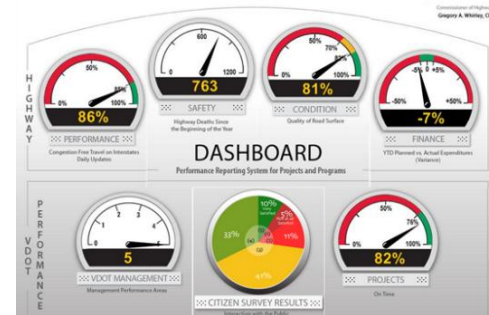
Monitoring: The KPI contributes to monitoring performance of organisational arrangements aimed at ensuring workers' competencies regarding emergency preparedness, response and coordination actions.

Anticipating: The KPI provides information on the performance of organisational arrangements aimed at ensuring appropriate emergency preparedness and response. Thus, the KPI indicates the level of operational readiness to anticipate the occurrence of potential incidents, emergencies and major hazards.

Learning: No direct contribution to improving this ability.

Practical implementation of KPIs in enterprises

- A standalone software based on applications of MS Excel and Word
- Supporting implementation and monitoring of KPIs in companies
- Providing managers with a concise picture of OSH MS performance
- Main features and functionalities:
 - easily customizable and user-friendly
 - selecting preferred KPIs (out of 27 predefined KPIs)
 - tailoring KPIs to specific conditions in an enterprise
 - creating and using additional KPIs (if needed)
 - calculating KPIs for respective reporting periods
 - displaying KPI diagrams customized by the users
 - generating reports in MS Word and Excel formats



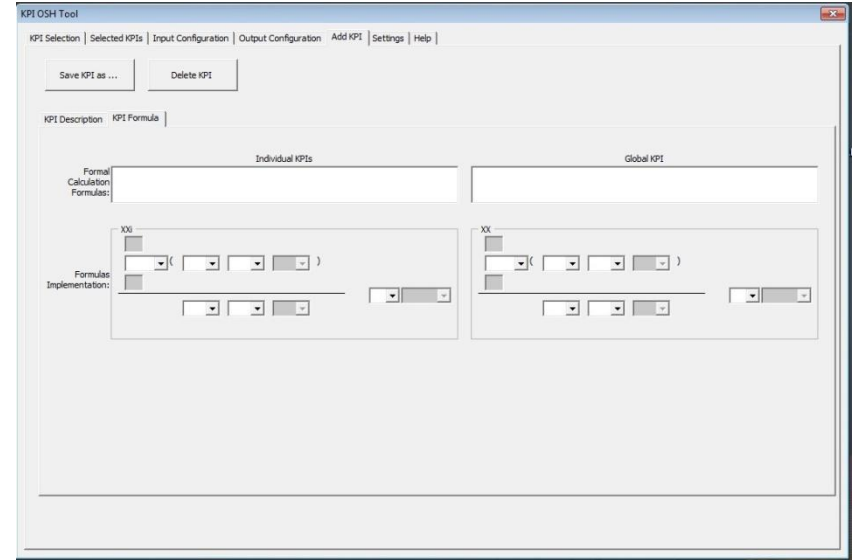
Software tool user interface (example screens)



KPI Selection | Selected KPIs | Input Configuration | Output Configuration | Add KPI | Settings | Help

Category	KPI Name	Selected	
Leadership	Leadership and commitment	AudRevd AR	<input checked="" type="checkbox"/>
		LeadPerc(1) LP1	<input type="checkbox"/>
		LeadPerc(2) LP2	<input type="checkbox"/>
Planning	Organizational roles, responsibilities and authorities	JobsAssd JA	<input type="checkbox"/>
	Hazard identification	HazCrtrl HC	<input type="checkbox"/>
		HazRevd HR	<input type="checkbox"/>
	Assessment of OSH risks	RiskAssd RA	<input checked="" type="checkbox"/>
	Planning to take action	RiskCrtrl RC	<input checked="" type="checkbox"/>
Support	Planning to achieve OSH objectives	ObjAchvd OA	<input type="checkbox"/>
	Competence (Training effectiveness)	TrainCmpld TC	<input checked="" type="checkbox"/>
		TrainEffectv TE	<input checked="" type="checkbox"/>
	Competence (Monitoring workers' competences)	PermRevd PR	<input type="checkbox"/>
	WrksTrand	<input type="checkbox"/>	

