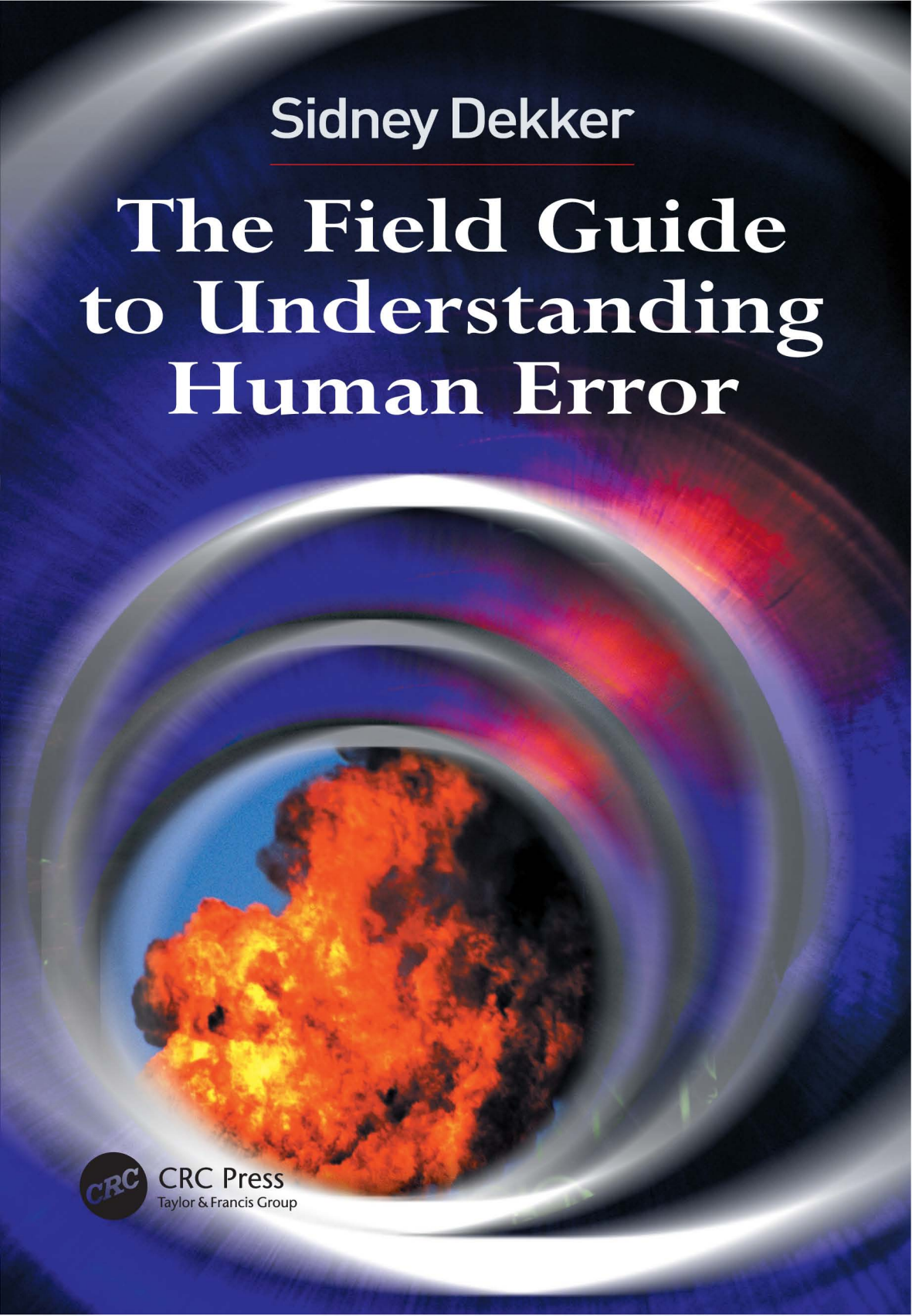
Sidney Dekker

The Field Guide to Understanding Human Error



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THE FIELD GUIDE TO UNDERSTANDING HUMAN ERROR

'This is the kind of message the industry needs to listen to.'

