



Learning from errors; towards an error management culture

Insights based on a study in the capital markets

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The Dutch Authority for the Financial Markets

The AFM is committed to promoting fair and transparent financial markets.

As an independent market conduct authority, we contribute to a sustainable financial system and prosperity in the Netherlands.

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Summary

Many financial companies state in their strategy that it is their ambition to be a learning organisation. However, it does not appear to be recognised and acknowledged everywhere that dealing with errors is a crucial factor in this. The learning potential that errors provide is often overlooked, certainly if the error did not have major consequences. Scientific research shows that more is learned in organisations with an error management culture, which contributes to (1) the ethical behaviour of employees, (2) a better quality of service to customers and (3) a better performance of the company. Making mistakes and learning from these mistakes thus offer a unique possibility to increase the learning ability of an organisation.

With this report, the AFM wishes to demonstrate the importance of an error management culture for financial companies and to inspire them to actually work on achieving this in practice. Especially for companies that operate in a dynamic context and sell complex products, such as financial companies, creating an error management culture is important.

This report describes a case study that the AFM has performed into the error management culture within financial companies. This case study was carried out at 13 companies that are active within the infrastructure of the capital markets. On average, it appeared that the companies that participated in the study have a reasonably open error management culture. The reporting discipline of errors is also high. Employees are, on average, less positive about the leadership demonstrated, the tone at the top and the degree to which people learn from errors that occur. The outcomes differ between the investigated companies. There are companies with high scores across the board and companies with low scores. It is striking that often there are large differences between how managerial and non-managerial staff perceive how errors are dealt with. The best practices that we encountered are also described.

In order to create an error management culture as a company, it is important first of all to deal with this on the organisation level, instead of only at the level of (a number of) individual employees. Secondly, structure and culture have to be well aligned. Thirdly, middle management and senior management play an important role in creating an error management culture. Their conduct and their reactions are crucial for how errors are regarded on a company level in the organisation.

“Where people work, mistakes are made. Mistakes are also made occasionally at AFS Group. This study has made us realise even more that the way that you deal with these errors is very important. A transparent error management culture directed at remediation and prevention works the best in the short and the long term.” H. Siemerink, CEO AFS

1. The importance of an error management culture

Knight Capital lost \$ 440 million within half an hour on 1 August 2012. This loss equalled four times Knight Capital's net annual profit over 2011 and ultimately led to the demise of this New York trading firm. A technician had accidentally activated a programme that was used to test the functioning of algorithms in the production environment. As a consequence, stocks were bought at the ask price (for example \$ 13.20) and sold at the bid price (\$ 13.15). The error was discovered relatively late because they did not realise that the test software was running live alongside the normal software.

Completely ruling out errors is an illusion; where people work, errors are made. What organisations have in common is that often, making mistakes is considered to be a terrible thing. Especially due to the negative consequences these errors may have such as large financial losses, reputation damage and damage to clients. However, organisations differ in the manner in which they deal with errors or, in other words, the degree in which they have an error management culture. What makes an organisation reliable is not the absence of errors, but dealing adequately with errors.

The Dutch Authority for the Financial Markets carried out a study in 2016 into error and incident management within 13 companies that are active within the infrastructure of the capital markets.

With this report, we wish to inform the financial sector about the importance of creating an error management culture and the positive consequence thereof. In addition, we would like to share the experiences and best practices that we encountered in this study with the sector and inspire companies to work on creating an error management culture. This study is a case study that the AFM performed into the error culture within financial companies. The AFM is currently exploring in which other sub-markets this study can be repeated. We plan to publish the methodology, including the accompanying survey at the end of 2017.

The study on error and incident management at companies within the infrastructure of the capital markets was started because dealing adequately with errors and incidents is essential for the management and control of operational risks on the capital markets. During the last ten years, problems of an operational nature were an important cause of large losses at companies active on the capital markets. Trading on capital markets has been strongly computerised and

developments such as order routers, high frequency trading and self-learning algorithms are proceeding very fast. As a result, the impact of problems of an operational nature is growing and therefore also the importance of adequate risk management.

The Capital Markets Supervisory Division carried out this study together with the AFM's Behaviour & Culture team. As a result of this joint approach, both the structural aspect of error and incident management as well as the 'human' aspect or the culture aspect were examined. This report focuses on the culture aspect; how do organisations deal with errors, as perceived by the employees?

Capital markets play an important role in the economy. They enable companies to raise money to, for example, invest in innovative growth. The AFM promotes the fair and efficient operation of capital markets, so that all market parties have equal opportunities and that everyone abides by the rules. In order to reduce the risk of disruptions of the capital markets, the AFM is paying more attention to controlled trading and taking adequate measures to ensure a robust trading infrastructure.

From: AFM year agenda 2017.

An error is defined as something that is not intentional, thus something that goes wrong unintentionally.¹ Matters such as fraud and misconduct are not regarded as errors. Incidents are defined as things that go wrong and that have to be reported internally. Not every error has to be reported. An *error management culture* exists when active communication takes place within the organisation about errors and employees dare to admit their errors, as this is regarded to be only human. Errors are detected, analysed and corrected quickly and knowledge is actively shared within the organisation, with a focus on learning and taking effective improvement measures.

