Addressing Productivity Concerns in Risk Management Through Repeatable Distributed Collaboration Processes

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Abstract

Traditional Risk Management (RM) focuses on a single project same time & same place. It emphasizes identifying, assessing, controlling and monitoring risk. Due to an increasing number of distributed projects and distributed teams, the RM paradigm has begun to shift towards group oriented RM any time any place. Although distributed RM provides major benefits in terms of productivity and shortening throughput time, it represents a challenge to coordinate the efforts of distributed teams working towards a common goal. We propose a repeatable process for distributed collaborative RM. This process consists of a set of collaborative activities, defined in terms of patterns of collaboration, chunks of facilitation skill (thinkLets), and the interdependencies between them. The process was developed and piloted based on experiences in a multinational service organization, an insurance company, and an international financial institution. The proposed process serves as a blueprint for further research on collaborative RM.

1. Introduction

Risk Management (RM) concerns the identification and control of risks in an organization and its context. As most major business decisions are made under risk [32], the management of risks is an important topic for organizations [8,23,24]. Recent business failures (e.g. Worldcom, Enron, Lloyds, Andersen, Barings) placed RM even higher on the organizational agenda. Other reasons to employ RM are: it adds value to the organization, it supports corporate governance requirements, it gives a clear understanding for organization wide risks, and it helps drive management accountability for risk [33,34].

Various authors noticed that there are numerous definitions for Risk Management [20,28]. Most definitions are tailored to a specific application area. For our purposes we use a process-oriented definition. Risk Management in this context is defined as: 'the process of identifying, assessing, controlling and monitoring risk. It includes maximizing the results of positive events and minimizing the consequences of negative events' [15].

Although RM represents a critical business activity, managers often perceive it in a negative way. Several reasons may underlie this perception:

1. It has to be done (rules and regulation). Risk Management is often seen as 'something that has to be done', a necessary evil. Organizational regulations and/or (international) law require many organizations to have a formal RM program in place.
2. It delays the throughput time (productivity losses). RM is often considered to be a burden that delays the work process. This is because desk research has to be performed to find the risky facts (numbers), people have to be scheduled, flown in, interviewed, and brainstorm sessions have to be held to identify risks and possible counter measures.

This paper focuses on the last negative managerial perception regarding RM: productivity loss. Productivity losses associated with Risk Management indicates that organizations need to improve their ability to identify, assess, control and monitor the risks.

Nowadays, many organizations employ distributed project teams to capitalize on scarce or comparatively inexpensive intellectual capital that is spread out over the globe [21]. The extent to which distributed teams have become an integral part of modern organizations is stressed by the increasing number of organizations that carry out activities in more than one country.

A recent UN report states that there are around 63000 transnational corporations working with around 700000 foreign counterparts [33]. Because of the distributed nature of many organizational production processes, the RM processes associated with these processes are also

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increasingly carried out in a distributed fashion. When distributed teams have to collaborate in RM activities (e.g. interviews, desk research and risk assessments), several problems can be observed:

1. Distributed teams and management have to be interviewed. This often results in traveling to different sites and scheduling problems.
2. The intermediate results have to be coupled back to all relevant parties in feedback rounds. This results in time-consuming document editing, reviewing etc.
3. Distributed teams (e.g. experts) and management need to collaborate in brainstorm sessions (workshops). These sessions are often held site-per-site due to traveling. The (intermediate) results have to be verified with all teams until a satisfactory compromise and level of consensus is reached.
4. Both teams and management have to be committed to the risks that may occur and/or materialize at other sites due to their interdependent processes.
5. Risk Management is a continuous process, so the above problems occur on a repeatable basis.

The success of the RM process is thus greatly determined by the productivity of distributed teams. For distributed teams to be productive in RM, collaboration is crucial. As collaboration consumes a lot of workers time, successful collaboration is essential to increase team productivity and decrease costs [30].

In this paper, we describe our experiences with distributed teams who were involved in a Risk Management process from a productivity perspective and propose a way of working with Group Support Systems (GSS) to support any-time-any-place collaboration. Our first experiences were gained at four large distributed projects in a service organization. The objective of this study was twofold. First, to identify the most critical items that influence team productivity in distributed Risk Management. Second, to propose a repeatable process for distributed Risk Management. This repeatable process was subsequently fielded in an insurance firm and evaluated with experts from a financial organization.

