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RISKGATE: Promoting and redefining best practice for risk management in the Australian coal industry

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RISKGATE: PROMOTING AND REDEFINING BEST PRACTICE FOR RISK MANAGEMENT IN THE AUSTRALIAN COAL INDUSTRY

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ABSTRACT: RISKGATE, an ACARP funded initiative, is an interactive online risk management system designed to assist in the analysis of priority unwanted events unique to the Australian coal mining industry. The system is innovative in that it is built upon a foundation of expert knowledge gathered through action research workshops, further supported by a substantive and diverse array of industry, academic and technological resources. In operation, RISKGATE offers an innovative tool to assist industry partners and regulators alike in the design, management and reporting of organisational and regulatory compliance requirements. In practice, RISKGATE provides a continuum for knowledge transfer and redefining best practice in risk identification, assessment and management in the coal industry. The RISKGATE prototype in its early phase of testing for priority of unwanted events of most relevance to coal mining is presented.

INTRODUCTION

RISKGATE is a web-based tool providing clear, up-to-date and practical checklists for controlling risks across 15 specific high priority unwanted events in Australian coal mining. Based on interactive 'Bow-Tie' methodology to assist in the implementation of safer operations, each RISKGATE topic and each bow-tie is centred on a specific unwanted or initiating event. The funneling of causal factors and consequences through this initiating event keeps the information concise, intuitive and targeted. Users can generate checklists that will deliver on-site managers and engineers quick and relevant access to best-practice controls for consideration within their own procedures and practices. These checklists are designed to assist with risk assessment, auditing, accident investigation, and training.

RISKGATE is funded by the Australian Coal Association Research Program (ACARP); managed and implemented by the University of Queensland; and each of the thousands of specific controls loaded into the RISKGATE system have been instigated and assessed by industry experts from Australia's leading mining companies.

CONTEXT

The Australian coal mining industry is concentrated in Queensland and New South Wales. In Queensland, the industry is regulated by the Queensland Mines Inspectorate, a division of the Department of Employment, Economic Development and Innovation (DEEDI). The NSW Department of Primary Industries (NSWDPI) Mine Safety program provides the framework and direction to the mining industry in that state.

Queensland statistics on injuries and high potential incidents (Table 1) have been extracted from the latest data (DEEDI, 2011). It was not possible to pool Queensland and New South Wales data due to differences in the methods these agencies use to collect and report mining statistics. The number of recorded events and potential incidents (Table 1) demonstrates the timeliness and importance of developing the RISKGATE system. As Open Cut mining accounts for about 65% of Australian coal production (Scott, *et al.*, 2010), this may provide a partial explanation for the different number of incidents between Open Cut and Underground operations in Table 1.

Risk assessment is a widely used process in the mining industry that involves the identification, evaluation, and estimation of the levels of risk involved in a given situation, their comparison against

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benchmarks or standards, and a determination of an acceptable level of risk (e.g. Iannacchione, *et al*., 2007; Joy, 2001, 2006; NSWDPI, 1997; Allanson, 2002; Ross, 2011).

Table 1 - High potential incidents in the Queensland coal industry (2006-2011) organised by RISKGATE topic categories

Coal Mining Environment	RISKGATE Topics			
	Strata	Fires	Collisions*	Isolation**
Open Cut	88	608	615	303
Underground	31	32	72	189

* While HPI Data for Vehicle and Mobile Plant are pooled, some mobile plant HPIs may not be collisions;
** Electrical and Hydraulics/Compressed Air HPIs are pooled;
Source: DEEDI 2011 "High Potential Incidents - Hazards Identified 1/7/2006 to 30/6/2011".

The RISKGATE mission is to research, design, develop and operate an on-line resource that will focus the Australian coal industry on prioritising CONTROL MANAGEMENT as a way to achieve acceptable risk. As designed, RISKGATE does not specifically assess risk, but instead provides a decision support tool, resources and outputs, such as tailored checklists, that can assist users in their site-specific risk assessment tasks. RISKGATE will assist the coal mining industry in improving minimum standards for safety performance, efficiency, operating practice and training.

