

## RA 1210 - Ownership and Management of Operating Risk (Risk to Life)

### Rationale

*Aviation Duty Holders (ADH) have a personal Duty of Care for the personnel under their command: those who, by virtue of their involvement in aviation activities, come within an ADH's Area of Responsibility (AoR); and the wider public who may be affected by their operations. Failure to ensure a suitable and sufficient risk assessment is conducted and the findings acted upon accordingly, will potentially expose individuals to risks that are neither As Low As Reasonably Practicable<sup>1</sup> (ALARP) or Tolerable.*

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### Regulation

#### 1210(1)

### Risk Ownership

1210(1) As the risk owners, ADHs **shall** always remain accountable for Risks to Life (RtL)<sup>2</sup> within their AoR.

### Acceptable Means of Compliance

#### 1210(1)

### Risk Ownership

1. Annex A contains the risk ownership, referral/escalation protocols and Defence Aviation Hazard Risk Matrix (HRM) that **should** be used by ADHs.
2. If a RtL is identified that the Senior Duty Holder (SDH) considers is of potential Societal Concern<sup>3</sup>, the Secretary of State (SofS) **should** be informed for consideration of the wider implications before the SDH accepts such a risk.
3. Director General Defence Safety Authority **should** be informed in parallel when risks are referred up to the SDH or SofS.

### Guidance Material

#### 1210(1)

### Risk Ownership

4. ADHs accountable for the RtL of a given activity will be fully engaged in the risk decision process.
5. In the execution of their specific ADH responsibilities, ADHs are personally accountable to the SofS via their superior ADH chain.
6. ADHs are legally accountable for the safe operation of systems in their AoR and for ensuring that RtL for 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> parties<sup>4</sup> are both ALARP and Tolerable.
7. As a formal element of ADH succession activities, all existing hazards and risks that present a credible RtL must be reviewed by the incoming ADH to ensure they are personally content with the level of RtL being carried and the effectiveness of any extant mitigation measures.

### Societal Concern

8. Societal Concern is a recognized factor in risk management when there is potential for public condemnation, particularly from accidents involving significant numbers of people and/or vulnerable groups. Measures introduced to mitigate this class of risk need to be considered carefully taking into account the political dimension with the need to protect both the MOD's reputation and maintain public confidence.

### Regulation

#### 1210(2)

### Risk Management

1210(2) ADHs **shall** ensure RtL are both ALARP and Tolerable.

<sup>1</sup> The ALARP principle derives from Sections 2 and 3 of the Health and Safety at Work Act 1974.

<sup>2</sup> MAA02 provides definitions for Risk to Life, Hazard and Risk which are to be used in conjunction with this RA.

<sup>3</sup> Reducing Risks, Protecting People (R2P2) paragraph 17 - 27 – ISBN 0 7176 2151 0, Published 2001.

<sup>4</sup> 1<sup>st</sup> Parties are aircrew. 2<sup>nd</sup> Parties are other personnel working on Air Systems, or as ground crew, or flying as duty passengers. 3<sup>rd</sup> parties are the general public and MOD personnel who do not fall within the category of 1<sup>st</sup> or 2<sup>nd</sup> Parties.

### Acceptable Means of Compliance 1210(2)

#### Risk Management

9. ADHs **should** be able to demonstrate that RtL have been reduced ALARP.
10. ADHs **should** be able to satisfy themselves that the risk exposure is Tolerable such that people are only exposed where some defined benefit is expected, where the risk exposure is proportional to the expected benefit and where the risks are adequately controlled.
11. In the Safety Statement and Safety Case<sup>5</sup> the Operating Duty Holder (ODH) **should** record and justify an argument that risks are ►◄ ALARP and Tolerable.
12. Risk Management **should** consider both single risks and the overall risk<sup>6</sup> exposure. Single risks provide a clear focus for effective management of issues at lower levels, but superior ADHs **should** understand the overall risk exposure.