The remainder of this paper is structured as follows: in the next section relevant literature in the area of RM, team productivity, and Group Support Systems is discussed. The research approach and design of the study are elaborated in Section three. In Section four, we present the results of our study in a multinational service organization, that became the basis for the development of a repeatable collaborative RM process. Section five builds on these experiences and presents the repeatable process for distributed Risk Management. Section six summarizes the paper and gives a description of the limitations of the study, and an outline of future research.

2. Background

2.1 Risk Management

Major business decisions are made under both risk and uncertainty [34]. A decision made under risk is one in which the decision-maker considers various feasible outcomes for each alternative, each with a given probability of occurrence. This distinguishes risk from uncertainty where the decision-maker does not know, or cannot estimate, the probability of occurrence and the possible outcomes [32]. Managers usually try to avoid making decisions under uncertainty as much as possible. They try to acquire more information so that the problem can be treated under certainty or risk.

Risk Management is a powerful tool that supports management in making major business decisions. Risk Management helps preventing business failures, rework and overkill, but more importantly it stimulates win-win situations. Risk management can [7, 34]:

- Identify all possible risks at an early stage and control them before a major business disaster occurs;
- Involve stakeholders at all levels of the organization in an iterative manner, to create a shared understanding for risk.
- Provide the mechanism for achieving an open exchange of information and ideas;
- Help drive management accountability for risk;
- Increase the chance of (project) success;
- Add value to the business.

Many RM methods exist [7,8,19,20,23,24,34]. Most methods characterize risk by estimating the probability and impact of the adverse effects, in qualitative and/or quantitative terms. If reliable quantitative data is available, mathematical methods to calculate risk can be used. The most common method is to select the alternative with the largest expected value. However, this method can be dangerous because the ‘utility’ of each potential outcome may be different from the real ‘value’. Often, quantitative data is unavailable or unreliable. Then, more qualitative approaches are used. Personal judgment plays an important role in qualitative approaches. However, research shows that the outcome of personal judgment must be handled with care because it can be influenced by peers [34].

Fig. 1 shows several RM trends. Service organizations show an above average score in using methodologies, tools and techniques to identify, assess, control, and monitor risks [1].

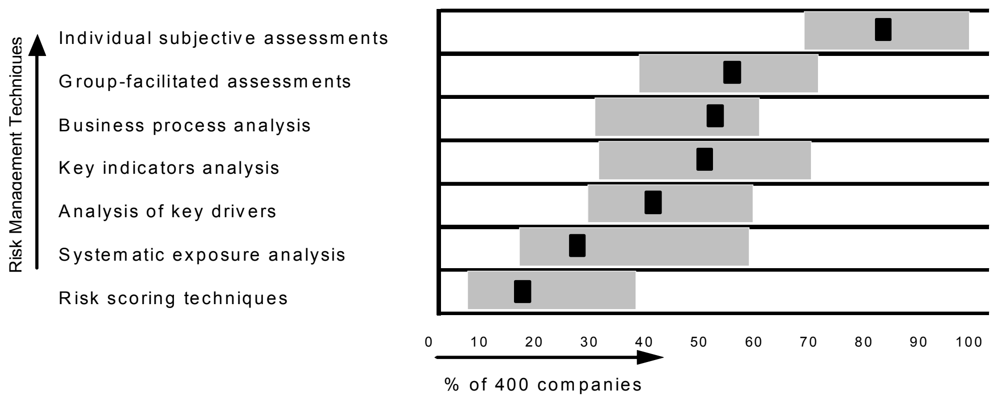

Figure 1. Trends in Risk Management

With respect to Risk Management techniques, the following observations were made from a study presented at the annual Financial Executives International summit: 82% percent of 400 companies indicated that individual self assessments are used and, while as not wide-spread as individual self assessments, 52% percent group-facilitated face-to-face assessments are used [1]. Recent trends indicate that self-assessment techniques performed by teams are the most popular [1]. Moreover, risk (self) assessments are too complex to be conducted by a single person. They require the input and critical evaluation of experts in a number of scientific disciplines [7]. Team oriented self assessments become increasingly important because leaving the risk management process up to one individual is a risky business, and poor substitute for a systematic, repeatable methodology that can be performed any-time-any-place by distributed teams [34].