1.1 Organisations with an error management culture learn more

Creating an error management culture ensures that *organisations learn more*, on the individual, team and organisation level.² That is because errors offer unique opportunities to learn. When information is shared about errors within organisations and open communication takes place about errors, joint understanding and insight arise which benefit the detection, speed and quality of the correction.³ Employees are also more inclined to explore, experiment and innovate,⁴ which leads to better results. Below, we zoom in on the most important reasons that make an error management culture relevant.

¹ Van Dyck et al. (2005); Frese and Keith (2015).

² Edmondson (1999); Homsma et al. (2009); Van Dyck et al. (2005); Lei et al. (2016).

³ Van Dyck et al. (2005); Homsma et al. (2009).

⁴ Dormann and Frese (1994); Edmondson (1999).

First, research shows that creating an error management culture is an effective way to stimulate ethical behaviour among employees.⁵ Employees in an error management culture are more inclined to report their own and other people's errors honestly and to act responsibly, in line with the organisation's requirements.⁶

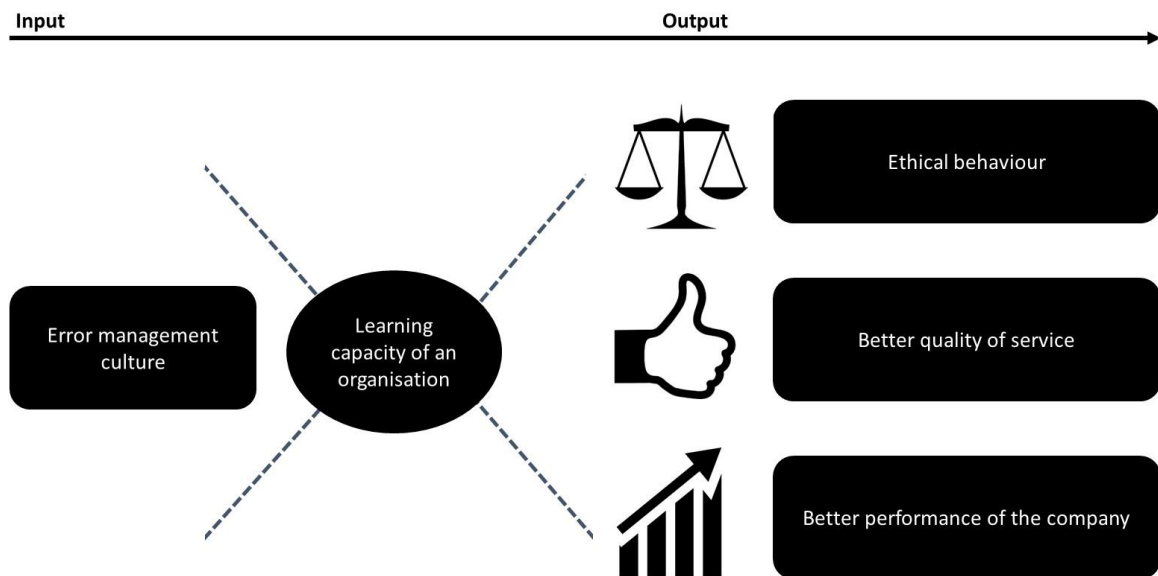


Figure 1. The positive consequences of an error management culture

Secondly, an error management culture contributes to the *quality of the services* provided to the customer.⁷ When employees feel safe to openly discuss errors and dare to give their opinion, they are more motivated to invest in the improvement of the quality of processes and products.⁸ Employees will also actively search for information and feedback from customers sooner. This contributes to a better quality of service to the customer.⁹

Thirdly, creating an error management culture leads to a *better performance* of companies. Individuals and teams perform better and companies are more successful when an error management culture exists.^{10 11} Moreover, research shows that the positive relationship between an error management culture and performance is stronger for companies that operate in a dynamic context and sell complex products,¹² which makes creating an error management culture extra relevant for the financial sector.¹³

⁵ Gronewold et al. (2013).

⁶ Edmondson et al. (2004) ; Gronewold et al. (2013); DNB (2015).

⁷ Hoffman and Mark (2006).

⁸ Nembhard and Edmondson (2006).

⁹ Edmondson (1999).

¹⁰Scientific research at a large number of Dutch and German organisations shows that an error management culture leads to a better firm performance (return on assets) and is related to the survival of organisations (firm survivability), Van Dyck et al. (2005), see also Bear and Frese (2003). Keith and Frese (2011).

¹¹The effect of an error management culture on the performance of individuals is also demonstrated with the aid of experiments. For instance, participants were divided into two conditions when learning new complex tasks. In the first condition, it was emphasised that errors had to be avoided and participants were given precise instructions about how the task was to be carried out. In the second condition, the positive function of errors was emphasised, for example 'errors are a natural part of learning' and 'great, you have made a mistake!'. In a series of such experiments, it turned out each time that the second group performed better on complex tasks than the first group, see Frese and Keith (2015); Frese et al (1991); Keith and Frese (2008); Van Dyck et al. (2010).

¹² Hofmann and Mark (2006), Van Dyck et al. (2005).

¹³ DNB (2015).

