1. Policy level and fundamentals (rational, objectives, stakeholders)

note: total number of countries = 12

mentioned objectives (in order of frequency):	# countries
provide licencees and RB with objective indicators to assess safety performance and trends	6
provide accurate and understandable information to public, media and other stakeholders	5
provide congress/parliament/ministries/govern. agencies with objective information	4
accurate and objective measurement of safety performance of NPPs	4
allows national and international comparison of safety performance	3
to allocate resources in effective and efficient manner, strengthening of effectiveness of RB	3
to rationalize RB enforcement policy	2
to evaluate and develop the RB's supervision activities	1
to develop co-operation between RB and stakeholders	1
to illustrate levels and trends of NPP performance in a quantitative manner	1
to provide additional tool in overall assessment of safety performance of NPPs	1
to provide additional insights to various inspection activities and the yearly integrated safety assessment of each licensee	1
to provide the program to assess safety performance objectively and reasonably	1
to predict arising problems	1
to identify weaknesses at NPPs	1
to identify timely degradation in safety performance	1
to allow the RB to track causes of degradation of safety level and help to perceive areas and extent of detoriated performance	1
to follow certain aspects of operational safety and to trigger additional investigations if needed	1

mentioned stakeholders:	# countries
Public	6
RB Pilicy Makers	11
Gov/Congress/Parliament	6
Utility/Licensee	12
Inspectors/Assessors	12

2. Current indicator system used (includes information on current pilot indicators)

Indicator areas and indicators	USA	Canada	Spain	Korea	Switzerland	Hungary	Finland	Belgium	Sweden	Slovakia
A. Reactor safety										
A1 Initiating events										
unplanned scrams / RPS actuations	x		x	x	x	x	x	x	x	x
unplanned scrams with LOFW	x							x (pilot)		
unplanned reactor power transients		x								
safety system actuations			x		x	x		x (pilot)		x (2)
significant events (reportable)			x		x	x	x	x (pilot)	x	x (>INES1)
less significant events (disturbance reports)					x	x	x			
event investigations ordered by RB						x				
events caused by technical factors							x			
reportable events during plant shutdown								x (pilot)		
events during tests										x
A2 Mitigating systems										
safety system availability / unavailability/ inoperability	x			x	x	x	x	x (pilot)	x (level 1 and 2)	x
safety system functional failures	x		x				x	x (pilot)		
tests of safety valves						x				
failure of components subject to TS							x			
potential CCFs							x			
Emergency DG reliability (start+ run)								x (pilot)		
failure of safety systems at start										x
failure of safety systems during operation										x
A3 Barriers integrity										
fuel cladding/reliability (RCS specif. activity)	x			x	x		x	x (pilot)	x	x
number of removed fuel bundles due to leakage							x			
RCS / Pressure boundary (leakage)	x			x	x	x	x	x (pilot)		
Number of pressure boundary degradations		x								
Use of stressor cycles						x				
Ratio of plugged SG tubes						x				
Drywell/ Primary Containment/ Hermetic zone					x	x	x (3)	x (pilot)		x
chemistry indexes		x (2)					x			
A4 Operational preparedness										
Number of staff with regulatory licence						x				
Unsuccesfull regulatory exams						x				
A5 Emergency preparedness				x	x					
drill/exercise performance	x	x								
drill participation	x	x				x				
alert and notification system reliability	x									
emergency response resources completion index		x								
deficiencies found during emergency exercises						x				
deficiencies found during regulatory inspections						x				