The flexibility and sophistication of a risk measurement method used by companies in a given situation is often driven by many factors, including: (1) The companies' objectives, strategies and culture; (2) The complexity of the environment (e.g., the number of risks and the interdependencies between distributed business units). Moreover, several studies show the importance of both collaboration in RM and communication of risk information for decision-making [1,7,34]. This gives rise to GSS to support the RM process.

2.2. Team productivity

Several authors have offered models and theories to make distributed teams more productive [25]. Other authors seek to explain the use of group support systems (GSS) in order to understand the dynamics of distributed teams (see [27] for an overview). These models and theories are somewhat contrasting but offer valuable insights into the dynamics of distributed teams. However, to fully understand team productivity, a theory is needed that: (a) unifies other apparently contrasting models, (b) explains the mixture of productivity findings in literature, and (c) predicts and explains the effects of technologies and interventions on team productivity.

Focus Theory attempts to provide us with these insights. It shows the causal relationships that influence team productivity (see figure 2) [4]. Focus Theory has five constructs and is based on a chain of reasoning that ties many other models and constructs used in GSS research back to a common foundation [4].

Its reasoning begins with the assumption that regardless of the goal, a team accomplishes its goals by exchanging and deliberating about information [14]. In order to be productive, team members must be able to engage in three processes: communication, deliberation, and information access [4]:

- Communication is "the exchange of meanings among people". People may use data communication equipment as a medium to effect the exchange, but Focus Theory treats such equipment as a black box, and considers only how the use of such equipment would affect the participants' attention resources.
- Deliberation is defined as the cognitive processes required to form intentions with respect to the team goal. The concept of intentions is broader and more inclusive than the concept of goals. A goal is a desired end state, but an intention includes the goal, along with some notion of actions required to achieve the goal, and the duration and intensity of action.

- Focus Theory recognizes that in most choice making activities information changes the expectations of the choice-maker, but does not necessarily change the outcome of making a particular choice. The theory also states that if teams achieve their goals by exchanging and deliberating about information, it follows that they cannot be productive without information. Thus, information is the content for both communication and deliberative processes.

Each of these processes demands cognitive effort over time (attention). Yet, attention is a limited resource. Attention devoted to one process interferes the other two. Thus, the limits of attention bound team productivity. Productivity is defined as the degree to which a team achieves its goal. Further, the attention focused on these processes is the direct cause of productivity. Distractions are anything that interferes with the focus of team members attention toward achieving their goals.

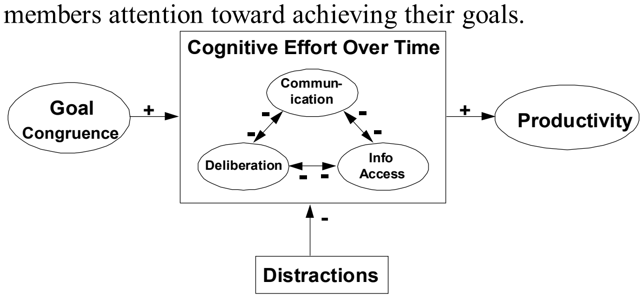

Figure 2. The Constructs of Focus Theory

As stated above, Focus Theory starts with the assumption that teams already agreed upon a goal. Therefore, the theory may not be useful for teams that do not have a common understanding of the goals. Another assumption of the theory is based on extensive empirical research and shows that humans have a limited capacity to handle multiple cognitive processes. Focus Theory states that attention given to one cognitive process interferes with the ability to do others. Focus Theory is technology-free, but it is framed at a level of abstraction such that each detail of the theory suggests opportunities to improve productivity by applying technology.

Focus Theory can be used to improve team productivity. It gives insights into the causal (cognitive) processes that affect productivity. The theory offers both opportunities to explore the problems that occur in distributed RM, and suggest future improvements to coordinate teams working any-time-any-place.