RISKGATE conception and work plan 2011-2014

In 2006, ACARP funded the development by the Minerals Industry Safety and Health Centre (MISHC) of two topic-specific risk management portals based on Incident Cause Analysis Method (ICAM) methodology: TYREgate (MISHC, 2011a; Kizil and Rasche, 2009) and ISOLgate (MISHC, 2011b; Kizil and Rasche, 2011). In late 2009, ACARP identified the need for a broader risk management system that could carry the coal mining industry to the next level in system-wide risk management and reduction of incidents (Kizil and Rasche, 2011).

In response, The University of Queensland's Minerals Industry Safety and Health Centre (MISHC) developed a scope for such a system, RISKGATE, in consultation with select coal industry representatives (via workshops and individual interviews involving >25 industry leaders) (Joy, 2011). These industry participants initially identified 12 unwanted priority events for phased development to form the foundations of the current RISKGATE programme. This set of events (now called Topics) included fires, tyres, collisions, isolation, strata, hazardous substances, explosions, trips/slips/falls, manual handling, interface and displays, inrush and workplace hazards, such as dust, noise, and vibration.

After the first year of research and workshops, 2011, the RISKGATE programme is now targeting completion of 15 topic areas identified to be of highest importance to the Australia coal industry. Each topic is an unwanted event, not a hazard. The 2011 program tackled an ambitious target of five topic areas, comprising fire, strata-UG/ground-OC (now split into two), collisions, tyres and isolation. In 2012, the research and development program is forecast to expand to address an additional four new topic areas, followed in 2013-2014 by the remaining five topics (Table 2).

RISKGATE 2011: Topic definitions

RISKGATE

Every RISKGATE topic is focused on coal industry activities (mining, processing, transport and storage) in both open cut and underground mine environments. The scope includes mine sites, lease areas, and mine infrastructure (e.g. mobile, fixed plant, field equipment, buildings, transport; including road and rail); and all aspects of the mine life cycle from design through to decommissioning. The topics uniformly recognise that 'loss of control' can result in personnel injury and/or fatality, equipment damage, production loss, reputation loss and environmental damage. However, the priority focus throughout RISKGATE is personnel safety.

Table 2 - RISKGATE schedule for topic area delivery 2011-2014

2011	FIRES	TYRES	ISOLATION	STRATA U.G.	GROUND O.C.	COLLISIONS
2012	EXPLOSIONS	EXPLOSIVES	MANUAL TASKS	TRIPS & FALLS		
2013/2014	INTERFACE	WORKPLACE	INRUSH	CHEMICALS	OUTBURST	

FIRES

FIRES relates to the unwanted or unexpected combination of a fuel source and an ignition source resulting in fire. This topic identifies ignition and fuel sources that potentially interact within different mine site locations (e.g. mobile plant, infrastructure, stockpiles). As a result, controls have been developed that take into account specific fuel sources, ignition sources and locations. Mitigating controls provide comprehensive information regarding the development of an emergency response plan for use within the open cut and underground environments.

TYRES

TYRES provides information about the prevention of incidents and accidents associated with the use of tyres/rim assemblies throughout their lifecycle in the mining environment - including transport and storage, fitting (installation and removal), and operation. Experts from mining organisations, tyre Original Equipment Manufacturers (OEMs) and ancillary service providers have concentrated on developing a comprehensive and specific set of controls highlighting best practice in tyre management systems.

ISOLATION

ISOLATION delivers information about the loss of control of specific relevant energies (including electrical, hydraulic, and pneumatic) due to failure to lock out and make safe (i.e., isolate) equipment throughout the period of its use (equipment's lifecycle). Design processes cover the full life cycle management of the asset (design and procurement, identification of energy sources, assessment of risk and implementation of methodology to manage the risk). Operational processes include identification of an energy source, isolation, confirmation, dissipation and lock out of that source. Maintenance processes include inspection, testing, verification, shut down and start-up.

STRATA U.G.

STRATA-UG provides information about management and prevention of incidents and accidents due to loss of strata control in the underground mine environment. In this topic, loss of strata control refers to the longwall face, outbye roadways, roadway face, pillar system, caving, goaf edge in pillar extraction, shafts, and coal burst/bumps domains. Causes and controls are separated into design and operational elements.

GROUND O.C.

GROUND-OC provides information about management and prevention of incidents and accidents due to ground instability that is outside expectation of the ground/strata control management system. Within the open cut mine environment, ground instability is considered in the highwall, endwall, low wall, truck dump, tailings dams and embankments, stockpiles, truck and shovel benches and box cuts domains. Causes and controls are separated into design and operational elements.