2. Findings of the study

Below, the most important findings are presented, accompanied by characteristic quotes from the interviews. The outcomes below provide an overall picture of the 13 investigated companies (overall picture) and provide an impression of what we observed.¹⁴

These 13 companies were divided into four sectors: brokers, proprietary trading groups, trading platforms (all regulated markets and MTF established in the Netherlands) and post-trading companies (all Central Counterparty clearing houses established in the Netherlands and the Central Securities Depository). We also show - anonymised and averaged over the whole group - relevant differences between the companies.

2.1 Overall picture: Learning from incidents and Tone at the top could be improved

Overall, the companies score relatively high error management culture. We also see this reflected in the reporting discipline. On the other hand, employees are, on average, less positive about the leadership that is demonstrated when errors occur, about the tone at the top and the degree in which the organisation learns from errors,¹⁵ see Figure 1.

The relatively high score on *error management culture* means that employees, on average, perceive that reasonably open and honest communication takes place about errors and that sufficient time is taken to analyse errors and to correct errors in an adequate manner. In general, employees are not inclined to conceal errors. Employees also experience that others are willing to help when something goes wrong and that others have confidence in them. If somebody makes a mistake, he or she can easily ask colleagues for advice.

“In general, we experienced the study as useful and efficient. Although the members of APT are reasonably flat organisations with a low degree of bureaucracy and a focus on risk management, the study did provide a number of suggestions for improvements and a different perspective on the internal organisation of the participating companies. This in spite of the fact that the study was not really geared to the specific sector of proprietary traders.” M.E.A. Hiskes - Willemse, Secretary of the Board of APT

¹⁴The described findings provide an average image of the 13 surveyed companies. This is not a representative picture for the whole market, not to mention for all companies in the financial sector. However, it does indicate where gains can be achieved with regard to dealing with errors.

¹⁵ A distinction is made in the study between *errors* and *incidents*. Errors are defined as things that go wrong *unintentionally*. Incidents are defined as things that go wrong and that have to be reported internally. Not every error has to be reported, see also the Appendix.

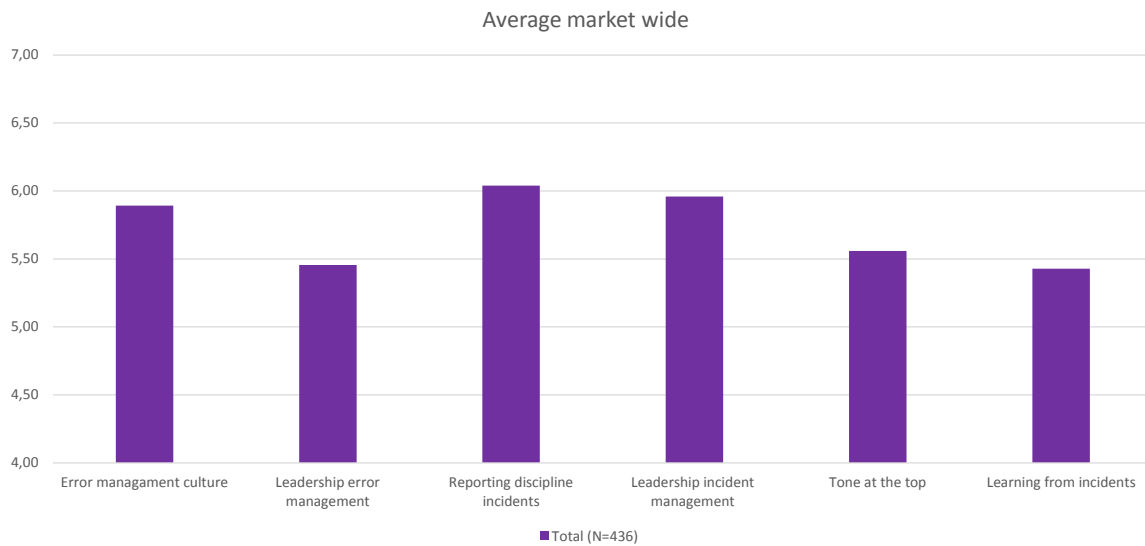


Figure 2. Leadership error management, Tone at the top and Learning from incidents remain behind.¹⁶

“Yes, making mistakes is not a problem. Preferably not, but errors do occur. And when errors do occur, we have to solve this together as soon as possible to ensure that the product remains as good as possible.”

The *reporting discipline* appears to be high. Incidents are generally reported and people see the importance of this. However, the relatively low score on *leadership error management* indicates that employees are of the opinion that their managers do not regard errors sufficiently as opportunities for improvement and do not communicate enough about what has been learned from errors. It is also perceived that managers still do not steer enough on and help with the thorough analysis of errors and the correction and prevention of errors.

Furthermore, it is striking that employees perceive that the top of their organisation does not communicate a clear vision regarding incident management (*tone at the top*). Employees believe that attention paid to the improvement of incident management is not permanent within the company.

*To the question: What is the CEO's stance with regard to error and incident management?
“He does not really say anything about this, not to me in any case. I don't know how he sees this.”*

¹⁶ The scale varied from 1 (does not apply to our organisation at all) to 7 (applies completely to our organisation). Where '4' was neutral. A high score on a theme implies that employees were positive about that theme.