### Guidance Material 1210(2)

#### Risk Management

13. Guidance material on the standardized approach to ALARP and Tolerable decision making is contained in Annex B.
14. A risk can be said to be reduced to a level that is ALARP when the sacrifice (see Annex B), of further reduction is “grossly disproportionate” to the decrease in risk that would be achieved; the ADH will be able to show that this is the case when he decides not to incorporate a recognised risk reduction measure. The balance must be weighted in favour of safety, with a greater “disproportion factor” for higher levels of risk<sup>7</sup>.
15. Once a risk has been reduced to ALARP, the ADH must balance the residual risk against the expected benefit to determine whether the risk is Tolerable. The ADH must be aware of how much risk he can accept and when to elevate risk decisions to a higher level.
16. An ALARP argument will be revisited periodically and on any occasions which suggests a change in associated assumptions or analysis as part of the ADH's risk review process in line with RA 1205, to ensure that it remains valid. The validity of an ALARP argument can only be decided definitively by the courts, in the event of an accident.
17. ADH-Facing organizations need to be cognisant of their responsibilities in the delivery of their outputs and dependencies of their respective ADH<sup>8</sup> when assessing RtL.

### Regulation 1210(3)

#### Standardized Approach to Risk

- 1210(3) ADHs **shall** adopt a standardized approach in managing RtL.

### Acceptable Means of Compliance 1210(3)

#### Standardized Approach to Risk

18. Superior ADHs **should** ensure a coherent and consistent approach to managing RtL, particularly if lower level ADHs have similar responsibilities or where multiple platforms operate under a single Delivery Duty Holder (DDH).
19. It is a legal requirement for ADHs to ensure that risk assessments are carried out. The core elements of a risk assessment, that focuses on RtL, that **should** be conducted are:
  - a. Hazard identification.
  - b. Assessment of the risk (likelihood, consequence, who is exposed, existing mitigation, and accountability).

<sup>5</sup> ► Refer to ◄ RA 1205 – Air System Safety Cases.

<sup>6</sup> Overall risk is sometimes referred to as 'Aggregated Risk'. Aggregated Risk is defined within the International Organization for Standardization Risk Management vocabulary as: "the process of combining individual risks to obtain a more complete understanding of risk". The purpose of risk aggregation is to provide a more complete picture of the risks posed by a system, or risks faced by an individual or group of people, than is given by considering possible risk outcomes one at a time.

<sup>7</sup> Further guidance on ALARP is available from <http://www.hse.gov.uk/risk/expert.htm>.

<sup>8</sup> ► Refer to ◄ RA 1020 – ► Aviation Duty Holder and Aviation Duty Holder-Facing Organizations - Roles and Responsibilities. ◄

**Acceptable  
Means of  
Compliance  
1210(3)**

- c. Reduce risk until ALARP. Ensure residual risk is Tolerable.
- d. Record significant findings.
- e. Monitor and review.

20. ADHs **should** maintain clear, unambiguous and auditable records of each of their risks including details of risk decisions and periodic risk reviews. The minimum information requirements and risk review process is at Annex C which **should** be used by ADHs.

**Guidance  
Material  
1210(3)**

**Standardized Approach to Risk**

21. Hazard identification, risk assessment, reduction, recording, monitoring and review are key elements in managing RtL and need to be maintained and updated to ensure a coherent risk picture. Annex D provides further detail on the key elements of risk management.

22. ADHs will be cognisant of the higher levels of risk exposure associated with military aviation and the requirement for more rigorous risk management than that typically expected of those activities with lower risk exposure.

**Regulation  
1210(4)**

**Emerging Hazards and Risks**

1210(4) The ADH **shall** be involved in the understanding and management of emerging hazards and risks.

**Acceptable  
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Compliance  
1210(4)**

**Emerging Hazards and Risks**

23. ADHs **should** identify, record and manage emerging hazards that undermine RtL mitigations within an Air System Safety Case<sup>5</sup>.

24. ADHs **should** ensure that emerging safety risks derived from new and future platforms, systems, modifications, technologies, environments and activities<sup>9</sup> are managed in accordance with this RA.

**Guidance  
Material  
1210(4)**

**Emerging Hazards and Risks**

25. Emerging risks may be best managed through an early, pan-Defence Lines of Development (pan-DLoD) focus on the Air System Safety Case while the system or modification is still in development. Emerging risks may arise from temporary changes in the operating environment (eg exercise, deployment or other transient condition). These risks will be recorded, managed and reviewed in a standardized and auditable manner.