COLLISIONS relates to the unwanted or unexpected interaction between people, mobile and field equipment, or fixed plant that results in collision or rollover. The topic has a particular focus on behavioural based causes of these unwanted events and innovative design solutions that mitigate these events.

The MISHC-based RISKGATE project team has assembled individual topic panels (teams of industry experts) that meet separately to discuss and develop the expert content (industry knowledge) for each of these specific topics. These panels develop the optimal system content and wording through discussion and debate within the group. As a result, each of the thousands of specific causes, controls and consequences within RISKGATE have been identified, created, assessed and confirmed by industry experts from Australia's leading mining companies prior to upload into the system.

2011 RISKGATE RESEARCH PROGRAMME AND PARTICIPANTS

RISKGATE's research programme consists of workshops (focus group format) supported by analysis of resources (industry/regulatory guidelines, protocols and accident/incident reports). Workshops started in April 2011, to collect causal, consequence and control information for five of the original 12 priority topic areas: Strata-UG/Ground-OC, Tyres, Collisions, Isolation and Fires. As the programme developed, the original forecast of two to three workshops per topic (12-18 total) more than doubled to a total of 37 separate workshops (one to two days/workshop) for a total of 61 workshop days in 2011.

To date, industry experts (and the coal mining companies) have contributed a collective equivalent of 296 individual personnel days to the RISKGATE programme. These experts bring broad ranging experience and training in underground, open cut, coal and hard rock environments (Table 3). Additional workshops will be necessary in the first quarter of 2012 to complete the development of these initial five (now six) topics.

Table 3 - Workshop Programme*: Number of workshops per topic, attendance in personnel days, and mean workshop participant experience (and range)

Topic	No of workshops	Workshop attendance (days)	Mean workshop participant experience (yrs)
Strata-UG	6.5**	41.5	18.18 (5-37)
Ground-OC	6.5**	41.5	21.86 (5-43)
Tyres	6	34	19.95 (3- 45)
Collisions	5	22	20.50 (1- 39)
Isolation	5	29	23.64 (14-36)
Fires	8	47	26.50 (9-48)

* Data are totals up to December 21, 2011. The workshop programme is ongoing with further activities planned for Q1 2012 to complete the initial set of six topics;
** At the first strata workshop it was decided to create two discrete topic areas (strata-UG; ground-OC) to recognise different terminology and geotechnical practices between the open cut and underground mining domains.

A separate panel of experts is assembled for each single topic area, constituting a wide range of risk management proficiencies with participants carefully selected or recommended to maximise that panel's knowledge base. Workshop participants represent a broad array of industry knowledge and professional expertise acquired across a spectrum of seven mining companies, five OEMs, three ancillary industry organisations, two universities, and one regulatory agency (Table 4).

In total, representatives from mining enterprises contributed the largest number of workshop days to the development of RISKGATE 2011 (212 industry days, 72%), followed by Tyre OEMs and other tyre service groups (21%) and DEEDI (7%). As a percentage of the total number of days (212), mining company participation was spread as follows: Adani (1%), Anglo American (23%), BMA/BHP (17%), Centennial (10%), Peabody (19%), Rio Tinto (11%) and Xstrata (19%). Joy (2011) provides mid-year company participation rates by individual topic panel.

Collaborative industry efforts provide the foundation upon which RISKGATE is built, with outcomes a reflection of how leading practitioners share and negotiate best practice. These outcomes are further strengthened by the academic rigour and integrity of delivery within a Group of Eight (Go8) university vehicle. This approach makes RISKGATE both innovative and novel when compared to previous research programs relating to risk management. Integration of cross-sectorial industry knowledge, further supported by a substantive and diverse array of industry, academic and technological resources, means RISKGATE can offer a continuum for knowledge transfer and redefining best practice in risk identification, assessment and management in the coal industry.