It is also striking that the potential to learn from errors and incidents is not yet realised fully. This means that employees report that they do not hear much about what has been learned from incidents. Employees are relatively dissatisfied about how often they are invited to think critically in order to jointly develop improvements. At most companies, little information is shared about incidents at other departments. People other than direct colleagues are also hardly ever or never invited to help think about incidents. In addition, it came to the fore that the reaction to incidents mainly focuses on correcting the error as adequately as possible. The incident is often only discussed on the individual level instead of on the organisation level (group level). Employees do not often experience that positive changes are implemented following an incident.

“When I was not involved in things or if information isn’t shared, I can get angry. If we don’t hear about it, it’s difficult for us to improve and know how to change it.”

Finally, managers assessed all themes more positively than non-managerial employees. For instance, managers perceive that more is learned from incidents than employees who are lower in the organisation. It is a well-known fact that managers have a (slightly) more positive impression of behaviour and culture in the organisation than employees, also, for example in employee satisfaction surveys. However, the differences become more prominent when we zoom in on the individual companies. We will discuss this below.

2.2 Differences between companies

In the feedback meetings with companies, we experienced that findings really became meaningful when companies saw their scores, compared to all surveyed companies and compared to their peers in the same sector. This is also important as there is no explicit legal norm regarding how organisations should score on cultural aspects. In addition there is no absolute norm that indicates, for example, that scoring a 5 on a specific question is sufficient. The relative scores and the room that there is for improvement matter more.

Benchmarking provides important insights

This way of benchmarking provides us with important insights. Figure 3 provides an example. We can see that three companies clearly remain behind with regard to the degree of the management of the error culture. It can also be observed that some companies score significantly better than average and that there is a considerable spread in results.

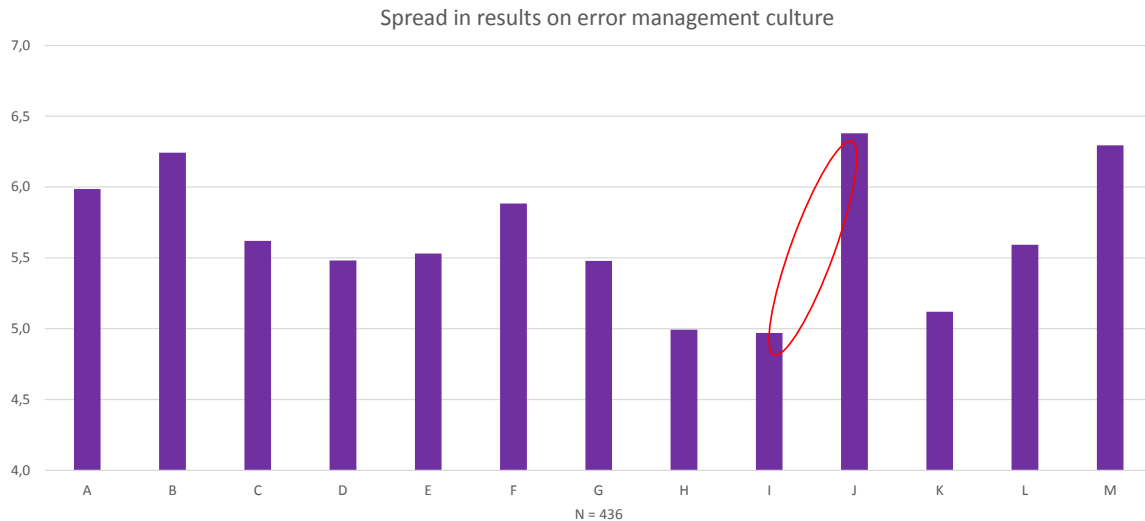


Figure 3. Some companies remain behind in the management of the error culture.

The benchmark also clearly shows that some companies score systematically lower or higher than the total picture and the peers in their own sector. Figure 4 provides the comparison for company H. Every company received such a comparison in the feedback meeting.

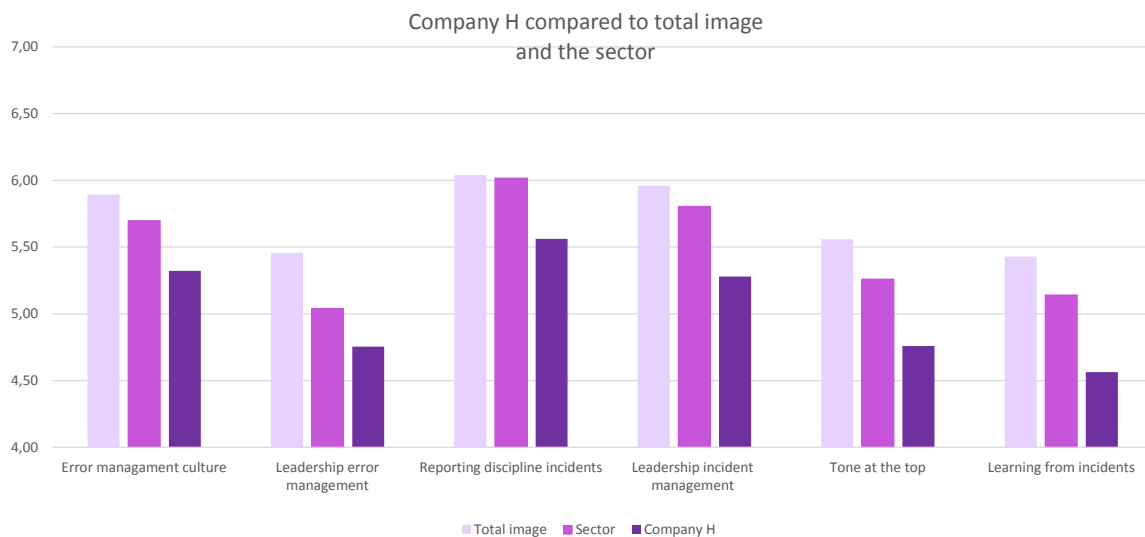


Figure 4. Company H scores systematically lower than the total picture and its peers (the sector).