2.3. Group Support Systems

A Group Support Systems (GSS) is a socio-technical system consisting of software, hardware, meeting procedures, facilitation support, and a group of meeting participants engaged in intellectual collaborative work [16, 22]. GSS is an umbrella term for the technologies that support group collaboration [4, 9]. GSS are employed to focus and structure group deliberation, while reducing cognitive costs of communication and information access among teams working collaboratively towards a goal [10]. A recent trend is that GSS are increasingly employed to support distributed groups for organizational and inter-organizational coordination [27, 31].

Groups are usually engaged in several projects and as such work on a number of different tasks at the same time. A frequently occurring situation is that groups work on the same task but at a different time and place. These tasks always have some form of dependency [29]. Moreover, these tasks have to be coordinated. This also holds true in the RM context, for example: a first group identifies the most important risks that threaten the current business. Then, this group passes the risk list on to an expert group who can assess the risks in terms of probability and impact. The expert group then passes the list to management for prioritization. After this, management can pass the prioritized list to another group to find alternative courses of action.

Due to the distributed character and complexity of these interdependent tasks, coordination between and within these distributed groups becomes increasingly important and can be supported by GSS. Yet research on the effects of GSS on group processes and outcomes yields a somewhat inconclusive picture. Although in general, GSS seem to have a positive effect on group productivity and decision quality [2, 12], the extent to which this positive effect occurs appears to depend on a variety of other factors, such as task-fit and group size, see e.g. [12]. Meta-analyses of lab experiments present mixed results, see e.g. [11, 13, 17]. Field research results, however, consistently paint a more positive picture [18, 26]: GSS are suggested to save up to 50% of person hours and project time when compared to regular meetings, while high levels of participant satisfaction are achieved. Notwithstanding these encouraging numbers, many groups of GSS users never become self sustaining, i.e. are not capable of successfully running the GSS themselves for their daily collaborative processes [5].

High failure rates associated with GSS implementations indicate that synergy needs to be created between collaborative organizational work processes (e.g. risk management), the technology used, its configuration, and the facilitation scripts [6]. The challenge to enhance group productivity is thus to design coordination mechanisms for the organizational work processes and supporting technology in such a way that they enable distributed collaboration and synergy is created. Although

GSS provides major opportunities in terms of productivity gains and shortening throughput time, it represents a challenge for coordinating the efforts of distributed teams.

3. Method

In this paper we first report on our experiences gained at a multinational service organization. Our study used a multiple case study. In this study, eight different geographically distributed locations were involved. The locations were situated in Europe, U.S.A. and Asia representing a rich mix of cross-cultural teams.

Following Yin [35] our study aims to examine a contemporary phenomenon in its natural setting where the boundaries between the phenomenon and its context are unclear. Following [3], we decided to use a case study because (1) Conducting RM in distributed settings represents a complex phenomenon that needs to be studied in its natural setting, and (2) there is a lack of similar studies on developing design guidelines to create synergy between distributed teams performing Risk Management processes and the technology used. Embedded in the case study the following strategies were used: a pilot study and expert panels.

In the pilot study, face-to-face interviews were held with twenty-two respondents. From these respondents, who represented different countries and backgrounds, we identified a rich list of items that likely influenced team productivity in distributed Risk Management processes.

Then, four expert panels, each consisting of eighteen project managers coming from eight different countries narrowed the list down by assessing the relative contribution of each item to the productivity of the distributed teams in the Risk Management processes. The experts represented four to nine years of experience in Risk Management processes. The panels used a five-point Likert scale, where five represented the highest perceived contribution to productivity. After this, all the experts were interviewed to elaborate on their choices.

4. Results

Having analyzed the data from our case studies we found a number of items that affected team productivity in distributed RM. One of the most interesting findings was that the panelists noted that '*they were not aware of any appropriate tools and techniques to support any-time-any-place collaboration in a distributed RM process*'. The results of the case studies are presented from a productivity perspective and mapped into the five constructs of Focus Theory (see table 1).

