iNTeg-Risk: Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risks

iNTeg-Risk SP1 :

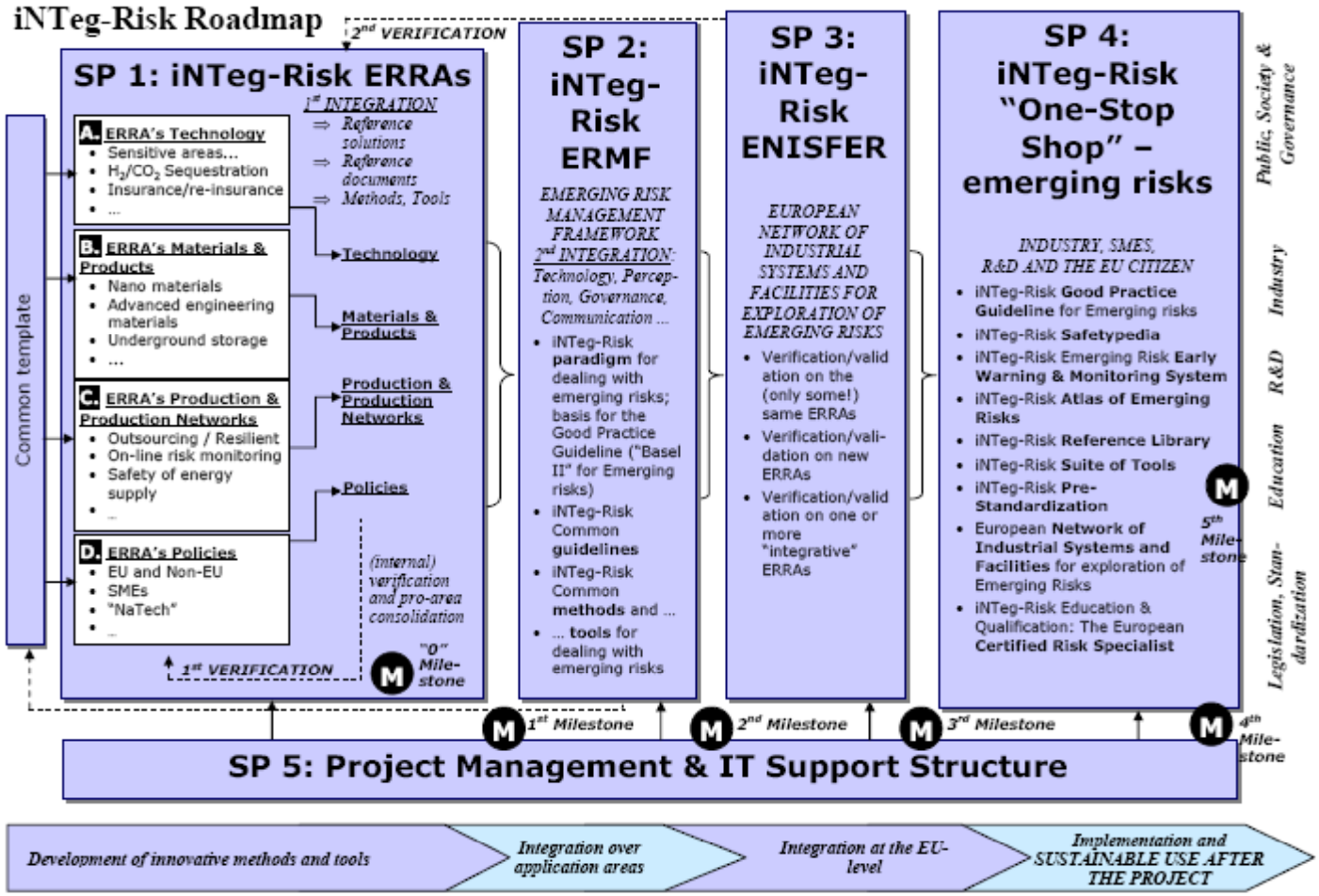
From specific industrial problems to common European approach in iNTeg-Risk ERRAs

Bruno Debray, INERIS
Murès Zaréa, GDF Suez

SP1 – Start with REAL Technology Problems : Objectives

- ERRAs = Emerging Risks Representative Applications
  - SP1 provides the ***17 practical cases*** on which the methodology will be build upon
  - Each ERRA: Characterises an emerging risk and therefore clarifies the criteria to qualify it as such
  - Structures the questions raised by an ***integrated approach*** applied to emerging risks in each ERRA
  - Identifies ***methodological gaps*** to be filled
  - Identifies ***available tools*** to be used
  - Develops ***specific solutions*** to the problems
- SP1 is the key input to other SP's, especially SP2 !