Table 4 - Workshop participants

Mining enterprises	OEMs	Ancillary industry organisations	Research institutes	Regulatory bodies
Anglo American **BMA/BHP** **Centennial Coal** **Peabody Energy** **Rio Tinto** **Xstrata** **Adani**	Bridgestone Good Year Marathon Michelin Titan	Otraco Klinge Group Pulford	The University of Queensland University of New South Wales	Qld Department of Employment, Economic Development and Innovation (DEEDI)

Action-research workshops

The RISKGATE workshop series signifies an action-research-like program (Dick 2002, 2010) in that three core phases underpin the facilitated agenda, while program delivery remains flexible to encourage maximal participant input to formulate the final product (Figure 1).

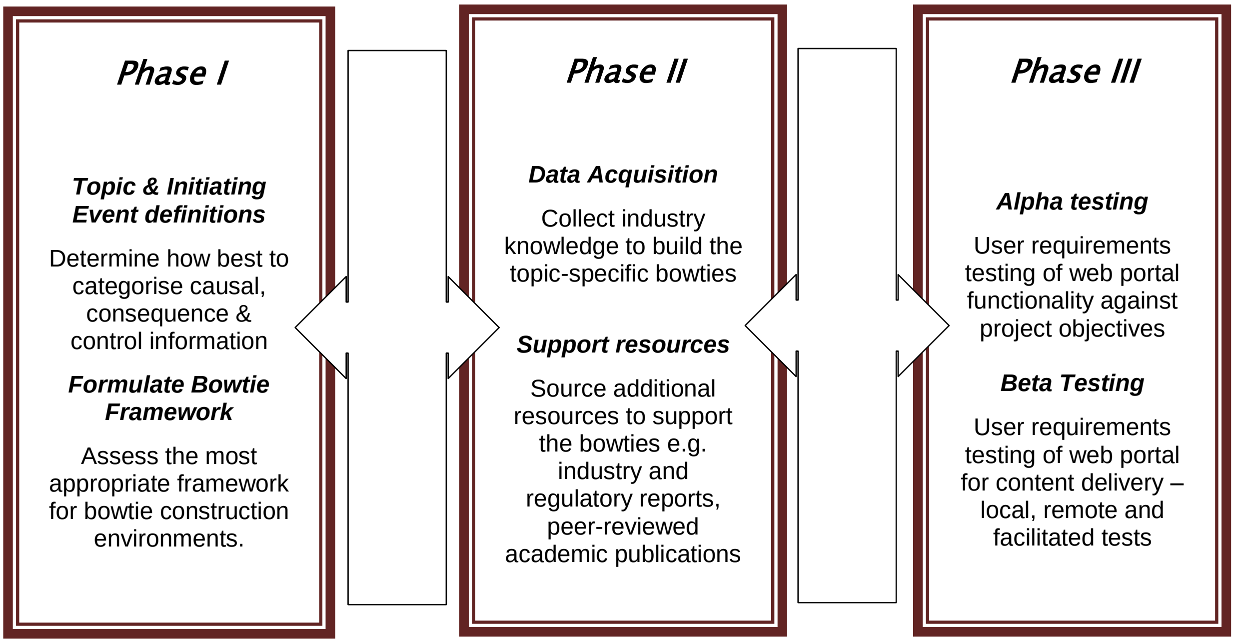

Figure 1 - Sequential RISKGATE workshops, knowledge acquisition process, core workshop objectives, and embedded RISKGATE team communication feedback loops

Workshop facilitators provide guidance by explaining key concepts (e.g. bow-tie analysis technique), maintaining a consistent approach to collecting and collating information, communicating project outcomes with and between topic area experts, and understanding and explaining the evolving software's capabilities and restrictions. Topic leaders were contracted from various university centres, professional organisations and or regulatory bodies to attend workshops and guide the development of information in adherence with the bow-tie method and the parameters in which the topic was defined by each panel of experts.

Development of each topic progresses through several phases, starting with a topic-specific industry workshop to define that topic's database terms and structure, and identify initiating events. Subsequent workshops undertake detailed bow-tie analysis for each of the identified initiating events, and conclude with analysis and feedback for quality control of the RISKGATE system to ensure that technical accuracy is upheld and industry user requirements are fulfilled. This process is refined after each individual workshop based on participant feedback, and will be further refined for the new topics planned in 2012.

All participants are continually encouraged to evaluate the strengths and weaknesses of the RISKGATE system design and content, and tailor outputs that will 'add value' to current industry practice. Thus the RISKGATE program and final product is constantly growing and evolving through workshop participant testing and product evaluation. This process improves RISKGATE's validity and reliability.