4.1 Goal congruence

Due to the interdependent business processes of our investigated case distributed teams need to have commitment towards risks that might occur and/or materialize at other sites. An example from the interviews with respondents was: "*We don't care about risks occurring at other units, that's their business*". Interviews revealed that a lack of this commitment was mainly due to the perception that only 'other' teams would benefit from their efforts. They did not want to identify, assess, and mitigate risks if they could not see the benefit for themselves. The interviews with respondents also showed that RM itself is not sufficiently relevant for all teams, which reduced commitment. Moreover, interviews with experts indicated that a low perceived relevance and a lack of commitment often resulted in poor risk identification, assessment and/or mitigation which frequently had great impact to the business processes.

Teams need to invest a certain amount of time in the RM process in order to complete their (sub) tasks (e.g. identification of risks). However, our interviews show that both teams and individuals do not want to spend too much time for the RM process. According to the interviews with respondents and experts this is because they are "*very busy with real work*". Teams usually do not want to invest a lot of time in RM because it disturbs them in their daily work and they already 'know' what the risks are. In addition, teams were not always confident that their contribution would make a difference. Consistent with these findings, experts added that from a practical point of view it is difficult to map agendas in such a way that teams can meet face-to-face to identify, assess, and mitigate risks. Moreover, they mentioned that it is an expensive operation to assemble a team for RM.

4.2 Communication

Distributed teams exist on various levels in organizations. An important observation from our case study is that teams on the operational level think differently about risks than teams at the tactical or strategic level and vice versa. In order to avoid misinterpretations within a certain organizational level a common understanding of the risks and countermeasures is needed. Experts said that different interpretations frequently lead to irrelevant discussions between groups or even worse: wrong assessments! The interviews taught us that non-relevant risk assessments frequently occurred because it often was not clear what the precise nature of risks was. Moreover, experts said that it takes a lot of time to get a common understanding of the risks because people tend to talk around the issue.

Table 1. Items that influence team productivity.

Focus Theory Construct	Item	Perceived contribution to team productivity*
Goal congruence	Commitment towards risks of other sites	4.3
	Time to invest in the Risk Management process	4.4
Communication	Common understanding of risk definitions	4.5
	Anonymity	3.2
	Risk communication	3.6
Deliberation	Structuredness of RM process	4.8
Information access	Consulting previous answers	4.2
	Consulting distributed experts	4.0
Distractions	Clear (sub) goals	3.6

*Scale 1-5, 5 highest perceived contribution to productivity.

Anonymous communication was found to represent a Janus head. On the one hand, we found that distributed teams do not always like anonymous communication. Teams sometimes want to know 'who' was saying 'what' in order to attach value to it. Teams also wanted to make sure that other individuals were contributing to the RM process. On the other hand, our results also indicate that where a strong organizational hierarchy rules, a lack of anonymity converges a discussion to the superior's opinion. Experts said that this may result in an incomplete risk identification process. To them, a risk identification process should be as complete as possible because unidentified risks will increase project costs and can cause projects to fail. In their opinion, a tool that could support anonymity would prevent team members to focus on the superior's opinion.

Our case study shows that teams need to know well in advance what is going to happen in the RM process. Otherwise, they spend a lot of effort and time in getting the right information. Interviews showed that teams want to know what is going to happen with the results that they achieved in e.g. a workshop. According to the experts, communicating the RM process steps is not enough. The entire RM process should be mapped out in sub processes with a clear description of the roles and responsibilities in order to communicate to participants where they are contributing and what they can expect.

4.3. Deliberation

For various reasons, the number of participants in distributed RM processes may vary continuously. Often, different teams carry out different processes in the RM process. E.g., the participants identifying risks might not be the same as teams assessing them. Experts mentioned that this is because participants from the operational level are perfectly able to identify risks but sometimes lack management experience needed to assess them. In other words: participants' contributions to a RM process differ from time to time. Experts mentioned that although the main RM process itself is clear (identify, assess, mitigate) the steps that have to be executed in each sub process are not. E.g. (1) what are the steps that you have to take with the teams to identify all possible risks; (2) how can we reach more agreement on certain risks and their controls? A structured RM process that describes the specific tasks, roles and responsibilities that different teams have to perform was lacking in their opinion.