A6	Operational Risk / Probabilistic Indicators										
	Number of occurrences under effect of TS						x				
	Core-melting index caused by initiating events						x				
	Reliability Analyses					x					
	Configuration Analyses					x					
	Risk of safety system unavailability							x			
	Risk significance of TS equipment failures							x			
	Risk significance of prev. maintenance of TS equipm.							x			
	Risk significance of TS exemptions							x			
	Highly risk significant events (CCDP > 1E-04)								x (pilot)		
	Mitigating System Performance Index	x(pilot)									
B. Occupational and public radiation safety											
B1	Occupational Radiation Safety										
	Occupational Exposure Control Effectiveness	x						x			
	Radiation exposure to workers (collective dose)		x	x	x	x		x	x	x	
	Radiation occurrence index		x								
	Case reports connected to radiation protection						x				
	Dispersion of contamination						x				
	Work programs at high radiation level						x				
B2	Public Radiation Safety / Environmental risk										
	Radiological Effluent Occurrences	x							x (pilot)		
	Public dose/ Environmental Radiation				x	x		x			
	Solid Releases / Solid waste generated					x	x				
	Liquid Releases					x	x	x	x (pilot)		
	Gaseous Releases					x	x	x	x (pilot)		
C. Industrial safety											
C1	Fire safety										
	Number of malfunctions of fire alarms							x			
	Number of real fire alarms							x			
	Number of fires						x	x			x
	Number of other rescue missions							x			
C2	Occupational safety										
	Work accidents						x				
	Accident severity rate		x								
D. Global plant performance											
	Unplanned power changes / load reductions	x			x	x	x		x (pilot)	x	
	Forced outage rate/ Capacity factor / Availability /Unplanned capability loss factor		x	x			x			x	
	Capability loss due to failures							x			

E. Safety Culture / Compliance / Attitude towards safety							
E1	Compliance with procedures/rules/licence req.						
	Number of TS exemptions (temporary changes)			x	x	x (pilot)	x
	Number of TS violations/deviations			x	x	x (pilot)	x
	Number of TS modifications			x			
	Number of cancelled /missed mandatory tests	x		x			
	Violation of instructions		x	x			
	Licensee deviations from regulations/ Non-compliance index	x				x (trial)	
E2	Attitude towards procedures, policies and rules						
	Temporary modifications			x			
	(Temporary) Operating instructions			x			
E3	Human performance						
	Promotion of Training		x				
	Management		x				
	Human Factors		x				
	Unsuitable state of work			x			
	Events due to human failure / MTO related events			x	x	x	x (2)
	Human-based CCFs				x		
	Number of MTO causes					x (level 2)	
	Number of MTO root causes					x (level 2)	
	Set of adminstrative indicators (MTO)					x (trial)	
F	Striving for Improvement						
F1	Self Assessment						
	Independent checks / internal audits		x	x			
	Corrective measures of investigations			x			
	Corrective measures of QA audits			x			
F2	Operating experience feedback						
	Event Reporting Culture		x				
	Evaluation of external occurrences		x				
	Delay of notification of events			x			
	Delay in reporting of events			x			
	Delay in investigation of events			x			
	Recurring events			x		x (pilot)	x (trial)
F3	Other						
	Investments				x		

G. Other safety related processes									
G1 Maintenance									
Inspection of Safety Systems					x				
Operational Maintenance					x				
Ratio of work-instructions beyond plan						x			
Ratio of planned and real duration of outages						x			
Ratio of preventive vs total / corrective maintenance		x				x	x		x (trial)
Ratio of unsuccesful engineering safety reviews						x			
Repair time of TS-components							x		
Events caused by maintenance deficiency								x (pilot)	
Number of maintenance activities									x (level 2)
Components with increased maintenance need trends									x (level 2)
G2 Quality Management									
Quality					x				
Keeping plant documentation current							x		
G3 Management of change									
Change control index (temporary changes)		x							
Events caused by deficiency in modif. manag. process								x (pilot)	
H. Physical Protection									
Protected Area Safety Equipment Performance Index	x								
Personnel Screening Program Performance	x								
FFD/Personnel Reliability Program Performance	x								
Use of thresholds	x			x	x	x			x (partial)
Time windows (CY=calendar year, GW= gliding window)	GW			CY	CY	CY	CY	CY	GW

4. How are indicators used by Regulatory Agencies

	# countries	USA	Canada
development of inspection program based on PI data	4	x	
increased RB response when threshold values are crossed (additional inspection)	4	x	
regulatory action determined by integrated picture (PI combined with other info)	2		x
indicator trending used internally to focus on problematic areas	2		
regulatory action depending on trend violation and margin to safety	1		
indicators are compared among plants to rank regulatory responses	1		
indicators are compared with those of foreign plants (performance evaluation)	1		
annual reports with evaluation of safety level of NPPs from PI point of view	1		
indicators are reported to parliament	1		
reporting of selection of indicators to host ministries	1		
trending of indicators left to individual responsability of inspectors	1		

Spain	Swizerland	Hungary	Finland	Sweden	Belgium	Slovakia
	x		x			x
	x	x				x
				x		
x			x			
			x			
x						
x						
			x			
x						
			x			
					x	