Position of SP1 in the project



➢ MAIN OBJECTIVES

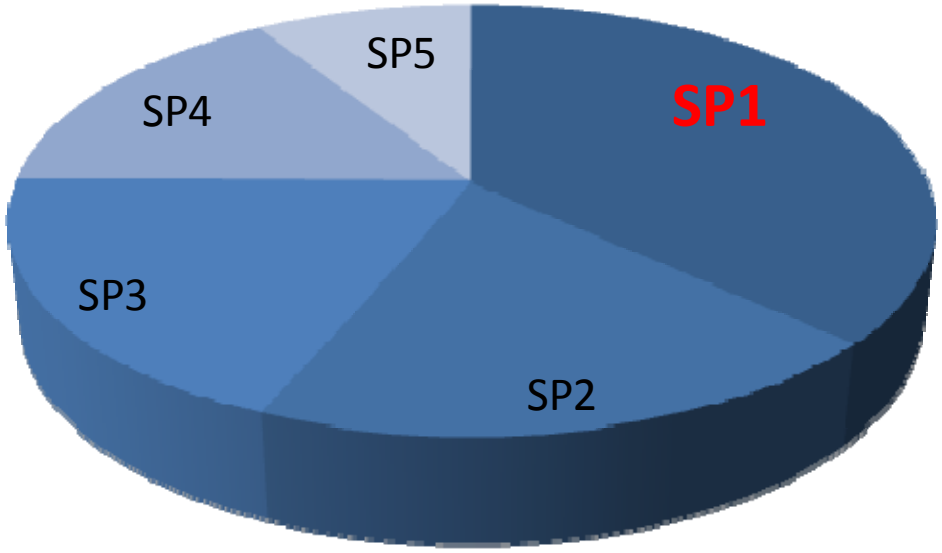
- **Direct Usability in Industry**: deliverables to be directly used by industry

- **Direct Usability in iNTegRisk**: apply the template, to to contribute results to SP 2, 3, 4

Main figures

Duration : 27 months

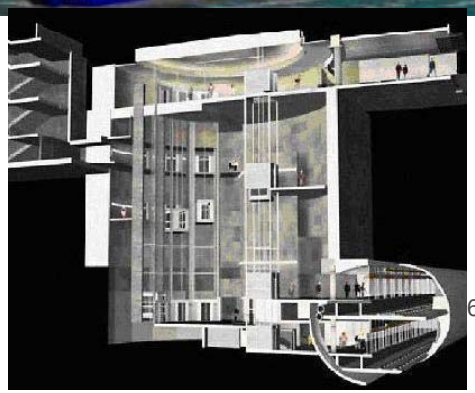
Total SP1 effort : 606 MM



Partners involved : 55

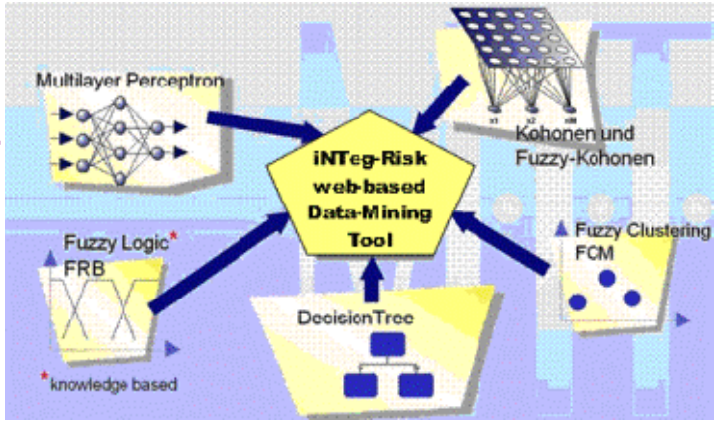
ERRAs on Topic A : new technologies (POLIMI: Renato Rota)