Managerial staff sometimes score considerably more positive than non-managerial staff

In those feedback meetings, we also included figures that provide insight into the differences between managerial staff and non-managerial staff in the company (see Figure 5). In several cases, it proved to be a useful insight for the companies to see, for example, that managerial staff perceive that learning does take place within the organisation, but that employees lower in the organisation do not perceive this in the same manner. Or that managerial staff are relatively positive about the tone at the top regarding errors and incidents, but that employees lower in the organisation have a totally different opinion. It should be mentioned that in about 50% of the companies, there was hardly any difference between managerial and non-managerial staff.

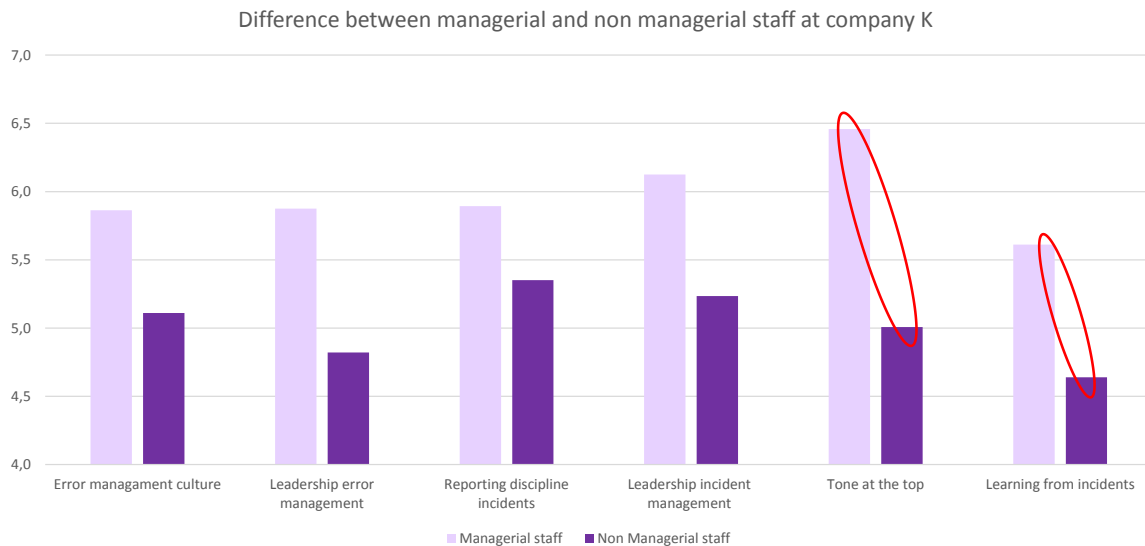


Figure 5. At company K, large differences between managerial and non-managerial staff were mainly found regarding the Tone at the top and Learning from incidents.

In addition, the companies also received feedback on how their company scored on the question-level compared to the total image. In this manner, a company can see, for example, how it scores, relatively, on the question: 'My manager/supervisor informs me about what has been learned from the things that went wrong.' This provides companies with an indication of the specific items that individual companies can work on.

3. Encountered best practices

This study provided us with the opportunity to collect the best practices with regard to error and incident management. These were received with a lot of interest by the companies involved as these are examples of working methods that other companies in the sector actually implement in practice. In most cases, the companies from which the best practices originate also score high in the survey.

The most important best practices are examples in which the structure (systems, policies, procedures) and the culture are well aligned with each other and strengthen each other. This means that the desired behaviour - for example open communication about errors - is made easier for employees with the aid of user-friendly systems (structure) and is truly appreciated in the organisation by, for example, the middle and senior management (culture). Thinking this through thoroughly for the whole organisation does justice to the principle to deal with errors on the organisation level instead of on an individual level.

Structure and culture are also well aligned when a clear policy is really implemented in practice throughout the organisation. For example, when the importance of consistently reporting errors is not only stated on paper, but is also actively promoted and valued by the senior management, middle management and employees among each other. In that case, the tone at the top is the same as on paper and people are actively involved in the policy.

A number of companies clearly succeed in translating the procedures into practical tools. Well-designed software turns out to be an important tool in this case. For example, being able to report errors quickly and easily in one user-friendly registration system. This also shows how important it is that employees understand, via the applicable software and work instructions, where and when something has to be reported, which information is important, with whom this has to be shared and who is responsible for the follow up. Professionalising systems stimulates employees to report incidents better and more often.

“We would really like to share things and then pull works better than push. You have to facilitate this, for example, by sending employees to other departments and offices on a project basis. That way you can learn from each other.”