Daniel Maurino, ICAO

'Hurrah! Hurrah! Sidney Dekker has provided us with a delightful book, well written, concluding with a most helpful guide to the understanding of accidents and the appropriate way to investigate them. The lessons will be of great value to everyone.'

Don Norman, author of *The Psychology of Everyday Things*

'Next time I'm lecturing students, I'll be recommending The Field Guide *as required reading! Well done.'*

Barry Kirwan, System Safety and Human Error, Eurocontrol, France; co-editor of *Changing Regulation: Controlling Risks in Society* and *Human Factors Impacts in Air Traffic Management*

'I have just finished reading The Field Guide. I found it both to be very useful and inspiring at the same time – not necessarily common attributes that occur together!!'

Rob Robson, M.D., Chief Patient Safety Officer, Winnipeg, Canada

'This is probably the most useful of all available books on accident investigation.'

Wayne Perkins, Human Factors Analyst, Maritime New Zealand

'The Field Guide *makes a fine contribution to accident investigation methodology.'*

International Journal of Applied Aviation Studies

'This is great work – a welcome, practical, refreshing guide to human error using a new lens. A must-read for everyone tired of the "old view" of human error.'

Boyd Falconer, University of New South Wales, Australia

'Neatly summarizes many of the issues during the delivery of CRM training.'

Norman MacLeod, Integrated Team Solutions

'Having read The Field Guide*, there is no doubt in my mind about Dekker's ability to push the boundaries of conventional thinking on human factors.'*

Bryce Fisher, Manager, Safety Promotion and Education, Transport Canada

'… a very insightful and practical look at the human error side of investigations in any system … anyone with an interest in aviation safety should make this book part of their collection.'
Journal of Air Transportation

'Congratulations on saying new things to the accident investigation community.'
Neil Johnston, Trinity College Dublin

'… very accessible and satisfying text … a most welcome and useful primer for those entering the field of investigation and for seasoned professionals seeking refreshment and inspiration.'
The RoSPA Occupational Safety and Health Journal

'The Field Guide *has become a standard text in the field and influential in the patient safety movement. Dekker's work is helping make our clinical laboratory safer for patients.'*
Michael Astion, Editor-In-Chief, Laboratory Errors and Patient Safety

'I think The Field Guide *is the best book I've seen to use not only as a guide for leading investigations, but also for anyone who works in a complex organization to read to help them reframe their understanding of why accidents happen. It is outstanding.'*
Celeste Mayer, Patient Safety Officer, University of North Carolina Health Care System

'I hope the book has a large impact upon accident investigators in all industries. The book focuses upon aviation, but obviously the lesson applies to all.'
Donald A. Norman, Northwestern University, USA and Nielsen Norman Group

'I have every executive in the entire Department of Energy reading The Field Guide *as we speak.'*
Todd Conklin, Los Alamos National Laboratory

'Dekker rocked my world.'
David Devantier, Captain, Boeing 737; CRM instructor

'Congratulations on a well designed book. This has significant potential as an aid for all investigators.'
Hans Willemsen, ATC Quality Assurance Specialist, Airservices, Australia

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Acknowledgments

I keep writing books about human error, even though I don't believe that "human error" actually exists—other than as a convenient but misleading explanatory construct; as an intervention in history that helps us structure and make sense of the past. Initially, such a construct may make our own life easier. But it quickly troubles our ability to really understand sources of safety and risk in our own organizations and elsewhere. This is not just my insight, as I am but a student of a set of people and ideas far greater than myself. Without them, neither this Field Guide nor any of my other writings would even exist or be worth reading. The ideas of David Woods, Erik Hollnagel, Nancy Leveson, John Flach, Richard Cook and Jens Rasmussen are among the most prominent ones in this book.