- A1: CO2 capture and sequestration, both technical risks and governance risk (**HSE**)
- A2: Insurance and re-insurance aspects of emerging risks including the security-related (HSSE) emerging risks of new technologies (**SWISS Re**)
- A3: Automated aerial surveillance for gas and oil high pressure transmission pipeline (**GDF SUEZ**)
- A4: Liquid Natural Gas (LNG) regasification in sensitive areas on-shore and offshore (**D'Appolonia**)
- A5: Safety and security of underground hubs with interconnected transportation services and shopping centers (**VSH**)



ERRAs on Topic B : new materials and products

- B1: Public health and medical issues related to monitoring of emerging risks in production, storage and transport of nano-materials on industrial scale in small and medium enterprises (SMEs) (**Novineon**)



- B2: Emerging risks related to advanced storage technologies for hazardous materials (including H2) (**BAM**)

- B3:Emerging risks related to development and use of advanced engineering materials, composite materials (**KMM-VIN**)

ERRAs on Topic C : new production – technologies & production networks SINTEF Øien Knut

- C1: Challenges to safety posed by outsourcing of critical tasks – in oil, gas, petrochemical and construction industries (**DTU**)

- C2: Remote operation in environmentally sensitive areas (**SINTEF**)

- C3: On-line risk-monitoring and assessment of emerging risks in conventional industrial plants – monitoring of risks beyond the design/regulatory basis (**BZF**)

- C4: Atypical, one-of-the-kind major hazards/scenarios (post-Buncefield implications) and their inclusion in the normal HSSE practice (**HSE**)

- C5: Security of energy supply and related emerging risks (**JRC**)

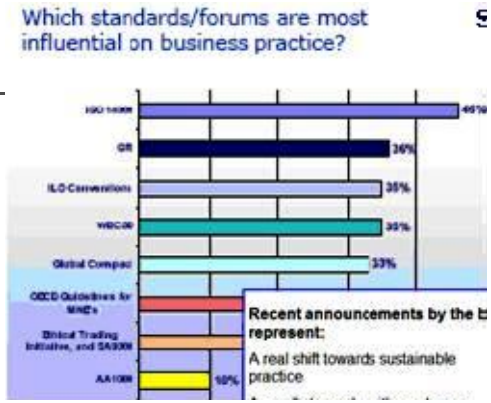
ERRAs on Topic D : emerging risks – related policies

- D1: Definition of KPIs emerging risks for selected industry case studies, including CSR aspects of emerging risks (**DNV**)

- D2: Integrated approach on emerging risks related to the implementation of European safety legislation on SMEs and its application on companies working in Distributed Energy Resources (DER) (**LEIA**)

- D3: Emerging risks related to interaction between natural hazards and new technologies at a community level (**INERIS**)

- D4: Emerging risks related to hazardous substances, impact on public health and relations with REACH and GHS (**RIVM**)