Annexes:

- A. ADH Risk Ownership, Referral and Defence Aviation Hazard Risk Matrix
- B. ALARP and Tolerable
- C. Risk Register and Review Process
- D. Standardized Approach to Risk Management

<sup>9</sup> ►Refer to◄ RA 1200 – Defence Air Safety Management. Paragraph 1.c.(2). Management of Change is one of the auditable facets that each organization's Air Safety Management Systems **should** address.

**ANNEX A****ADH RISK OWNERSHIP, REFERRAL AND  
DEFENCE AVIATION HAZARD RISK MATRIX**

1. In order to ensure management attention commensurate with the levels of risk and authority to accept Single Risks, the following graduated scale **should** be used:

- a. Very High (VH) risks - **SDH**.
- b. High (H) and Medium (M) risks - **ODH**.
- c. Low (L) risks – **DDH**.

2. All operating risks<sup>8</sup> **should** have an ADH owner and this **should** be indicated in the Risk Register or suitable alternative<sup>10</sup>. DHs can delegate the management of risks to other suitably qualified and experienced individuals as and when appropriate. However, as the risk owners, the ADH **should** always remain accountable for RtL within their AoR.

**Defence Hazard Risk Matrix**

3. The Defence Aviation Hazard Risk Matrix at Table 1 enables risk classification according to each Single Risk's assessed severity and likelihood and is designed to assist with assessing the hazards on a like-for-like basis and to determine the appropriate levels of ADH risk ownership. The position of a risk in a Hazard Risk Matrix (HRM) is not an indication of its ALARP or Tolerable status.

**Risk Referral**

4. The process for referring risks classified using the HRM to a superior ADH is outlined below. However, the purpose of referring a Single Risk is not limited to transferring ownership. It also informs a superior ADH's assessment of RtL across the related activity and wider AoR, the importance of the activity being undertaken, and re-evaluation of whether the RtL remains demonstrably ALARP and Tolerable.

**Key Principles of Risk Referral**

5. SDHs **should** ensure:
- a. Risks are owned at the lowest acceptable level, by an ADH with the appropriate level of authority and resources.
  - b. Positive control of all risks at the appropriate level through the escalation process.
    - (1) The decision over who is best placed to manage a risk is separate from risk ownership.
    - (2) Once escalated, the superior level ADH **should** provide formal feedback to the lower level ADH on the treatment and outcome of the subject risk. It is the responsibility of the accepting ADH to ensure that the Risk Register or suitable alternative is annotated accordingly and to establish a review process to monitor the risk and associated mitigating action.

**Severity**

6. The severity of a Single Risk is an assessment of the worst credible outcome<sup>11</sup> that could result from the hazard. The severity categories listed below **should** be used.

- a. **Catastrophic**. Three or more fatalities of MOD employees<sup>12</sup> engaged in the activity in question or a single fatality of a member of the public.
- b. **Critical**. One or two fatalities of MOD employees engaged in the activity in question. A large number of specified injuries<sup>13</sup> **should** also be included in this category.
- c. **Major**. Specified injuries to any person. A large number of reportable injuries<sup>14</sup> **should** also be included in this category.

<sup>10</sup> Any suitable alternative **should** enable a record to be kept of risk decisions, activities and periodic risk reviews.

<sup>11</sup> Although the HRM is calibrated on worst credible outcome, care **should** be taken to ensure that ADHs are aware of the full range of outcomes when considering appropriate mitigations.

<sup>12</sup> Including MOD contractors engaged in MOD-supervised activity.

<sup>13</sup> Specified injuries are defined on the Reporting of Injuries, Diseases and Dangerous Occurrence Regulations (RIDDOR) 2013 website at: <http://www.hse.gov.uk/riddor/>.

<sup>14</sup> Injuries that result in a worker being away from work or unable to perform their normal work duties for more than seven consecutive days (not counting the day of the accident). See HSE guidance: <http://www.hse.gov.uk/pubns/indq453.pdf>.

- d. Minor. Reportable injuries to any person.

**Likelihood**

7. Likelihood is assessed with respect to the likelihood of the assessed consequence of a hazard. This is based on the likelihood of a single accident resulting in harm for a particular fleet. The appropriate category listed below **should** be used:

- a. Frequent. Likely to occur at least several times a year.
- b. Occasional. Likely to occur one or more times per year.
- c. Remote. Likely to occur one or more times in 10 years.
- d. Improbable. Unlikely to occur in 10 years.