4.4. Information access

It appeared to be important for distributed teams to be able to consult information generated during previous RM activities easily and quickly. The interview results indicated that consulting previous information often led to frustration because important data was not recorded in the right way or not at all. For example: when a participant wanted to measure how well a risk is managed, he needed to consult the risks and existing countermeasures that were identified in a previous process step. Experts said that it is too difficult to recall all identified risks and existing countermeasures from their memory when they landed in the next process step. They had difficulties to remember what they exactly answered and why they answered in that way. This happened in several steps in the RM process, for example in the risk identification process where risks were identified and in the risk assessment process where existing countermeasures are identified for each risks.

Consulting distributed experts would improve productivity because then the intermediate results could be verified without having to wait until agenda's are matched. For example: when risks and existing countermeasures were identified, another team was needed with relevant management knowledge to assess the risks. However, this team was not always immediately available due to the distributed character of the projects. This very often resulted in traveling to the risk experts and thus delays in the RM process.

4.5. Distractions

Results showed that having too many sub goals at the same time distracted teams from pursuing their goal. For example: assessment of absolute risks and the assessment of managed risks is a random process for the participants. From our case the following observations were made: If teams are in a risk assessment process, they become distracted when they have to assess absolute risks (before existing controls). This distracted them because it is very difficult for the participants to forget about the controls that are already in place in their daily work. Participants constantly had to consider each risk carefully and think about what might happen if that risk would materialize without the already existing controls.

5. Discussion

5.1. Collaboration requirements for distributed RM

In distributed RM, teams need to collaborate any-time-any-place. We found that this influences perceived team productivity in a number of ways (items in table 1). Compared to the literature, we found several new items. We argue that these items were likely introduced because of the distributed nature of our RM context [19].

In order to enable any-time-any-place collaboration in RM, several requirements need to be met. First, a clear *script* is needed to limit the cognitive load of designated RM facilitators and participants and create patterns of collaboration in a predictable and repeatable way. Clear scripts are critical because people find it difficult to engage in poorly organized deliberation processes, especially when distractions are present [4]. E.g.: a team may begin seeking new controls for a risk before they have developed an understanding of the risks. A clear script supports people in framing RM processes in a predictable and repeatable way and is expected to improve team productivity. A script can be envisioned at two levels:

1. *The overall process*. This level describes the flow (process logic) of the overall RM process. It defines the separate activities and their interdependencies. E.g., it explains when risks are identified, when controls are identified, whether absolute risk is measured before or after identifying existing controls etc. The building blocks used to model the overall process are depicted in fig. 3.
2. *The collaboration within each activity*. This levels details how the RM facilitator can help the participants involved in each collaborative RM activity to achieve their goals. It defines the prompts and decisions the facilitator has to give and make to make the participants combine their intellectual capacity to create value collaboratively. E.g., it explains which prompts the facilitator gives during a risk brainstorm, which voting techniques to use during residual risk assessment, or how to focus discussions about voting results. The script at this level is the same as the script element in a thinkLet [6].

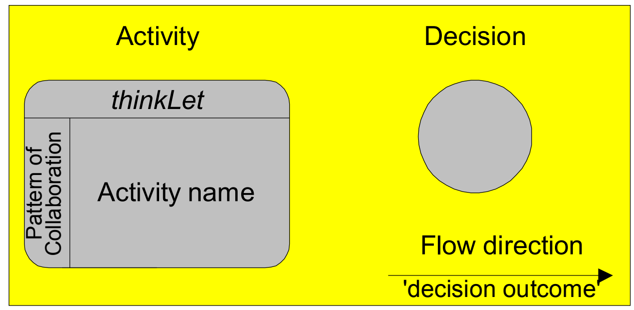

Figure 3. Elements used to model the process logic of the repeatable collaborative RM process.

Second, a *tool* is needed for any-time-any-place collaboration in a distributed RM process. This may increase team productivity and decrease costs. For example: distributed participants brainstorming risks together need to be supported by an (a)synchronous brainstorming tool. Based on successful experiences in earlier projects, we selected GroupSystems (by GroupSystems.com) as the prime collaboration tool in the repeatable process.