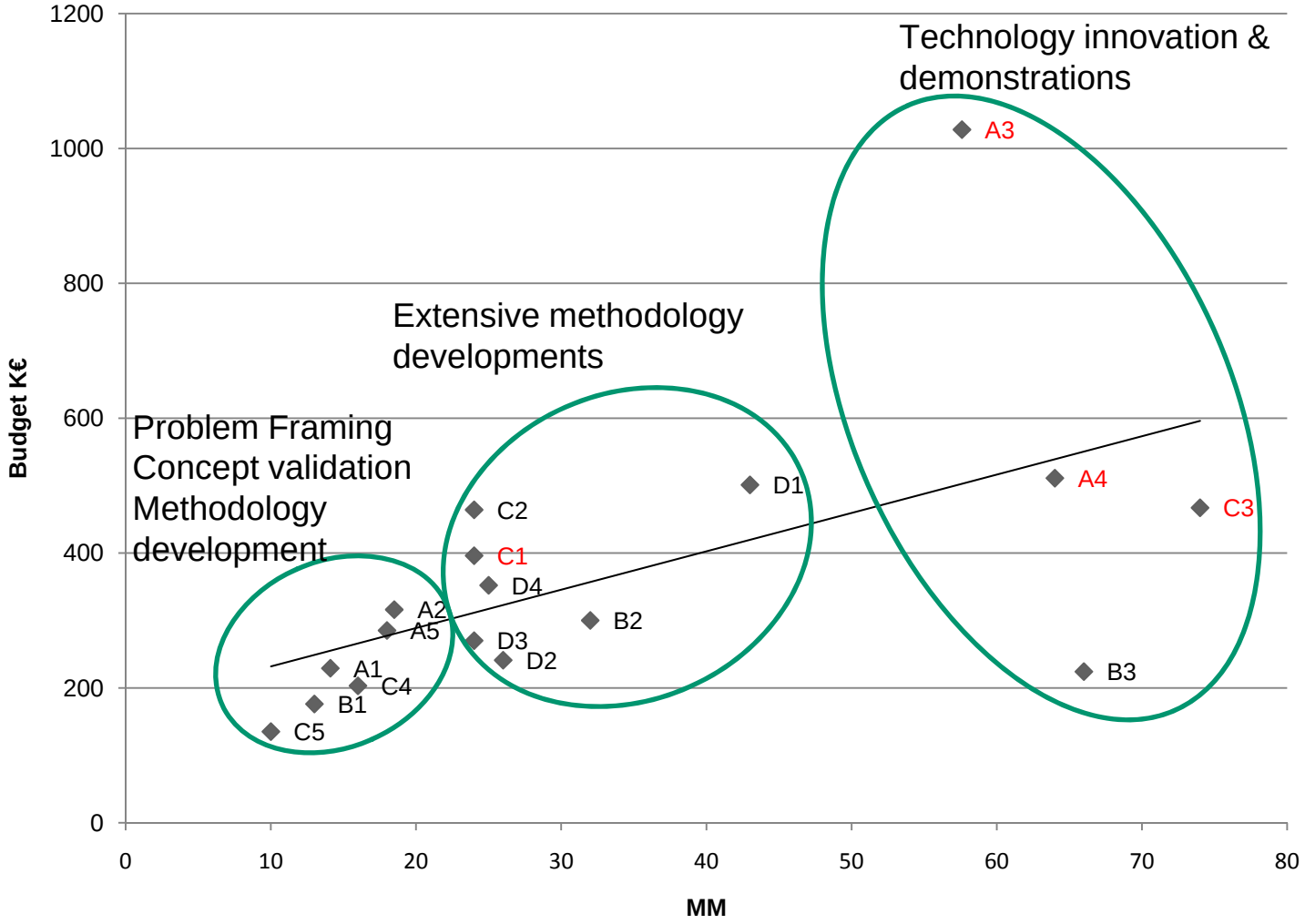


How emerging are the risks in different ERRAs

- A first glance in a table

	Origin of emerging risk				
Emerging Risk Type	***New Technology***	***New Materials, Products***	***New Industrial Process - P or Environment - E***	***New Organisation - O or Regulation - R***	***Existing risk issue***
Totally New	A1, A2, A3, B3	B1, B3	A1E + P, B2 - P, B3 - P	A1, A3, B1, C5, D2	A3, C3
Reconsideration of existing issue due to public perception	A2		C2 - E	C5	A5, C1, C4, D1 D3, D4
Reconsideration of existing issue due to new / lacking knowledge	A2	B3	B2 P	D2	A5, C1, C3, D1, D3, D4
Risks increasing due to higher occurrence frequency	A2				A5, C1, C3, D4
Risks increasing due to more severe consequences	A2		A4, B2 E+P		A5, C4