Define my own customized KPIs



KPI Selection | Selected KPIs | Input Configuration | Output Configuration | Add KPI | Settings | Help

Save KPI as ... Delete KPI

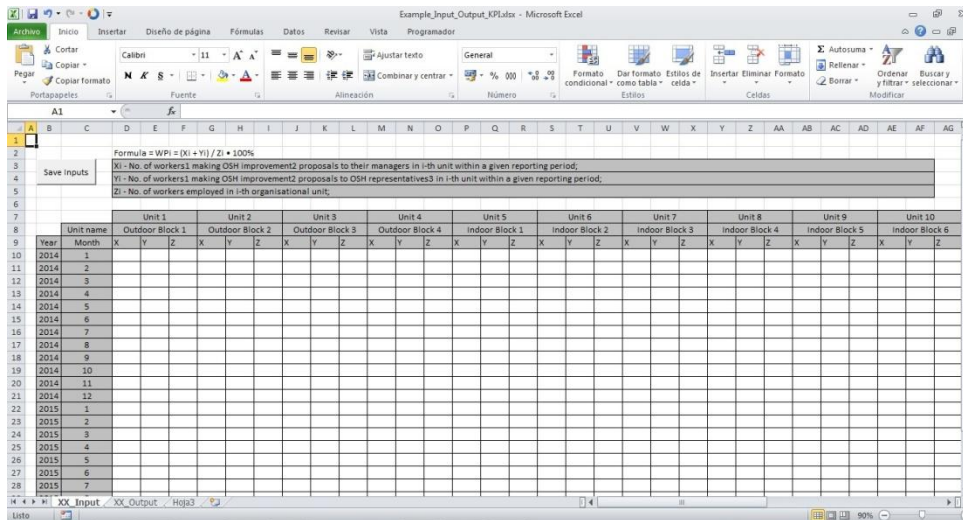
KPI Description | KPI Formula

Formal Calculation Formulas:

Individual KPIs: $XX = (\dots)$

Global KPI: $XX = (\dots)$

Formulas Implementation:

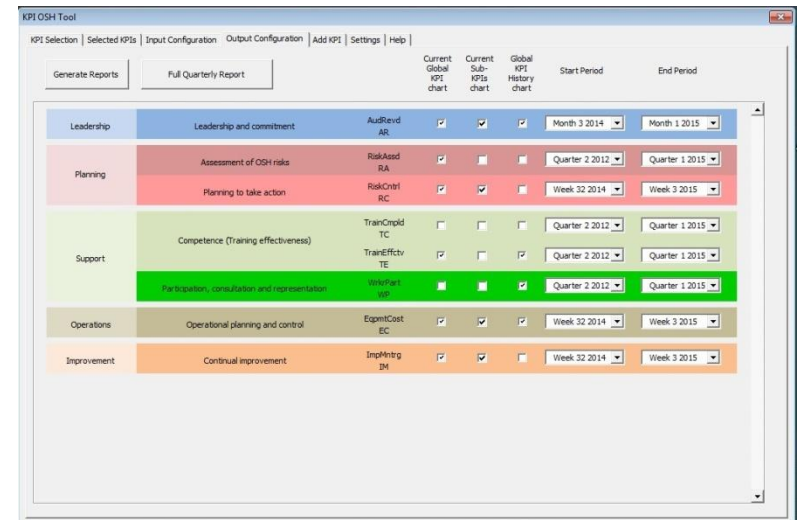


Example_Input_Output_KPI.xlsx - Microsoft Excel

Formula = $WPI = (X1 + Y1) / Z1 * 100\%$

X1 - No. of workers1 making OSH improvement2 proposals to their managers in i-th unit within a given reporting period;
 Y1 - No. of workers1 making OSH improvement2 proposals to OSH representatives3 in i-th unit within a given reporting period;
 Z1 - No. of workers employed in i-th organizational unit;

Year	Month	Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6		Unit 7		Unit 8		Unit 9		Unit 10		
		Outdoor Block 1	Outdoor Block 2	Outdoor Block 3	Outdoor Block 4	Indoor Block 1	Indoor Block 2	Indoor Block 3	Indoor Block 4	Indoor Block 5	Indoor Block 6	Indoor Block 7	Indoor Block 8	Indoor Block 9	Indoor Block 10	Indoor Block 11	Indoor Block 12	Indoor Block 13	Indoor Block 14	Indoor Block 15	Indoor Block 16	
2014	1	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
2014	2																					
2014	3																					
2014	4																					
2014	5																					
2014	6																					
2014	7																					
2014	8																					
2014	9																					
2014	10																					
2014	11																					
2014	12																					
2015	1																					
2015	2																					
2015	3																					
2015	4																					
2015	5																					
2015	6																					
2015	7																					