The Field Guide to Understanding Human Error is a successor to, and extension of, *The Field Guide to Human Error Investigations*. Neither this Field Guide, nor its predecessor, nor my other books, would have been written if it hadn't been for the kind of sponsoring from Arne Axelsson, the immediate past Director of Flight Safety in Sweden. With his support throughout the years, he has always understood that scientists need the funding and freedom to let their imagination roam. Such support, on which scientific innovation depends, appears increasingly scarce today.

I am grateful to my editor Guy Loft for buying into this project with faith and enthusiasm and the friends, colleagues and students who have taken the trouble to review half-baked versions of various chapters. I also want to thank readers of the preceding Field Guide for encouraging me to try to give them more, and for their many suggestions for improvements. The result, as imperfect and tentative as any set of ideas out there, is in your hands now.

Sidney Dekker
January 2006

Preface

So you are faced with a human error problem.
What do you do?

How do you make sense of other people's puzzling assessments and actions? How can you get people in your organization to stop making errors? How can you get your operations to become safer?

You basically have two options, and your choice determines the focus, questions, answers and ultimately the success of your efforts, as well as the potential for progress on safety in your organization:

- You can see human error as **the cause of a mishap**. In this case "human error", under whatever label—loss of situation awareness, procedural violation, regulatory shortcomings, managerial deficiencies—is the conclusion of your efforts to understand error.
- You can see human error as **the symptom of deeper trouble**. In this case, human error is the starting point for your efforts. Finding "errors" is only the beginning. You will probe how human error is systematically connected to features of people's tools, tasks and operational/organizational environment.

The first is called the Old View of human error, while the second—itself already 50 years in the making—is the New View of human error. This Field Guide is the successor to the *Field Guide to Human Error Investigations*. It helps you understand human error according to the New View. Whether you are an investigator, a manager, a regulator, a practitioner, the New View can give you new and innovative leverage over your "human error problem". Leverage you may not have known existed.

Embracing the New View is not easy. It will take work. And maybe a change in your own worldview. But embracing the New View is necessary if you really want to create progress on safety.

We have long searched for ways to limit human variability in—what we think are—otherwise safe systems. Performance monitoring, error counting and

Table 0.1 Two views on human error

The Old View of human error on what goes wrong	**The New View of human error on what goes wrong**
Human error is a cause of trouble	Human error is a symptom of trouble deeper inside a system
To explain failure, you must seek failures (errors, violations, incompetence, mistakes)	To explain failure, do not try to find where people went wrong
You must find people's inaccurate assessments, wrong decisions, bad judgments	Instead, find how people's assessments and actions made sense at the time, given the circumstances that surrounded them
The Old View of human error on how to make it right	**The New View of human error on how to make it right**
Complex systems are basically safe	Complex systems are not basically safe
Unreliable, erratic humans undermine defenses, rules and regulations	Complex systems are trade-offs between multiple irreconcilable goals (e.g. safety and efficiency)
To make systems safer, restrict the human contribution by tighter procedures, automation, supervision	People have to create safety through practice at all levels of an organization

categorizing—these activities all assume that we can maintain our safety by keeping human performance within prespecified boundaries. Our investigations into human error often reveal how people create havoc in otherwise safe systems when they go outside those boundaries. When people don't do what they are supposed to do. When they violate rules or lose situation awareness.

In fact, while we can make our systems safer and safer, the human contribution to trouble remains stubbornly high (70 per cent!). We have long put our hopes

for improving safety on tightening the bandwidth of human performance even further. We introduce more automation to try to get rid of unreliable people. We write additional procedures. We reprimand errant operators and tell them that their performance is "unacceptable". We train them some more. We supervise them better, we tighten regulations.

Those hopes and ideas are now bankrupt. People do not come to work to do a bad job. Safety in complex systems is not a result of getting rid of people, of reducing their degrees of freedom. Safety in complex systems is *created by people through practice*—at all levels of an organization. It's only people who can hold together the patchwork of technologies and tools and do real work in environments where multiple irreconcilable goals compete for their attention (efficiency, safety, throughput, comfort, financial bottom line).