Data acquisition and Bow-Tie development

RISKGATE's knowledge content (data) is acquired from each workshop using the bow-tie approach (Joy, 2006). The Bow-Tie Analysis (BTA) is a constructive risk management tool that illustrates the relationship between causes or hazards, the initiating event, how this event could lead to negative consequences, and how controls could be used to prevent this occurring. Chevreau *et al*. (2006) document how the use of bow-ties contributes to organisational learning for safety.

Importantly, BTA allows for systematic examination of unwanted events, graphically represents the interaction between causal, consequence and control information, is a tool familiar to the target users and can be readily learned by a broader industry audience. This method is being researched theoretically and adopted broadly across industrial sectors (e.g. de Dianous and Fievez, 2006; Duijim, 2009; Ferdous, *et al*., 2011; Ferdous, *et al*., 2012), and in specific areas such as chemical engineering (Cockshott, 2005), sea ports and offshore terminals (Mokhatri, *et al*., 2011), ship building (Jacinto and Silva, 2010) and pharmaceuticals (Chevreau, *et al*., 2006).

Bow-Tie elements

There are typically between four and eight bow-ties within each RISKGATE topic with each bow-tie centred on a specific *initiating event* (Figure 2) The initiating event, or 'knot', of the bow-tie represents the point at which energy control is lost; with the primary causes and the unwanted consequences of the initiating event tabulated on either side of the knot. When graphically presented the tool conceptually represents a bow-tie; hence the name.

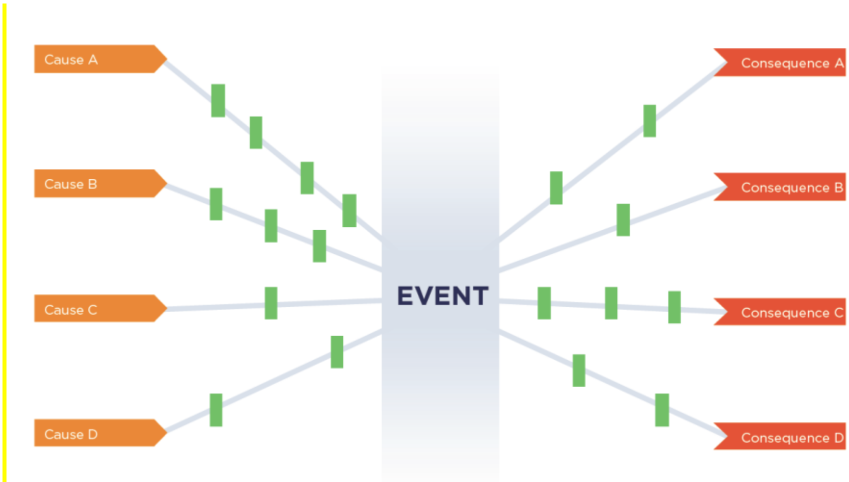

Figure 2 - Bow-tie conceptual diagram

A *cause* is any occurrence or reason that could lead to an event via the release of the hazard(s). Correspondingly, a *consequence* is any negative outcome that arises from an initiating event. This may commonly include damage to people, equipment and/or the environment, though there may be other important negative consequences. RISKGATE targets consequences that impact upon people, either by direct or indirect means. Note, there can be any number of causes or consequences to any given initiating event.

Controls include any process, policy, device, practice, or other action that is intended to reduce the likelihood of an event cause or to ameliorate (reduce the magnitude) of an event or consequence. Causal factors are prevented from triggering the event through specific preventative controls. Should these preventive controls fail, the occurrence or severity of consequences can be further minimised through mitigating controls designed and implemented before the event occurs.

The RISKGATE BTA tool has sufficient flexibility to accommodate a growing depth of knowledge beyond forecast user requirements, as has been experienced during this project. This expanding range of knowledge can be illustrated in comparing early *vs* current RISKGATE software flow diagrams and the growing number of controls now input into the system.

In 2011, the RISKGATE project has expanded from five to six topics, the result of splitting Strata into Strata-UG (underground) and Ground-OC (open cut) domains. The ACTUAL number of data elements collected to date for one initiating event per topic is summarised in Table 5. Note, these estimates are conservative as many of the controls are further broken into multiple options or 'sub-control' data points.