Table 1. The Defence Aviation HRM.

		Severity			
		Minor	Major	Critical	Catastrophic
Likelihood	Frequent	M	H	VH	VH
	Occasional	L	M	H	VH
	Remote	L	L	M	H
	Improbable	L	L	L	M

## ANNEX B

## ALARP and Tolerable

1. The goal of risk management<sup>15</sup> is to show that safety risks are ALARP and can be tolerated; merely identifying and mitigating risks is not in itself sufficient. The law requires that risk has to be weighed against the measures necessary to eliminate the risk, and the more significant the risk, the less weight will be given to the factor of cost.
2. A risk can be said to be reduced to a level that is ALARP when the sacrifice of further reduction is “grossly disproportionate” to the decrease in risk that would be achieved<sup>16</sup>. An ALARP argument must balance the “sacrifice” (in time, money or trouble) of possible further risk reduction measures against their expected safety benefit (incremental reduction in risk exposure).
3. In the Safety Statement<sup>5</sup>, the ODH is required to make an argument that risks are ALARP (and Tolerable); justifying and recording how this conclusion has been reached is an important and vital step in safety management. This argument must be revisited periodically in line with the ADH’s risk review process or when assumptions and knowledge has changed to ensure that it still meets the ALARP criteria, for example, by ascertaining whether further or new control measures need to be introduced to take into account changes over time, such as new knowledge about the risk or the availability of new techniques for reducing or eliminating risks. The Health and Safety Executive (HSE)<sup>17</sup> identifies 2 approaches to supporting an ALARP claim:
  - a. **Good practice justification**, based upon the argument that compliance with a recognized code of practice/MAA approved process/guidance/Defence Standard is acceptable. ADHs will understand that practices change over time and that “Good Practice” is only the minimum initial standard to achieve.
  - b. **First principles**, which can be further divided into:
    - (1) **Qualitative judgements** are founded upon professional and military judgement, common sense and experience from Suitably Qualified Experienced Persons (SQEP) using the best available evidence.
    - (2) **Quantitative assessment** is based upon practicable methods of risk reduction and control. A quantitative ALARP argument/judgement will normally be based upon a Cost Benefit Analysis (CBA)<sup>18</sup> and a gross disproportion test, the results of which will be used as evidence to support the ALARP claim. A CBA cannot be the sole determinant of an ALARP decision.
4. The approach chosen to support an ALARP claim can be constructed in a number of ways, which may include one or more of the above. The choice of approach is the ADH’s responsibility and is informed by the nature of the risk. ALARP arguments will therefore consider the wider risk reduction measures which are available for ‘reasonably practicable’ adoption, in both the short and long term. Risk owners need to consider whether in the event of an accident, the absence of further risk reduction measures to support an ALARP claim could be considered as due to negligence, inactivity or complacency.
5. Before exposing an individual to a risk, a judgement is required of the ADH, on whether the risk is ALARP and the exposure is Tolerable. The HSE defines Tolerable as a “willingness by society as a whole to live with a risk so as to secure certain benefits and in the confidence that the risk is one that is worth taking and that it is being properly controlled”<sup>19</sup>.
6. Given the unique nature of, and unavoidable hazards associated with Defence Aviation activity, ADHs are to ensure that the residual risk exposure is proportional to the expected benefit. The residual risk exposure can only be fully understood once the ALARP principle has been applied. It will be noted that what is considered ‘Tolerable’ in one scenario does not necessarily apply to another (eg a residual risk that, when balanced against an urgent operational need is considered Tolerable, is not necessarily Tolerable when balanced against a need that is less urgent). The HSE highlights that “what is Tolerable may differ in peace or war”<sup>20</sup>.

<sup>15</sup> MAA02 defines risk management as the “process that encompasses: hazard identification; risk assessment; hazard risk matrix; risk reduction; and risk monitoring and review”.

<sup>16</sup> However, the potential impact of societal concern may also need to be considered.

<sup>17</sup> <http://www.hse.gov.uk/risk/theory/alarpglance.htm>.