The New View embodies this realization and lays out a new strategy for understanding safety and risk on its basis. Only by understanding the New View can you and your organization really begin to make progress on safety. And the Field Guide is here to help you do just that.

Here is how.

Chapter 1. The Bad Apple Theory
Presents the Old View of human error: unreliable people undermine basically safe systems. In investigations, we must find people's shortcomings and failings. And in efforts to improve safety, we must make sure people do not contribute to trouble again (so, more rules, more automation, more reprimands).

Chapter 2. The New View of Human Error
Explains how human error is a symptom of trouble (engineered, organized, social, etc.) deeper inside the system, and that efforts to understand error begin with seeing how people try to create safety through their practice of reconciling multiple goals in complex, dynamic settings.

Chapter 3. The Hindsight Bias
Presents research on the hindsight bias, one of the best documented biases in psychology and an unwitting foundation of the Old View. Shows how pervasive the effects of hindsight are, and how they interfere profoundly with your ability to understand human behavior that preceded a bad outcome.

Chapter 4. Put Data in Context
Tells you how to avoid the hindsight bias by not mixing your reality with the one that surrounded other people. You have to disconnect your understanding

of the true nature of the situation (including its outcome) from the unfolding, incomplete understanding of people at the time.

Chapter 5. "They Should Have …"
Lays out what counterfactual reasoning is and how it muddles your ability to understand why people did what they did. Sensitizes you to the language of counterfactuals and how it easily slips into investigations of, and countermeasures against, human error.

Chapter 6. Trade Indignation for Explanation
Explains how you can avoid the traps of counterfactual reasoning and judgmental language, and how to move instead to explanations of why behavior made sense to people at the time.

Chapter 7. Sharp or Blunt End?
Shows you how easy it is to revert to proximal explanations of failure by relying on the (in)actions of those closest in time and place to the mishap or to potentially preventing it.

Chapter 8. You Can't Count Errors
Explains how getting a grip on your human error problem does not mean quantifying it. Error categorization tools look unsuccessfully for simple answers to the sources of trouble and sustain the myth of a stubborn 70% human error. This also makes artificial distinctions between human error and mechanical failure.

Chapter 9. Cause is Something You Construct
Talks about the difficulty of pinpointing *the* cause (proximal or root or probable cause) of an accident. Asking what is *the* cause, is just as bizarre as asking what is *the* cause of not having an accident. Accidents have their basis in the real complexity of the system, not their apparent simplicity.

Chapter 10. What is Your Accident Model?
What can count as "cause" depends on the accident model you apply (e.g. sequential, epidemiological, systemic). Some are better for some purposes than others, both when it comes to understanding error and making progress on safety.

of the factors that fuel debate around this choice. Introduces "no responsibility without proof of authority".

Chapter 19. Making Your Safety Department Work
Talks about the prerequisites of a meaningful safety department (involved, independent, informative and informed) and how safety work is not just bottom-up provision of information but also guidance of top-down countermeasures.

Chapter 20. How to Adopt the New View
Offers much-needed guidance on how you can help your own organization adopt the NewView, and guage where your organization is in its growth towards better learning from failure.

Chapter 21. Reminders for in the Rubble
Wraps together the most important lessons of the Field Guide in a number of ideas and steps for you to follow when trying to understand human error.

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1 The Bad Apple Theory

There are basically two ways of looking at human error. The first view is known as the Old View, or The Bad Apple Theory. It maintains that:

- Complex systems would be fine, were it not for the erratic behavior of some unreliable people (Bad Apples) in it;
- Human errors cause accidents: humans are the dominant contributor to more than two thirds of them;
- Failures come as unpleasant surprises. They are unexpected and do not belong in the system. Failures are introduced to the system only through the inherent unreliability of people.

This chapter is about the first view. The second is about a contrasting view, known as the New View. The rest of the book helps you avoid the Old View and apply the New View to your understanding of human error.