Table 5 - Summary of RISKGATE bow-tie element data (one initiating event per topic)

		Number of bow-tie elements for one initiating event			
Topic	No. Initiating Events	Causes	Preventative Controls	Consequences	Mitigating Controls
Tyres	4	40	118	2	11
Collisions	4	33	88	18	6
Strata	7	30	112	9	3
Ground	8	11	22	6	4
Fires	6	26	93	2	14
Isolation	9	67	168	20	4

Commensurate to the increase in project bow-tie elements and related data requirements, the complexity of the software and web page development has also increased considerably.

Web-based prototype development and outputs

The RISKGATE system is being built to requirements identified through research, individual surveys and a series of coal industry workshops (RISKGATE Phase I) held in 2010 (Joy, 2011). This work identified the following set of requirements:

- Information must be accessible, timely, up-to-date, practical, useful and useable.
- Control information must include classification by Levels of Practice (expected through to cutting edge), Hierarchy of Control, and background information and resources that support the controls;
- User outputs need to be designed for application in risk assessment, auditing/monitoring, incident/accident analysis or Investigation, and for training and education;
- RISKGATE inputs (system data) would be derived from incident reports, expert analysis (workshops), risk assessments, company protocols and technical literature;
- A feedback mechanism would be created to keep the system current and ready to incorporate new information from safety alerts, user contributions, legislative changes and ongoing workshops.

Proposed structural requirements and navigation pathways through the RISKGATE system altered dramatically during Phase I of the workshop series in response to mining company expert feedback that clarified the practical requirements from this system within the mining workplace.

This feedback required a shift in the knowledge capture process and software processing requirements from a relatively simple linear information delivery process to a more complex, robust and user-intuitive system. Additional search functions and feedback loops were incorporated with bow-ties and checklists capable of being tailored or personalised to user requirements (Figure 3).

The Bow-Tie Analysis method that was used to assimilate information specific to each Initiating Event is graphically represented as a series of panels to maximise screen real-estate (Figure 4). The proposed objective of the bow-tie selector screen was to identify control information to be included in a user-defined checklist tool that can be saved, edited and/or printed for evaluation relative to individual mine site conditions.

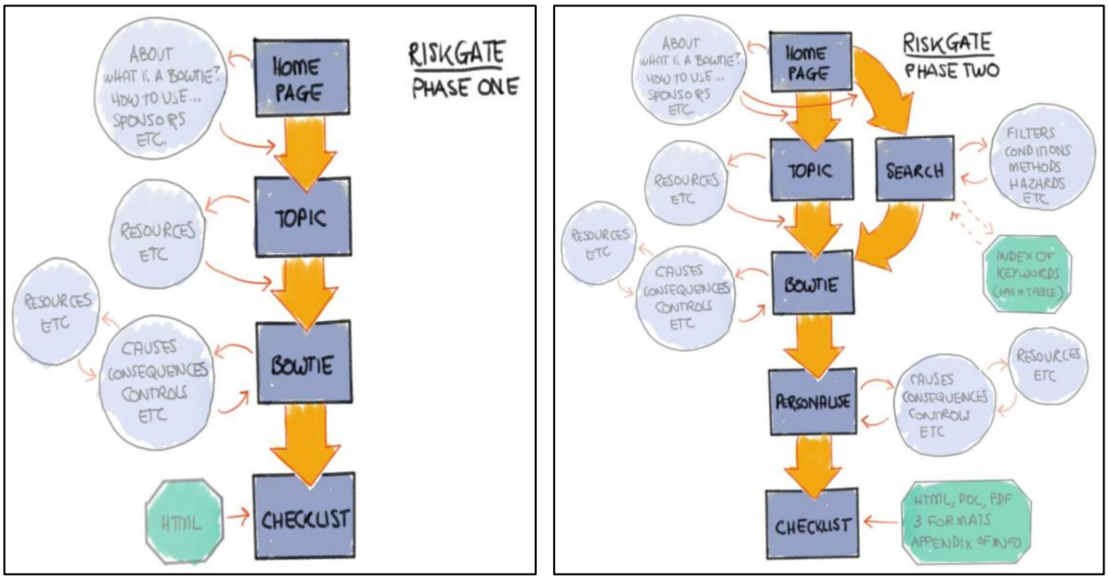

Figure 3 - The evolution of the RISKGATE software requirements. (a) Early software depictions; (b) Current evolved software depictions