Merely making technical changes, however, is not sufficient. Active involvement of management and extensive communication are also required. A good example of this is that the management of a company is informed on a daily basis about errors, reports are followed up quickly and clear feedback is provided to the person reporting the errors. Errors are analysed thoroughly and the analysis goes beyond symptoms, but instead identifies root causes.

Finally, an important best practice is that employees are not penalised when they make or report an error, but instead are regarded as sharp or smart, because they see opportunities for improvement. At a number of companies, we see that a change in thinking has taken place from focusing less on the error itself to focusing more on the possibilities for improvement. On the work floor, this has resulted in a culture in which employees who report the most are regarded highly because they are the best at identifying improvement possibilities.

“The results of the AFM study have given us better insight into the management of our error culture and also a comparison between our culture and that of the Dutch financial market in general. Based on the results of the study, we have been able to further improve our culture.” A. Siegmann, CRO European Central Counterparty N.V.

4. Leading in learning from errors

The aim to be a 'learning organisation' is stated in many strategic documents. However, it does not appear to be recognised and acknowledged everywhere that dealing with errors is a crucial factor in this.

4.1 A learning organisation embraces errors

Within organisations, errors are often regarded as negative and there is too rigid a focus on prevention.¹⁷ This strengthens the already human tendency to conceal errors due to feelings of shame or guilt instead of sharing them.¹⁸ Employees are afraid to lose face, to appear incompetent or they are afraid of receiving a negative performance appraisal and reducing their chances of getting promoted. An exaggerated focus on prevention of errors can even lead to a culture of fear and denial.¹⁹ Changing this for the good requires an active role on the part of the management, collective learning, good facilities and, most essentially, actually regarding errors as *opportunities to learn*.

The learning potential that errors provide is often overlooked, especially if the error did not have major consequences. However, it is exactly these errors that offer a unique possibility to increase the *learning capacity* of an organisation.²⁰ Where the negative consequences are limited, employees will be more inclined to reflect on the process and to work together on realising improvements. However, you often see that companies set up lessons learned projects in particular when errors with large negative consequences occur. This is often accompanied by a lot of turmoil and a natural focus on limiting the damage and protecting the company's reputation. However, this takes away from the focus on learning. Only when open communication about errors takes place within the organisation will this stimulate learning on the group level, for instance, both on the team and the organisation level.²¹

Learning is a cyclical process involving evaluating the demonstrated behaviour, discovering errors or opportunities, devising new behaviour and the implementation thereof (Homsma, 2009).

4.2 Creating an error management culture

In order to create an error management culture as a company, it is important **first of all** to deal with this on the *organisation level*, instead of at the level of (a number of) individual employees. Transparency with regard to errors, a detailed insight into errors and an open dialogue in the

¹⁷ Van Dyck et al. (2005).

¹⁸ Edmondson (1999).

¹⁹ Gold et al. (2015).

²⁰ Frese and Keith (2015); Lei et al. (2016).

²¹ Edmondson (1999); Homsma et al. (2009).

organization about errors are necessary preconditions to learn from each other and, for example, also from other departments within the organisation.²²

“You have to be able to work well together, to be working towards achieving the same goal... This only happens when lines are short. You see it here, it is very open. If something goes wrong, we deal with it together immediately.”

The learning ability of an organisation increases by examining, after an error occurs, whether lessons can be drawn for the organisation as a whole. For example, by checking whether similar processes, triggers or a similar complexity also exist in other departments or teams and whether these colleagues are involved and consulted in this.

Secondly, *structure and culture* have to be well aligned. Clear procedures and user-friendly systems will be used sooner to actually report errors (the 'ability') when employees perceive the added value of this (the 'willingness') and when this will lead to concrete changes or improvements in their eyes. A culture will become opener if detecting and discussing errors is linked to being competent and sharp.²³ Giving employees the opportunity to stand out in this area works well and we have encountered that in our study as a best practice.

Thirdly, *middle management* and *senior management* play an important role in creating an error management culture. Their conduct and their reactions with respect to errors is crucial for how errors are regarded on a group level in the organisation. Therefore, it should be made clear explicitly that openness about errors will never lead to penalisation or incrimination, while concealing errors will be regarded as negative.

“The list [with reports of errors] is not read as a list of people who make the most mistakes, but as people who are the sharpest at detecting errors. You see directly that it is not a shaming list, because very good traders are also on the list.”

It would also be positive if the senior management and middle management discussed their own errors to stimulate the dialogue about errors.²⁴ In this case, it is very important that a distinction is made explicitly between dealing with errors (things that go wrong unintentionally, by accident) in the organisation and dealing with misconduct. A zero-tolerance policy with regard to misconduct must not be generalised to include dealing with errors.²⁵ It has to be made clear that it is only human to make mistakes and that mistakes are a part of everyday reality.

²² DNB (2015); Cannon and Edmondson (2005). Scholten and Ellemers (2016).

²³ Gronewold et al. (2013).

²⁴ DNB (2015).

²⁵ DNB (2015).