Every now and again, nationwide debates about the death penalty rage in the United States. Studies find a system fraught with vulnerabilities and error. Some states halt proceedings altogether; others scramble to invest more in countermeasures against executions of the innocent.

The debate is a window on people's beliefs about the sources of error. Says one protagonist: "The system of protecting the rights of accused is good. It's the people who are administering it who need improvement: The judges who make mistakes and don't permit evidence to be introduced. We also need improvement of the defense attorneys."[1] *The system is basically safe, but it contains bad apples. Countermeasures against miscarriages of justice should focus on them. Get rid of them, retrain them, discipline them.*

But what is the practice of employing the least experienced, least skilled, least paid public defenders in many death penalty cases other than systemic? What are the rules for judges' permission of evidence other than systemic? What is the ambiguous nature of evidence other than inherent in a system that often relies on eyewitness accounts to make or break a case?

The Old View maintains that safety problems are the result of a few Bad Apples in an otherwise safe system. These Bad Apples don't always follow the rules, they don't

always watch out carefully enough. They undermine the organized and engineered system that other people have put in place so carefully. This, for instance, is what some think creates safety problems in the nuclear power industry:

> Although many of the human frailties and other deficiencies that lie behind the majority of remaining accidents "have been anticipated in safety rules, prescriptive procedures and management treatises, *people don't always do what they are supposed to do*. Some employees have negative attitudes to safety which adversely affect their behaviors. This undermines the system of multiple defences that an organization constructs …[2]

This quote (with the emphasis on "some people" actually in the original) embodies all of the tenets of the Old View. Here they are:

- Human frailties lie behind the majority of remaining accidents. Human errors are the dominant cause of remaining trouble that hasn't been engineered or organized away yet.
- Safety rules, prescriptive procedures and management treatises are supposed to control this element of erratic human behavior.
- But this control is undercut by unreliable, unpredictable people who still *don't do what they are supposed to do*.
- Some Bad Apples keep having negative attitudes toward safety, which adversely affects their behavior. So not attending to safety is a personal problem, a motivational one, an issue of mere individual choice.
- The basically safe system, of multiple defenses carefully constructed by the organization, is undermined by erratic people. All we need to do is protect it better from their vicissitudes.

This view, the Old View, and all it stands for, is deeply counterproductive. It has been tried for ages, without noticeable effect. Real progress on safety comes instead from abandoning the idea that errors are causes, and that people are the major remaining threat to otherwise safe systems. Real progress comes from embracing the New View.

Bad People in Safe Systems, or Well-intentioned People in Imperfect Systems?

At first sight, stories of error seem so simple:

- Somebody did not pay enough attention;
- If only somebody had recognized the significance of this indication, of that piece of data, then nothing would have happened;
- Somebody should have put in a little more effort;
- Somebody thought that making a shortcut on a safety rule was not such a big deal.

Given what you know after-the-fact, most errors seem so preventable. In some sense, errors seem the result of a Bad Apple. You wonder how you can cope with the unreliability of the human element (for example, deficient judges) in your system. But such apparent simplicity is misleading. Underneath every seemingly obvious, simple story of error, there is a second, deeper story. A more complicated story. This second story is inevitably an organizational story, a story about the system in which people work:

Underneath every simple, obvious story about error, there is a deeper, more complex story

- Safety is never the only goal. Organizations exist to provide goods or services and to make money at it;
- People do their best to reconcile different goals simultaneously (e.g. service or efficiency versus safety);
- A system isn't automatically safe: people actually have to create safety through practice at all levels of the organization;
- Production pressure influences people's trade-offs, making normal or acceptable what previously was irregular or unsafe;
- New tools or technology that people have to work with, change error opportunities and pathways to failure.

The second story, in other words, is a story of the real complexity in which people work. Not a story about the apparent simplicity.
Second stories of error reveal how people actually have to create success and safety. Systems are not basically safe themselves. These systems are themselves inherent contradictions between operational efficiency on the one hand and safety (for example: protecting the rights of the accused) on the other.