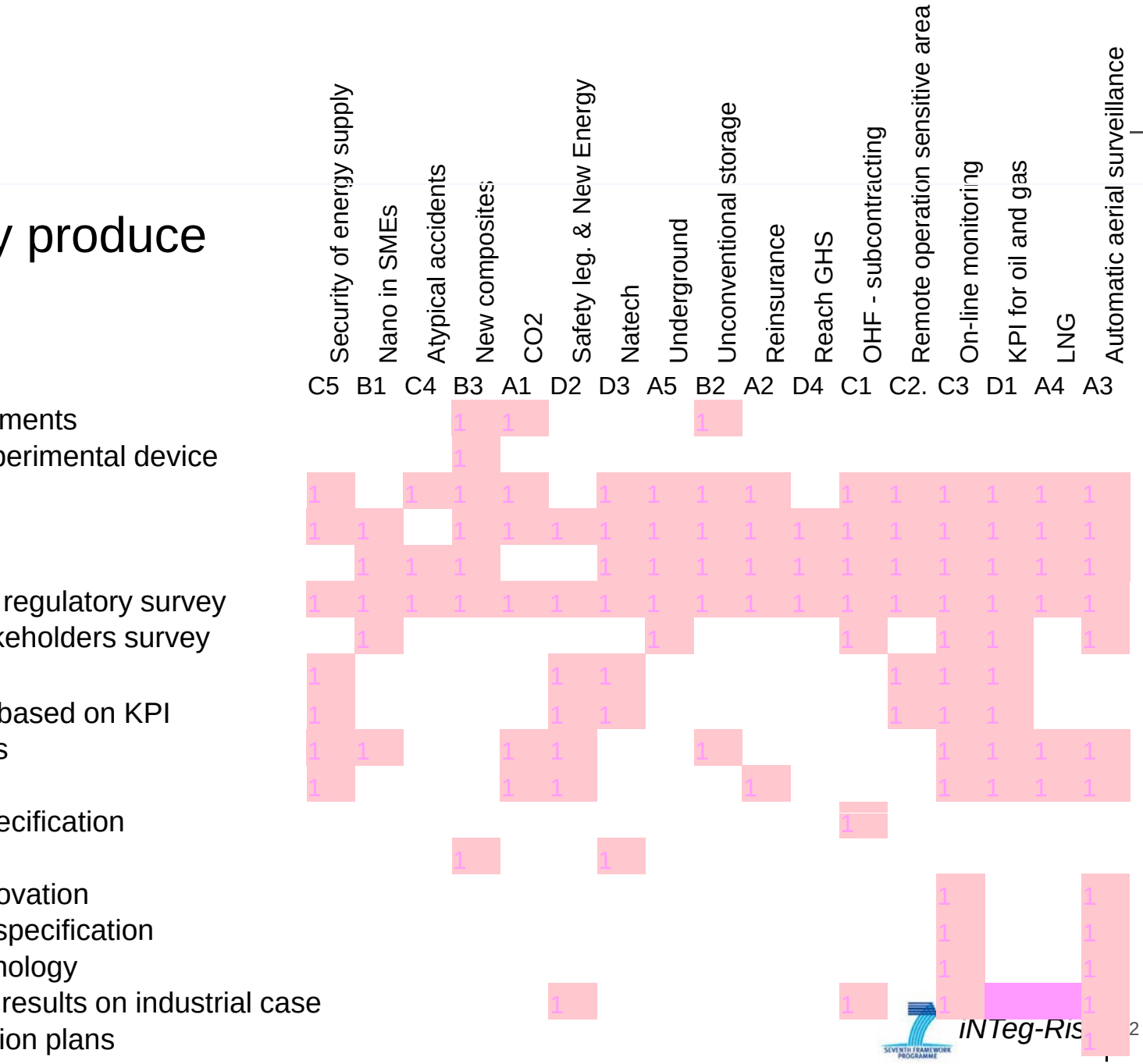
Typology of ERRAs



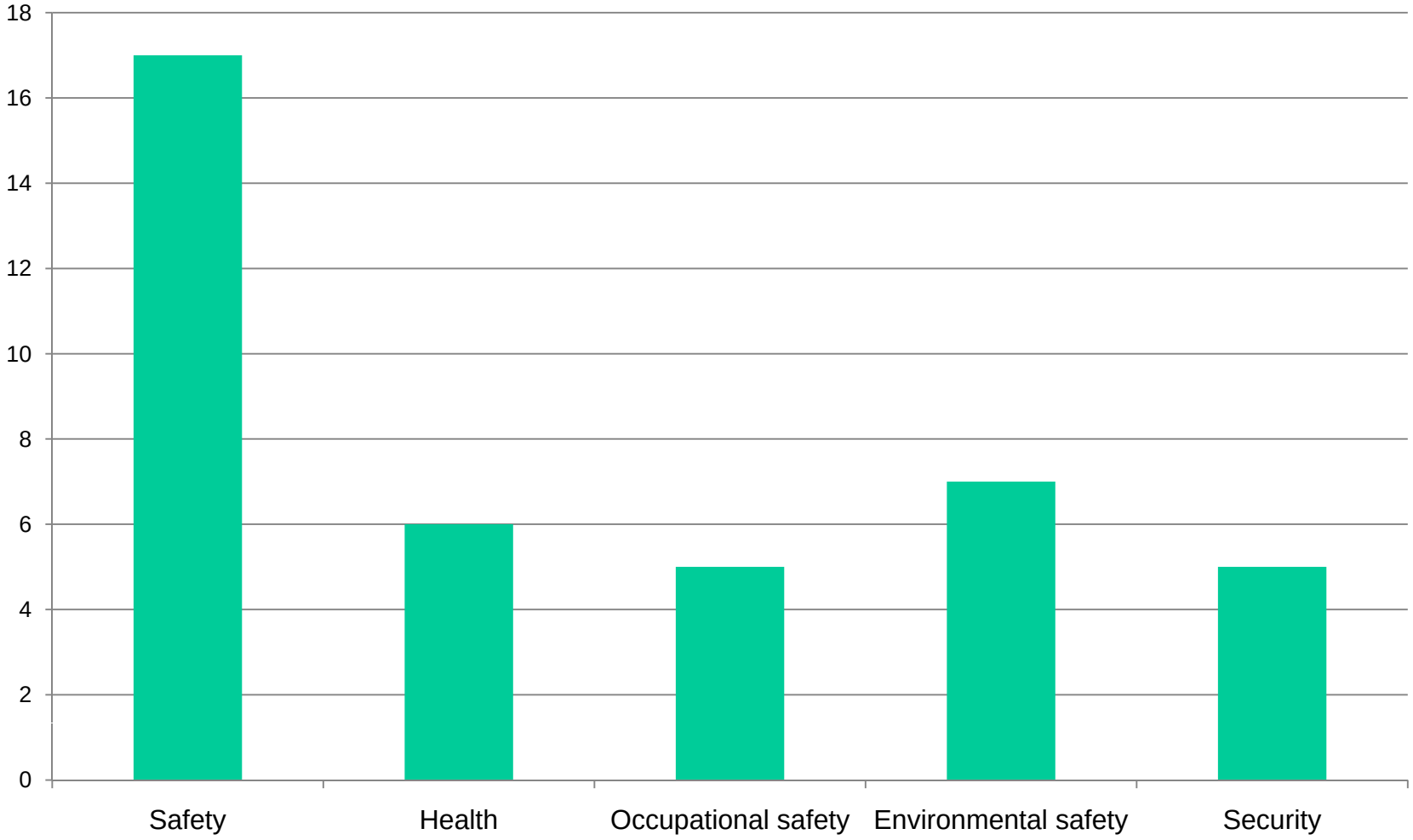
A1 CO2
A2 Reinsurance
A3 Automatic aerial surveillance
A4 LNG
A5 Underground
B1 Nano in SMEs
B2 Unconventional storage
B3 New composites
C1 OHF - subcontracting
C2. Remote operation sensitive area
C3 On-line monitoring
C4 Atypical accidents
C5 Security of energy supply
D1 KPI for oil and gas
D2 Safety leg. & New Energy
D3 Natech
D4 Reach GHS