KPI Selection | Selected KPIs | Input Configuration | Output Configuration | Add KPI | Settings | Help

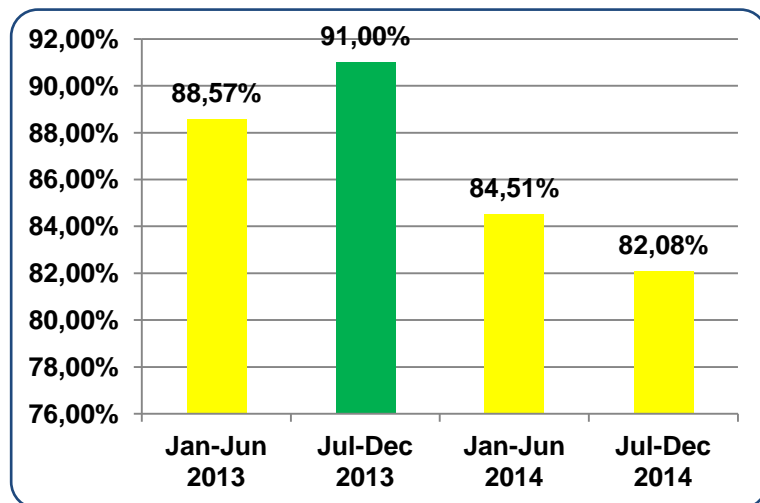
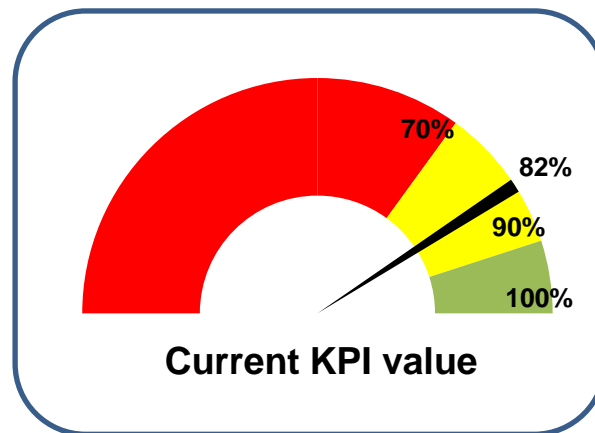
Generate Reports | Full Quarterly Report

Current Global KPI chart | Current Sub-KPIs chart | Global KPI History chart

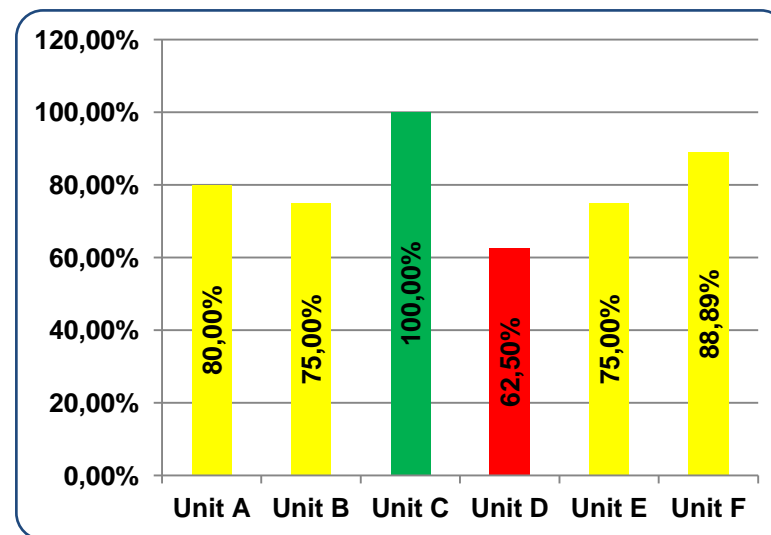
Start Period: Month 3 2014 | End Period: Month 1 2015