People in these systems learn about the pressures and contradictions, the vulnerabilities and pathways to failure. And they develop strategies to not have failures happen. But these strategies may not be completely adapted. They may be outdated. People may be focusing on the wrong things, the wrong risks.

They may be thwarted by their rules, or by the feedback they get from their management about what "really" is important (often: production, efficiency).

This is called the "New View" of human error. In this view, errors are symptoms of trouble deeper inside a system. Errors are the other side of people trying to pursue success in an uncertain, resource-constrained world. The old view, or the Bad Apple Theory, sees systems as basically safe and people as the major source of trouble. The new view, in contrast, understands that systems are not basically safe. It understands that safety needs to be created through practice, by people.

Take Your Pick: Blame Human Error *or* Try to Learn from Failure

So you can see human error as a cause of trouble in otherwise safe systems. In this case you stop looking any further as soon as you have found a convenient "human error" to blame for the trouble. Such a conclusion and its implications supposedly get to the causes of system failure. Or you can see human error as a symptom of trouble in a system that is not basically safe. Then you will begin to understand that human error is a structural by-product of people trying to pursue success in resource-constrained, uncertain, imperfect systems.

Is human error a cause or a symptom of trouble? The choice is yours

The old and the new view are two drastically different views on what makes systems safe, and how they occasionally fail. If you see error as a symptom, you commit to a radically new perspective on what makes systems safe or risky. Error is a starting point, not a conclusion. You will join an ever larger group of people, ranging from researchers, practitioners, managers and even regulators, who have discovered that efforts to make progress on safety begin with calling off the hunt for human error. "Human error" is not an explanation for trouble. It demands an explanation.

This Field Guide will help you make a commitment to the New View. It will equip you better for applying the New View as you and your organization are looking for ways to recover from a mishap, to stay safe, or become even safer.

Investigations and the Old View

Like debates about human error, investigations into human error mishaps face a choice. A choice between the Bad Apple Theory in one of its many versions, or the New View of human error.

A Boeing 747 Jumbo Jet crashed when taking off from a runway that was under construction and being converted into a taxiway. The weather at the time was bad—a typhoon was about to hit the country: winds were high and visibility low. The runway under construction was close and parallel to the intended runway, and bore all the markings, lights and indications of a real runway. This while it had been used as a taxiway for quite a while and was going to be officially converted at midnight the next day—ironically only hours after the accident.

Pilots had complained about potential confusion for years, saying that it was "setting a trap for a dark and stormy night". Moreover, at the departure end there was no sign that the runway was under construction. The first barrier stood a kilometer down the runway, and behind it a mass of construction equipment—all of it hidden in mist and heavy rain. The chief of the country's aviation administration, however, claimed that "runways, signs and lights were up to international requirements" and that "it was clear that human error had led to the disaster". So human error was simply the cause. There was no deeper trouble of which the error was a symptom.

The ultimate goal of an investigation is to learn from failure. The road that most investigations follow is paved with intentions to pursue the New View. Investigators intend to find the systemic vulnerabilities behind individual errors. They want to address the error-producing conditions that, if left in place, will repeat that pattern of failure.

In practice, however, investigations often return disguised versions of the Bad Apple Theory, both in findings and recommendations. They sort through the rubble of a mishap to:

- Single out particularly ill-performing practitioners;
- Find evidence of erratic, wrong or inappropriate behavior;
- Bring to light people's bad decisions; their inaccurate assessments; their deviations from written guidance or procedures.

Investigations often end up concluding how front-line operators failed to notice certain data, or did not adhere to procedures that appeared relevant only after the

fact. If this is what they conclude, then it is logical to recommend the retraining of particular individuals; the tightening of procedures or oversight.

Of course, you might as well not spend the resources on an investigation in this case. After all, you can easily write the conclusions and recommendations without any substantive knowledge of the event. You can even write them *before* the event! All you have to say is: "human error" (by whatever fancy label you deem legitimate: lack of awareness, poor judgment). And then you call for retraining, you issue a reprimand, you send out a reminder that people should follow applicable procedures.