<sup>18</sup> HSE principles for CBA in support of ALARP decisions are detailed at: <http://www.hse.gov.uk/risk/theory/alarpcba.htm>.

<sup>19</sup> Reducing Risks, Protecting People (R2P2) page 3 – ISBN 0 7176 2151 0, Published 2001.

<sup>20</sup> Reducing Risks, Protecting People (R2P2) page 43 – ISBN 0 7176 2151 0, Published 2001.

**ANNEX C****RISK RECORDING AND REVIEW PROCESS****Risk Recording**

1. ODHs are to maintain clear, unambiguous and auditable records of each of their risks including details of decisions, activities and periodic risk reviews. All risks of Catastrophic, Critical and Major severity (definitions at Annex A) **should** be recorded in a Risk Register or suitable alternative<sup>10</sup>. It is at the discretion of the ODH whether to record Minor severity risks. The minimum information recording requirements are detailed at Table 2.
2. The ODHs **should** own and hold the aggregated view<sup>21</sup> of risks and review them on a regular basis. There **should** be an aggregated individual Air System view and an aggregated view of all Air Systems operated by the ODH within their AoR, which considers pan-DLoD elements and have a suitably senior and empowered nominated Risk Records Manager (RRM). A suitably empowered individual **should** be nominated for the administration of the risk management process but this in no way relieves the managers and owners of individual and collective risks of their personal responsibilities.
3. Once a risk is identified and recorded, it **should not** be removed from records but **should** be closed only once the risk no longer has any relevance to, or impacts upon, the operating risk environment or ADH AoR. Effective safeguards **should** be in place to ensure records are protected from unauthorized access and editing. High confidence backups **should** be made to ensure through-life business continuity and that records cannot be corrupted or lost<sup>22</sup>.

**Review Process**

4. ODH led Air Safety Steering Group and Air System Safety Working Group meetings **should** include the review of risk mitigations, the aggregated risk and ALARP and Tolerable decisions. More frequent reviews **should** prove beneficial, particularly where there is a change in circumstances to identify best practice for understanding and management of risk.
5. ADHs **should** consider the frequency of subordinate working groups and attendance of Subject Matter Experts (SMEs) to ensure that sufficient and effective review is achieved, whilst avoiding an unwieldy and unnecessary burden. For example, at DDH level, this **should** be associated staffs under the Chairmanship of the RRM. Minutes, or Records of Decisions for the supporting meetings are to be taken, recorded, and relevant activity reported upwards as necessary.

**MAA Assurance**

6. Artefacts supporting the risk management process, including records of risk decisions, activities and supporting review meetings **should** be scrutinized during MAA oversight and on demand.
7. Table 2 overleaf details the minimum information that **should** be recorded to support effective risk management.

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<sup>21</sup> The aggregated view is a compilation of the ADH standardized Risk Registers or suitable alternatives.

<sup>22</sup> ► Refer to ◀ RA 1225 – Air Safety Documentation Audit Trail.

Table 2. Minimum Information Recording Requirements.

Each risk should have:	Rational
A unique identifier (number and/or title)	The unique identifier allows traceability of risk management decisions.
Description	A description of the risk using plain language to provide clarity on the relationship between the specific hazards and potential consequences.
Current likelihood	Assessed iaw Annex A.
Current severity	Assessed iaw Annex A.
HRM Classification	Assessed iaw Annex A.
Risk owner	Assessed iaw Annex A.
Risk manager	The individual managing the risk such as capability manager or appropriate individual nominated by ADH.
Existing mitigations	Details the existing mitigations in place (eg barriers (proactive and recovery)). This <b>should</b> refer out to the Air System Safety Case and where appropriate high level safety claims.
Proposed mitigations	Details of the strategies and action plans proposed to mitigate the risk and any additional strategies or controls required. If known, illustrative costs of proposed mitigations and timescale of action plans <b>should</b> be recorded. Artefacts supporting the risk management process, including records of risk mitigation decisions <b>should</b> be retained.
Future likelihood	Identifies likelihood post implementation of proposed mitigation. Assessed iaw Annex A.
Future severity	Identifies severity post implementation of proposed mitigation. Assessed iaw Annex A.
Future HRM Classification	The severity and likelihood <b>should</b> be recorded using the HRM. Assessed iaw Annex A.
Proposed mitigations status (funded, endorsed, not endorsed (include those rejected as grossly disproportionate))	Details of whether the proposed mitigation is funded, endorsed, not endorsed. Artefacts supporting the risk management process, including records of risk mitigation decisions <b>should</b> be retained. The rational for those risk mitigations rejected as 'grossly disproportionate' <b>should</b> be recorded.
Last review date	Details the date and level of review carried out.
Next review date	Details the date and level of review to be carried out.
Closure date and reference to risk owner authority to close risk	Risks <b>should not</b> be removed from records and <b>should</b> only be closed by the risk owner.