Managerial staff sometimes underestimate the influence that they have on the degree in which employees are willing to communicate openly about errors. Because people consciously or unconsciously believe that talking about their mistakes makes them appear stupid or incompetent and leads to negative consequences, they are inclined to conceal mistakes. Individually that appears to be the best course of action. However, it hurts the team and prevents learning from errors.²⁶ Managerial staff must pay active and constant attention to create a mindset in which making mistakes is accepted and where the focus lies on learning from mistakes. When employees experience that it is safe to talk about errors and to give their opinion (psychological safety), this fosters learning within the organisation.²⁷

(About manager) "I have never once experienced that I felt let down by him, I believe that he is more the type of person that would stand up for you (...). He is very good at making clear 'my staff do their work well and this is what my team does'. (...) Repeated errors, inaccuracies are not tolerated. (...) People who are not happy here leave at a certain point. People who are motivated by this stay."

"You have to avoid that people think that they will not receive a promotion or bonus if they have made a mistake. You have to put the focus on learning. When a mistake has been made, you must regard it as an opportunity for improvement." (manager)

In this case, it is important to not only discuss the big mistakes but also the small errors and the errors that had no or only limited consequences. This communicates a focus on learning from errors and gradually establishes an open and safe culture. When open, safe and extensive communication takes place, the learning potential of errors can be used.²⁸

Although the advantages of an error management culture can be significant, it can appear challenging and risky to work on this. In addition, the number of errors will not decrease immediately. As a result of open communication about errors and an accurate registration of errors, it can initially even appear that the number of errors are increasing.²⁹ In that case, you should realise that not discovering errors is much riskier because learning experiences remain limited to only one or a small number of employees.

Moreover, creating an error management culture will contribute to a better performance of the company, ethical behaviour within the company and a better quality of service to the customer, which are important outcomes for both the companies themselves and the AFM. With this report,

²⁶ Edmondson (1999; 2003).

²⁷ Edmondson (1999; 2003).

²⁸ Van Dyck et al. (2005; 2010).

²⁹ DNB (2015).

the AFM hopes to inspire companies to take the lead in creating an error management culture in order to really become a learning organisation.

5. Behaviour and culture supervision by the AFM

Stimulating new developments and breaking through conventional behaviour patterns in the market play an important role to advance the sector. The AFM's Behaviour & Culture team, part of the Expert Centre, does this by combining the practice of supervision with scientific insights and knowledge from the field of the psychology, focused on supervision.

This team conducts research into the organisational culture of financial companies. A healthy organisational culture consists of various building blocks. Dealing openly with errors is one of these building blocks. The AFM examines these building blocks based on both scientific publications and the relevance for supervision, and would like to start a dialogue with the sector to identify additional building blocks that are relevant.

The culture of a company largely determines what employees consider important or what they believe is considered to be important. This creates patterns of behaviour: 'This is how we do this here.' Consequently, the culture has a large influence on the behaviour of employees and vice versa. By examining the building blocks of a healthy organisational culture, the company gains insights into which building blocks are already sufficiently present and which are not. A company can use this insight to strengthen effective patterns within its organisation and to counteract destructive patterns. It helps the AFM to understand financial companies and sectors better and to thus make supervision more effective.

Cooperation with Utrecht University

Together with the Department of Social, Health & Organisational Psychology of Utrecht University, the Behaviour & Culture team has developed a methodology to make error management culture concrete and measurable. This study is a case study that the AFM performed regarding the error culture at financial companies. The AFM is currently looking into in which other market segments this study can be repeated.

Together with this report, we will publish part of the survey used on the AFM website. For each section, we have included a number of sample questions and we show the introductory text. We are further developing this survey and we expect to be able to make this improved version available shortly. We will then also organise workshops in which financial companies will receive guidance on how they can employ the methodology in their own organisation. With this, the AFM aims to reach a large group of companies within the financial sector and to encourage and inspire companies to actively work on important building blocks of a healthy organisational culture and to engage in dialogue with stakeholders.

6. Study at 13 companies: Survey and interviews

The study was conducted at 13 companies within the infrastructure of the capital markets and consisted of a survey and interviews.

Study error management in the financial sector



Figure 6. The process of the error management culture study

In the survey employees were asked how they perceive their organisational culture with regard to dealing with errors. The survey was based on scientifically validated scales and further developed in cooperation with Utrecht University.³⁰ The survey was sent to 613 employees and completed by over 400 employees ($N = 436$). Thus an average response of 71% was achieved.

In addition, three in-depth interviews per company were held with employees at five companies. The aim of these interviews was to assess the survey with regard to applicability and correctness in the financial sector (validate) and to add qualitative depth to the quantitative findings.

In accordance with (international) scientific publications in the field of error management, in the survey, an error is defined as something that goes wrong unintentionally.³¹ Matters such as fraud and misconduct are not regarded as errors. Six themes (constructs) were measured in the survey, see below. More information about the survey is provided in the appendix.

³⁰ Edmondson (1999); Van Dyck et al. (2005).

³¹ Van Dyck et al. (2005); Frese and Keith (2015).

Measured in the survey:

Error management culture: A culture in which open and honest communication takes place about errors, errors are detected quickly and handled in the best possible manner. People help each other in error situations and try to share knowledge and to learn from errors.

Leadership error management: The management accepts that errors can occur and regards these as an opportunity for improvement. He/she analyses errors thoroughly, helps with the correction and prevention of errors and communicates about errors and what has been learned from errors.