ERRAs in red continue in SP3

What they produce



Integration within ERRAs



SP1 : Common methodological framework

- *For each ERRA*
  - *Clearly identify the gaps*
  - *Clearly position the emerging risks*
  - *Solve these gaps with specific solutions*
  - *Provide elements for making them generic (-> SP2)*

1. OVERVIEW MATRIX					
Title of the ERRA:					
Particular Emerging Risks Issues (ERIs) within this ERRA	ERMF	IRGC			
		Pre-Assessment	Risk Appraisal	Tolerability; Acceptability Judgment	Risk management
ERI#1:.....	[T] Technology, technical:	e.g. LEVEL 2	e.g. LEVEL 1	e.g. LEVEL 2	e.g. LEVEL 1
ERI#2:.....	[C] Governance, communication:	e.g. LEVEL 1	e.g. LEVEL 3	e.g. LEVEL 3	e.g. LEVEL 3
ERI#3:.....	[H] Human, Management:	e.g. LEVEL 3	e.g. LEVEL 1	e.g. LEVEL 3	e.g. LEVEL 2
ERI#*n*:.....	[R] Policies, regulation, standardization:	e.g. LEVEL 1	e.g. LEVEL 2	e.g. LEVEL 3	e.g. LEVEL 1

- What the ERRAs are going to do and how it interacts with the preliminary framework (IRGCxERMF)
- Example of ERRA A5 - Safety and security of underground hubs with interconnected transportation services and shopping centers –VSH-SP-STUVA-INERIS (preliminary)
- 1) Pre-assessment
  - Problem framing : what are the emerging risk issues in the ERRA ?
    - Eg. The development of deep underground infrastructure (DUI) creates situations where risk is not managed… i.e. in case of an accident we don't know how to react
    - The estimation of risk is not possible because of lack of models and data
    - Risk management measures are lacking..
    - Fresh air supply ? (T)
    - Communication in complex DUI ? (T, H, C)
    - Escape routes ? (T, H, C)
    - User behaviour in crisis situations in DUI ? (H,C)

Pre-assessment

- Are there early warnings ? = indications of increase of mass transportation and number of DUI…
  - No clear warning beyond expert concerns ??? To be documented with stakeholders ?
- Can we screen these ERIs and make a hierarchy ?
- Determination of scientific conventions :
  - The usual models are at their limits. No clear consensus on the risk appraisal process => the gap analysis will be made (T,R)

- Risk appraisal
  - Risk assessment
    - Hazard assessment: Many debates about the models to use and their limits in DUI. A roadmap for developing new models will be designed (T,R)
    - Exposure and vulnerability assessment: risk analysis methodology not clearly defined => guideline for risk analysis (T,R)
    - Risk estimation: Need to develop integrated models to assess the influence of safety measures on risk => Roadmap
  - Concern assessment
    - Risk perception : is there any social perception of the risk related to DUI ? => talks with stakeholders (metro barcelona, Madrid, Munich…) (C,H,R)
    - Social concerns : are there social concerns about DUI? => talks with stakeholders (C,H,R)
    - Socio-economic impacts : what would be the socio-economic impact of… an accident in DUI… not developing DUI… => talks with stakeholders (C,H,R)

- Tolerability & Acceptability judgement
- Risk characterisation
  - Risk profile: is there a common agreed format to express the risk (eg. FN curves ?) or state of the art to which compare a situation ? KPIs ? are we able to draw the risk profile? at various scales? (T,R) (eg. An infrastructure, a region, a country?)
  - Judgement of the seriousness of risk : is there a conventional acceptability limit (eg. Regulatory) ? Decision criteria based on KPIs ?
  - Conclusion and risk reduction options : is there a clear decision process for implementing risk reduction options? Are risk reduction options known? => Specific ERRA result
- Risk Evaluation
  - Judging the Tolerability & Acceptability : who is involved in the definition of Tolerability ? Is there an explicit process? Could one be defined? => interview of stakeholders (R)
  - Need for Risk Reduction Measures: who decides that risk reduction measures are needed? Are possible risk reduction measures known? => interview of stakeholders (R)

- **Risk Management**
- Decision Making
  - Option Identification & Generation : who designs the risk management options (measures, risk avoidance, go/no go)?
  - Option Assessment: how is it done?
  - Option Evaluation & Selection: who does it? How ? On the base of which criteria besides the risk criteria? Cost, benefits, regulation...if so, is it adapted to DUI?
- Implementation
  - Option Realisation: who is in charge? What is the process? Are the design rules known ? Are the models available ?... Ventilation, escape routes, training, communication techniques in DUI specification guidelines?
  - Monitoring & Control: how is it monitored? Guideline for DUI monitoring
  - Feedback from Risk Management Practice?