Last but certainly not least, a specific *configuration* of the hard- and software is needed to realize and sustain the pattern of collaboration required for the problem at hand. The software configuration needs to be specified, because different configurations will results in different group dynamics and hence different group productivity [6]. The configuration of GroupSystems in the repeatable RM process is defined by the specific thinkLets that we propose to use in our process [6].

5.2. A collaborative repeatable RM process

Based on the experiences illustrated in Section 4 and the requirements described in Section 5.1, we developed a first draft of a repeatable collaborative RM process. This collaborative process we subsequently applied and evaluated in a pilot project within a large European insurance company. The pilot consisted of two half-day workshops over a period of two weeks facilitated by the first author. During the workshops, the complete RM process was carried out, consisting of risk identification, assessment, and mitigation activities.

The experiences from this pilot resulted in a number of modifications to the definition of the overall process in terms of collaborative activities, their interdependencies, and the thinkLets used. We then presented the resulting collaborative RM process model to a group of 12 RM experts from a large international financial institution. Each of these experts was experienced in operational risk management. During a half day discussion, the wording and order of activities was modified and the proposed patterns of collaboration where tested with a number of chosen thinkLets [6]. The resulting repeatable collaborative RM process is presented in figure 4.

In general, the RM process consists of three sub processes. (1) Risk Identification, (2) Risk Assessment, and (3) Risk Mitigation.

In the first sub process, participants in the RM process identify the most important risks concerning the situation that is being addressed, organized into a number of relevant themes.

In the second sub process, participants carry out the assessment of absolute risk. This assessment measures the impact and probability of each risk, assuming that no controls are in place. Next, existing controls are identified, after which the participants can assess managed risks, i.e. the impact and probability of each risk *given* that existing controls are operational.

In the third sub process, participants identify additional and/or improved controls that will further reduce the impact and/or probability of the risks. Control effectiveness is measured through an assessment of the residual risk, i.e. the impact and probability of each risk *given* that both existing and new controls are operational. The process concludes with the identification of the 'control owners', i.e. the stakeholders that will be responsible for the implementation of new controls.

As can be seen from figure 4, each activity uses a certain thinkLet that defines the tools, their configuration, and the facilitation that has to be followed to carry out the activity. For thinkLets examples, we refer to [6].

The repeatable RM process will be applied in the field in the international financial institution mentioned above. International trainers have been educated in the process so that they in turn can facilitate RM processes and train other facilitators for the same purpose. For the moment, the institution has opted not to use dedicated meeting tools, such as GroupSystems. As a result, the proposed thinkLets have been re-defined into a manual form (e.g. using stickies). We hope to follow the institution's efforts to see to what extent the proposed process provides facilitators in different parts of the organization with sufficient guidance for effective RM workshops. We are especially interested to see which activities/thinkLets can effectively be carried out in a distributed fashion.

6. Conclusions

Experiences with RM in a multinational service organization yielded various factors that negatively impacted or impaired goal congruence, communication, deliberation, information access, and distractions in distributed RM groups. Based on these experiences, we proposed a repeatable method for distributed collaborative RM, defining the collaboration activities in terms of their interdependencies, patterns of collaboration, and specific thinkLets. Based on first experiences in a pilot and validation by an expert panel of operational risk managers, we believe that our repeatable method represents an effective first blueprint for self-sustainable collaborative RM processes within organizations.

However, there are some limitations to take into account when interpreting our findings and experiences. First there is a possible bias introduced because we could only use data from one multinational service organization to investigate the effect of distributedness on group productivity. We attempted to address this concern by including respondents from four different projects from within the organization in our study. Second, the subjectivity of the risk management experts, both in the service organization and in the financial institution, limits the generalizability of our findings.

Future research challenges include:

- The development of thinkLets for distributed convergence. Experiences show that divergence (brainstorming) can be fairly effectively done in distributed settings. However, as convergence activities (and thinkLets) involve high levels of interaction and body language, it remains to be seen what form effective distributed convergence thinkLets will take.
- Not every participant in a RM process needs to contribute to each and every RM activity. During a distributed RM process, procedures for dynamic and fluent participant allocation need to be present.
- To evaluate and further improve the proposed RM method, its effectiveness and efficiency have to be assessed. Also, the effects it has on team productivity compared to existing processes has to be established.