## ANNEX D

### STANDARDIZED APPROACH TO RISK MANAGEMENT

1. Risk Management is an essential element of an effective Air Safety Management System<sup>23</sup>. Its implementation is also essential for the higher control and management of Air Safety risk and will enable Defence resources to be appropriately targeted to that end. The diagram below outlines the key elements and continuous cycle of risk management.

*Diagram 1. Key elements of risk management*



2. Risk is a measure of exposure to possible loss and it combines the severity of loss (how bad) and the likelihood of suffering that loss (how often). RA 1210 is concerned solely with RtL and so addresses fatality and injury, but excludes damage to assets or the environment where no personal harm results.

3. The following are required as a minimum to manage single risks:

a. **Hazard Identification.** Hazards may be identified by a variety of different means<sup>24</sup>: previous occurrences, reporting, checklists, HAZOPS<sup>25</sup>, Zonal Hazard (Safety) Analysis<sup>26</sup>, error trends, monitoring, Systems-Theoretic Accident Model and Processes (STAMP) etc. Whichever techniques are used, sound Hazard Identification depends on the engagement of individuals recognized as SQEP for the activity. A combination of techniques could be selected with the aim of providing high confidence that all credible hazards have been identified. Once identified, these are to be recorded iaw Annex C.

b. **Risk Assessment.** The likelihood and severity related to a hazard with a potential harmful outcome must be assessed. The assessment may be undertaken by a range of approaches, although it must be recognized that the results will only be an estimate, or forecast, of potential outcomes and subject to uncertainty. Hence, it may also be necessary to consider other more likely outcomes, rather than just the worst credible<sup>27</sup>. In addition the need to conduct the associated activity and the expected benefit must be understood. The Defence Aviation HRM enables classification according to each Single Risk assessed for severity and likelihood. It is designed to

<sup>23</sup> ► Refer to ◀ RA 1200 – Defence Air Safety Management.

<sup>24</sup> From both ADH and ADH-Facing organizations.

<sup>25</sup> Hazard and Operability Study.

<sup>26</sup> ARP 4761: Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

<sup>27</sup> Considered to have the greatest detriment.

assist with assessing the hazards on a like-for-like basis and enable determination of the appropriate levels of ADH risk ownership. Before exposing an individual to a risk, a judgement is required whether the risk is ALARP and the exposure is Tolerable.

c. **Risk Reduction.** In order that a single risk is reduced ALARP, risk mitigation techniques are to be applied. These may range from eliminating the hazard altogether, to reducing the severity and/or likelihood. Priority may be given to reducing the severity before considering a reduction in the likelihood.

d. **Risk Recording and Escalation.** Once risk mitigation is applied the ADH will assure himself that the risk is ALARP and the exposure is Tolerable. Key information regarding risks decisions and risk management activities must be recorded as detailed at Annex C and communicated across all ADH and ADH-Facing stakeholders. The ADH will be aware of how much risk he can accept and when to elevate risk decisions to a higher level.

e. **Risk Monitoring and Review.** ADHs must routinely monitor identified risks. Mitigation activity may take time to implement, therefore ADHs must review the timescales and effectiveness of mitigation plans to ensure that risks remain ALARP and Tolerable.

4. Due to the higher levels of risk exposure associated with Defence Aviation and the societal concerns it engenders, the standardized risk management process within the Defence Air Environment requires a higher level of compliance than that typically expected of those activities with lower risk exposure. Therefore the requirement for techniques, tools, assurance, recording, monitoring and SQEP involvement are far greater. Recognized good practice must, where possible, be the minimum level applied to risk management processes.