Reporting discipline incidents: Always and consistently reporting incidents, also when it is busy, it does not affect you directly or there is no direct damage (for client or counterparty).

Leadership incident management: The management actively emphasises the importance of reporting incidents and ensures that incidents are reported. He or she focuses attention on the incident instead of the person.

Tone at the top: Senior management voices a clear vision about how errors and incidents should be dealt with within the company and is constantly focused on improving error and incident management.

Learning from incidents: Analysing, discussing and sharing incidents on a company level, thus not only with the persons directly involved, in order to prevent incidents. Employees, also from other departments, are actively engaged in the discussion and provide feedback or voice ideas for improvement. Positive changes are implemented and the management communicates what has been learned from incidents.

6.1 New for the AFM and new for the companies

It was new for the participating companies that the AFM held a culture survey among their employees. Initially, there were large differences in how this approach was received. At some of the companies, there was fear for or resistance against asking about the perceptions of employees and the survey initially led to many questions. In other companies, we encountered a neutral attitude or even enthusiasm. A positive result was that all 13 companies that were approached cooperated.

A feedback meeting took place at every company. The possibility to benchmark by conducting the study at a number of companies at the same time had a clear added value. It provided the AFM with deeper insights to compare companies, for example, by comparing averages on the survey and by deriving the best practices from the actual practice. In addition, the findings became truly meaningful to the companies when they received the benchmark with anonymous peers or compared to the total picture.

Although the findings were not positive for every company, positive reactions were received across the board regarding the findings obtained in this manner, which provided a picture of how the employees perceive this. We also observed that making culture concrete by focusing on the theme learning from errors was effective. A number of parties saw the added value of the study for their own operations directly. This also made the dialogue about implementing improvements easier. The findings from this study, as is the case for other available data and research data, will be taken into account in the AFM's integral supervision strategy.

7. Literature

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Appendix: Background information survey

Six constructs (themes) were measured in the survey. A construct is a group of questions that belong together and that are meaningful when combined, for example, the construct 'learning from incidents'. All constructs were measured on a 7-point scale (1 = does not apply at all to our organisation, 7 = applies completely to our organisation). It is the case for each question that the higher the score, the better. A high score on leadership error management, for example, means that errors are dealt with adequately by the management in the eyes of employees. A '4' means that employees score neither positive nor negative on the construct (neutral). It is the case for many questions that a 4 is not the result that a company should be satisfied with, for example, the question of whether lessons learned are shared within the organisation.

When developing the survey, the choice was made to adhere as close as possible to scientifically validated constructs in order to realise the use of reliable scales. We were able to base an important part of the constructs scientifically published articles on error management and a publication of the Dutch Central Bank (DNB, 2015). For other constructs, questions were self-developed. Especially where we could rely on validated constructs, reliabilities were high: see below.

Reliability of the constructs in the survey

- **Error management culture:** $\alpha = .96$. Measured with the scale of Van Dyck et al. (2005).
- **Leadership error management:** $\alpha = .89$. Measured with the scale of Dimitrova (2014)
- **Leadership incident management:** $\alpha = .68$.
- **Tone at the top:** $\alpha = .68$.
- **Reporting discipline incidents:** $\alpha = .77$.
- **Learning from incidents:** $\alpha = .90$. Scale developed, inspired by Edmondson (1999).

A Cronbach's alpha of $> .70$ means that the construct was measured reliably. The alphas of Tone at the top and reporting discipline remain somewhat behind, but are still acceptable. At present, the survey is being further developed in order to achieve a high reliability for these constructs as well.

Background information about the participants was not asked in the survey, except whether someone held a managerial position (yes/no). This in order to ensure anonymity. Participants were able to participate in the survey in Dutch or in English. Based on scientific publications on error management, we made a distinction in the survey between *errors* and *incidents*. Errors were defined as things that go wrong unintentionally (therefore by accident). For example, sending

confidential information by mail by accident or making an entry error in a trading screen. Incidents were defined as things that go wrong and that have to be reported internally. Not every error has to be reported.

In order to validate the survey, each construct was also discussed in the interviews with employees. The companies at which the interviews took place were partially selected and partially chosen at random, whereby in any case a distribution of the sectors was aimed for. For example, it was asked what the reactions were of the manager after an error occurred (leadership error management) and the degree in which something was concretely improved after an error (learning from incidents). It could be concluded from this that questions underlying the constructs were well aligned with how employees talked about the matter. The distinction that was made between errors (things that go wrong unintentionally) and incidents (things that go wrong and have to be reported internally) was not recognised in the daily practice. In the future, we will no longer make this distinction and we will talk about dealing with errors and learning from errors.

Survey data was analysed with the statistics programme SPSS. The data of the Dutch and the English survey were combined. The average completion time was 12 minutes. The average response rate to the survey was 71%, but differed per company, varying from about 30% to nearly 100%. Therefore, the representativeness of the findings also differed per company. As the response at every company was at least 1/3, a representative picture was still obtained for every company. 18% of the participants held a management position.

In this study, we based the preparation of the survey on earlier scientific research. In addition, interviews were conducted as a means of validation. This approach has resulted in a reliable survey and confidence in the methodology.

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