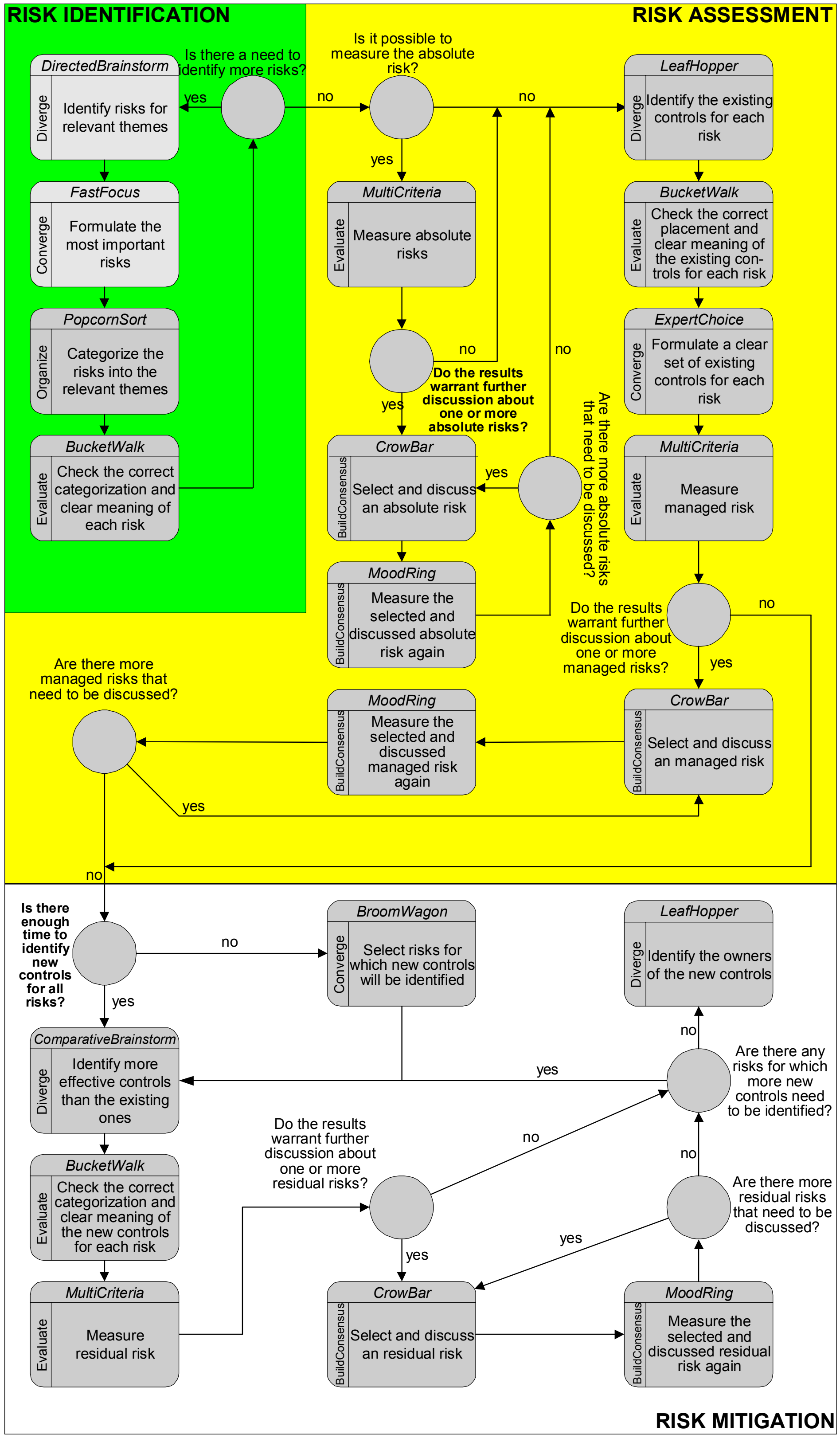

Figure 4. The proposed repeatable collaborative Risk Management process.

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