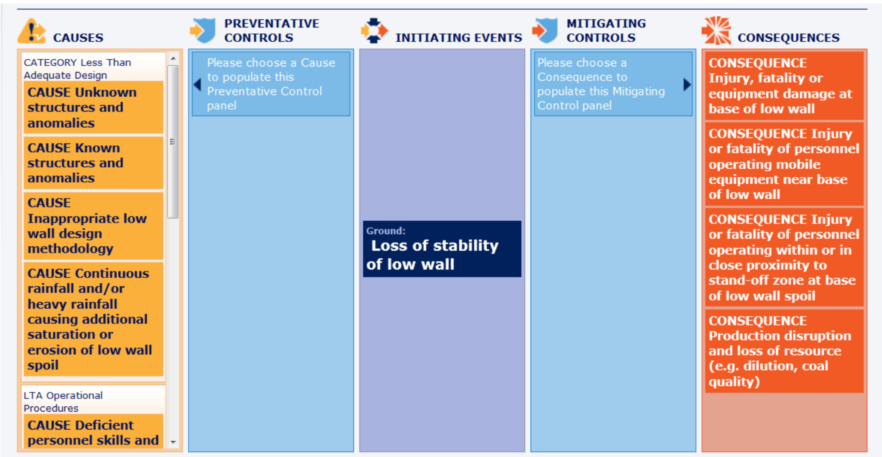

Figure 4 - RISKGATE bow-tie selector and checklist web page

The RISKGATE bow-tie selection and checklist development process has now been further refined to reduce the number of steps to move through the web tool - by combining the education, training and checklist development capacity in one screen. It is possible to navigate through the bow-tie structure, hover over elements to seek summary bow-tie information, or select an information icon to obtain more details about individual bow-tie elements. By doing this, the bow-tie interface has become interactive and allows the user to view and explore content at their discretion and tailor the checklist output. When the user is ready, they can proceed to create a customised checklist output from this same screen.

Design considerations and website development

RISKGATE has been designed to appear as simple and uncluttered as possible to help users navigate what will be a complex model. Styling and fonts are sans-serif with clean lines to appear both friendly and scientific. The font Gotham was chosen for its humanistic and clean styling. On the site Verdana was chosen for the body font for the same reasons.

Careful consideration was given to colour choices within the site. A dark navy blue was chosen as the main corporate colour with a light blue chosen as the secondary corporate colour. The only other colours introduced into the site were amber to represent causes; and an orange-red to represent consequences. Initiating events were given the dark corporate blue and controls were given the light blue. This simple colour scheme helps to define the main concepts in use within the bow-tie and RISKGATE. Green was purposefully rejected as a colour for controls because it implies 'go' while controls themselves are about 'stopping' or 'blocking'.

RISKGATE uses language that is easily understood, credible and appropriate to the industry, yet broad enough to accommodate a range of industry expertise. All of the data (initiating events, causes, controls, consequences) have been directly developed by industry experts on the topic panels. The visual flow of information is logical with descriptive guides imbedded within each page to assist user self-navigation, and clearly signpost where the user is relative to the four core stages of the RISKGATE checklist development process. Finally, RISKGATE promotes and enables self-directed user enquiry by offering multiple access points to support information.

Access to RISKGATE information and the process of enquiry supports the user to define a goal before beginning the search, and provides a clear process to derive the required output. Movement through the web-based tool is intuitive comprising a logical set of structured steps (e.g. the operator can insert keyword search terms, or select from pre-populated information that develops a deductive set of steps toward the user goals). The system caters for a moderate level computer-skilled operator to navigate, comprehend and use.

The modular structural development of the RISKGATE site allows for easier future growth of the system and for powerful implementation of new web technologies. Areas within RISKGATE are password protected to only allow access to select users. Content can be structured on pages to present different results based on the level of access a user has. For example, 'admin' users have extra powers within the navigation of the site than 'authorised' users.

Quality assurance and quality checks - review process (web and data)

A rigorous three-tiered approach to RISKGATE data entry and product delivery has been devised - comprising an Alpha and Beta testing program to assess user requirements for web portal functionality against project objectives (Alpha) and useability testing of web portal functionality and content delivery (Beta).