Answer to all these questions considering T.C.H. R = guidelines for DUI risk management

How ERRAs position themselves with respect to the ERMF and IRGC frameworks

iNTeg-Risk Framework	IRGC																			
ERMF	Pre-assessment					Risk Appraisal					Tolerability & Acceptability Judgment					Risk Management				
T	A1		A3	A4	A5	A1		A3	A4	A5			A3	A4	A5			A3	A4	A5
	B1	B2	B3			B1	B2	B3				B2	B3			B1	B2	B3		
	C1		C3	C4		C1	C2	C3	C4				C3	C4			C2	C3	C4	
	D1	D2	D3			D1		D3	D4		D1		D3	D4		D1	D2	D3	D4	
C			A3	A4	A5			A3		A5			A3	A4	A5			A3	A4	A5
	B1	B2				B1	B2					B2				B1	B2			
			C3	C4				C3						C3			C2			
	D1	D2	D3			D1	D2	D3			D1	D2	D3			D1	D2	D3		
H			A3		A5			A3		A5			A3		A5			A3		A5
	B1	B2	B3			B1	B2	B3			B1	B2	B3			B1	B2	B3		
	C1		C3			C1		C3	C4		C1		C3			C1	C2	C3	C4	
		D2	D3				D2	D3	D4					D4			D2		D4	
R	A1		A3	A4	A5			A3	A4	A5			A3	A4	A5			A3	A4	A5
	B1					B1					B1									
			C3	C4			C2	C3					C3							
		D2	D3	D4			D2	D3	D4				D3	D4				D3		

Note: ERRAs A2, C3 and C5 do not appear in the result matrix in the DoW.

Process to develop ERRA deliverables using the template

- Aim: produce ERRA results that can be pooled together in SP2 – SP4
- First shot at using the template (3 opportunities):
  - **Produce detailed summaries** for at least one deliverable of the ERRA – deadline June 2009, a teleconference (SP, WP, ERRA leaders) will be scheduled before summer holidays to check this action
  - Summaries to be developed / posted in the webtool
  - **Produce relevant information for SP2** (see below)
- Meetings september 22-23 to use these inputs in the Delphi workshops

ERRAs have to produce for SP2 items below in 2 releases

- **June & before September 22, 2009** :

  - An **initial list of terms**, with adequate definitions that will provide SP2 with elements of terminology
  - The **description of emerging risks** will provide SP2 with elements for the paradigm
  - The **description of which parts of the framework are covered by the ERRA** will provide SP2 with elements of the framework
  - The list of the **methods used in the ERRAs and the initial gap analysis** will provide SP2 with elements for the gap analysis between what is needed by the framework and the methods/tools already covered by SP2
  - The **initial reflection on KPIs** will provide SP2 with first ideas on this subject

- General criteria to validate deliverables & work

  - Direct Usability in Industry: can deliverables be directly used by industry ?
  - Direct Usability in iNTegRisk: was the template applied, do results contribute to SP 2, 3, 4 ?
  - Proportionality: is work to produce results commensurate with planned & spent resources ?
  - Compliance with Quality Assurance procedures
  - Good referencing of sources
  - Good indexation – Key words
  - Conformity to the type of deliverable (report, tool, method, database)

Conclusion

- Success of SP1 is critical
- ERRAs can be viewed as autonomous subprojects with own industrial objectives
- They produce their own innovative results
- But they also are the material for future integration and production of the innovative generic results of the project.
- It is essential to ensure a large sharing of content using the structuring tools provided aiming at convergence and sharing of knowledge within the project and with the rest of the world.