Category	KPI Name	Selected	Current	Sub-KPIs	Global History	Start Period	End Period
Leadership	Leadership and commitment	AudRevd AR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Month 3 2014	Month 1 2015
Planning	Assessment of OSH risks	RiskAssd RA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quarter 2 2012	Quarter 1 2015
		RiskCrtrl RC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Week 32 2014	Week 3 2015
Support	Competence (Training effectiveness)	TrainCmpld TC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quarter 2 2012	Quarter 1 2015
		TrainEffectv TE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Quarter 2 2012	Quarter 1 2015
	Participation, consultation and representation	WrksTrand	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Quarter 2 2012	Quarter 1 2015
Operations	Operational planning and control	EqpmCost EC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Week 32 2014	Week 3 2015
Improvement	Continual improvement	ImpKntng BH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Week 32 2014	Week 3 2015

Example KPI diagrams

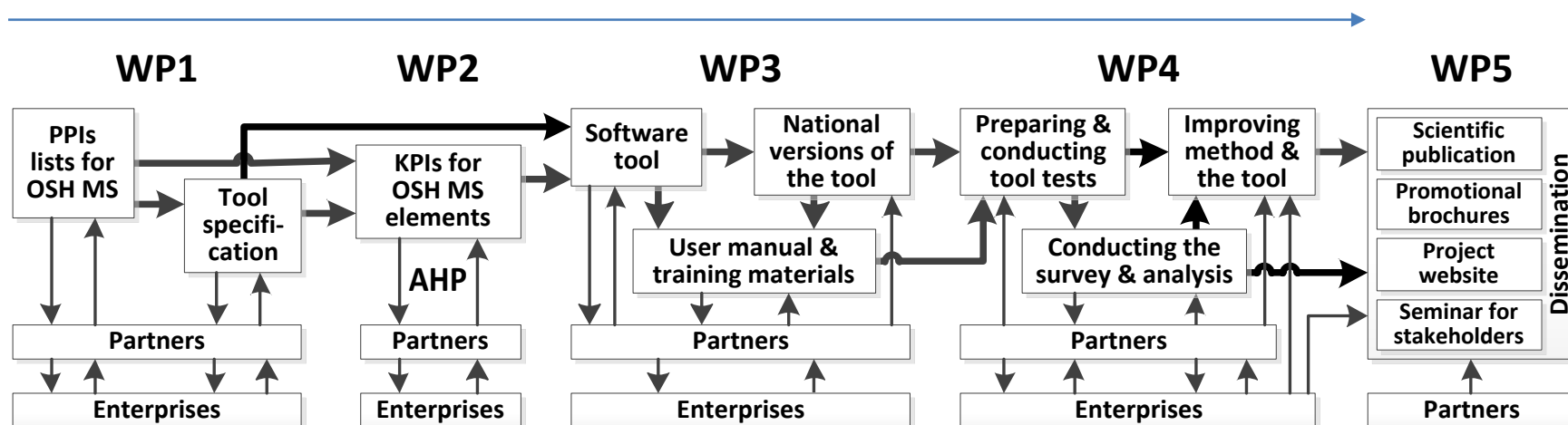


KPI values in selected reporting periods



Values of sub-KPIs for individual units

KPI-OSH Tool project flow diagramme



Project duration: 1 May 2014 – 30 June 2016 (26 months)

Next phases:

- translation of the tool and its manual into Polish and Finnish
- pilot implementation in several enterprises in Poland and Finland



Project information

Workpackages

Consortium

Contact

Useful links

Project website:



KPI-OSH-Tool: Development and validation of a KPI-based method and a user-friendly software tool for resilience-focused measurement of OSH management system performance

This is the official website of the KPI OSH tool project, a COLLABORATIVE project funded by the European Commission in the SAFERA 2013 joint call. The project was launched on the 1st of May 2014 and will run for a total of 26 months.

SAFERA Work programme topics addressed:

Human and organizational factors including the value of safety
T2: Resilience: improving management of safety

The **main objective** of the project is to **improve effectiveness** of OSH management systems (**OSH MSs**) by incorporating **resilience features** into those systems.

To this end an innovative approach based on **company-tailored performance indicators** will be proposed and validated in real conditions.

**Thank you very much
for you attention 😊**

dapod@ciop.pl

More about the project rationale and AHP-based method for KPI selection in the article:

Podgórski D. (2015). *Measuring operational performance of OSH management system – A demonstration of AHP-based selection of leading key performance indicators*. Safety Science, vol. 73, March 2015, 146-166