Alpha testing shall occur with a selected small group of stakeholders from ACARP companies. Beta testing will involve workshop participants (part a), and a select group of potential system users that are not knowledgeable in the background or design of RISKGATE but rather representative of typical target users (part b). After the preliminary Alpha and Beta testing is completed, RISKGATE will be made available on-line to the ACARP workshop experts for a period of 12 months to seek further feedback.

Challenges and proposed solutions

The pilot year of RISKGATE programme research and system development has identified a series of challenges:

- **Workshop attendance** is critical for generating an accurate and 'complete' set of data within each topic area, especially in the initial phase when the topic parameters are being defined. Continuity between workshops is also important so that the majority of time can be dedicated to project needs and project briefings are minimised;
- Like many new research projects, the programme scope was expanded/redefined through interaction with the industry experts. As a result, expanded project deliverables were expected within the same end of calendar year deadlines, leading to a considerable increase in the number of workshops. Workshop participation did decline over time: potentially reflecting workshop fatigue and the approach of the summer holiday season;
- Commensurate with the reduced workshop sizes, many new participants have joined the program as existing workshop attendees spread the word and encouraged peer collaboration,

and company management providing strong encouragement and support for attendance. This has meant the diversity of input into RISKGATE has increased over time, providing a continual cycle of workshop output critique through 'fresh pairs of eyes';

- **Continuous updating** will be critical to maintain the useability of the RISKGATE system. At this initial stage in the project, new information from industry guidelines, regulations, safety bulletins, is incorporated into the system on an ongoing basis. However, when the project team completes any one topic area, it will be critical to put processes in place to maintain currency of the RISKGATE content;
- At this stage, the RISKGATE team is proposing an annual conference where all topic panels would reconvene for parallel sessions (one to two days) to review and update the online information. In a pharmaceutical plant, the bow-tie method is used to facilitate and update organisation-wide learning for safety through adding specific learnings from local-level incident and accident analysis (Chevreau, *et al.,* 2006). On a national scale, the same approach might be used to maintain currency of the RISKGATE system for the Australian coal industry;
- An **internal RISKGATE programme review** of the 2011-2012 workshop series (initial set of topics) will be undertaken after completion of the Alpha and Beta testing period. This review will identify unanticipated challenges, formulate strategic changes, and assess future milestones to complete the RISKGATE work program for the remaining topics. In 2012, the intensity of workshop programs is expected to be significantly reduced, with the workshop format and methods of delivery now established. Workshops will also be located in areas outside of Brisbane if strategically appropriate - for example, the OUTBURST topic panels may be convened in the Southern NSW coal region;
- **Diversity of language** must be managed in developing a system for implementation throughout the Australian coal industry. Terminology can be specific to New South Wales, or Queensland, and these differences need to be captured. Further, the coal industry employs people from a wide range of backgrounds (coal/hardrock/heavy industry, technical disciplines, training/education, country of origin, culture, first language) and these differences can inadvertently create miscommunication or misunderstanding about specific terms or phrases. The RISKGATE workshop facilitators have taken a holistic approach in attempting to capture as many synonyms as possible; and every topic panel is actively encouraged to recruit additional members from diverse backgrounds.

CONCLUSIONS

The redefined scope and direction of RISKGATE generated through action-research workshops, exceeds the original expectations proposed in the RISKGATE Phase II 2010 grant application. This has resulted in delivery of a more complex, robust, industry-driven control management system soon to be available to ACARP and its members. By making the system available on-line, RISKGATE provides a continuum for knowledge transfer within and between mining sectors and provides a single-point risk management tool that promotes integration of available control information across a broad range of mining environments and worker expertise. Consequently, RISKGATE offers innovative technology to help redefine best practice in risk identification, assessment and management in the coal industry.

The RISKGATE team are now seeking industry experts for the 2012 program in the topic areas of explosions (methane gas), explosives, trips/slips/falls, and manual handling. Workshop participation offers benefits to individuals and the companies they represent including opportunities for networking, reflection and sharing of lessons learned, keeping abreast of current and emerging control technologies, instigating a shift in existing safety culture, and elevating the accepted levels of minimum best-practice.

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