If you conclude "human error", you may as well not have spent money on the investigation

Investigative bodies and departments across the world seem to keep a stack of these stand-bys on the shelf, ready for use whenever they run out of imagination, investigative acumen or political capital to probe any deeper. If you find that you only write such things in your recommendations, you have wasted everybody's time and money. There are, of course, reasons why investigations regress into the Bad Apple Theory.

For example:

- Resource constraints on investigations. Findings may need to be produced in a few months' time, and money is limited;
- Reactions to failure, which make it difficult not to be judgmental about seemingly bad performance;
- The hindsight bias, which confuses our reality with the one that surrounded the people we investigate;
- Political distaste of deeper probing into sources of failure, which may de facto limit access to certain data or discourage certain kinds of recommendations;
- Limited human factors knowledge on part of investigators. While wanting to probe the deeper sources behind human errors, investigators may not really know where or how to look.

In one way or another, The Field Guide will try to deal with these reasons. It also presents approaches for how to do a New View human error investigation.

Making Progress on Safety and the Old View

In the old view of human error, progress on safety is driven by one unifying idea: unreliable people undermine otherwise safe systems.

Charges were brought against the pilots who flew a VIP jet with a malfunction in its pitch control system (which makes the plane go up or down). Severe oscillations during descent killed seven of their unstrapped passengers in the back. Significant in the sequence of events was that the pilots "ignored" the relevant alert light in the cockpit as a false alarm, and that they had not switched on the "fasten seatbelt" sign from the top of descent, as recommended by the procedures. The pilot oversights were captured on video, shot by one of the passengers who died not much later. The pilots, wearing seatbelts, survived the upset.[3]

When you believe that systems are basically safe, you want to protect them from the vagaries of human behavior. Progress on safety, then, supposedly comes from:

- Making sure that defective practitioners (the Bad Apples) do not contribute to system breakdown again. Put them on "administrative leave"; demote them to a lower status; educate or pressure them to behave better next time; instill some fear in them and their peers by taking them to court or reprimanding them.
- Tightening procedures and close regulatory gaps. This reduces the bandwidth in which people operate. It leaves less room for error.
- Introducing more technology to monitor or replace human work. If machines do the work, then humans can no longer make errors doing it. And if machines monitor human work, they can snuff out any erratic human behavior.

But let's see where this gets you.

Adding more procedures

Adding or enforcing existing procedures does not guarantee compliance. A typical reaction to failure is procedural overspecification—patching observed holes in an operation with increasingly detailed or tightly targeted rules that respond specifically to just the latest incident. But procedural overspecification is likely to widen the gap between procedures and practice, rather than narrow

it. Rules will grow more and more at odds with the context-dependent nature of practice.

Mismatches between written guidance and operational practice always exist. Think about the work-to-rule strike, a form of industrial action. Workers say: "Let's follow all the rules for a change!" Systems come to a grinding halt. Gridlock is the result. Follow the letter of the law, and the work will not get done. It is as good as, or better than, going on strike.

There is always a mismatch between rules and practice. Do you want to increase that by writing more?

Seatbelt sign on from top of descent in a VIP jet? The layout of furniture in these machines and the way in which their passengers are expected to make good use of their time by meeting, planning, working, discussing, could well discourage people from strapping in any earlier than strictly necessary. Pilots can blink the light all they want, over time it may become pointless to switch it on from 41 000 feet on down.

And who typically employs the pilot of a VIP jet? The person in the back. So guess who can tell whom what to do. And why have the light on only from the top of descent? This is hypocritical—only in the VIP jet upset discussed here was that relevant because loss of control occurred during descent. But other incidents with turbulence and in-flight deaths have occurred during cruise. Procedures are insensitive to this kind of natural variability.

New procedures can also get buried in masses of regulatory paperwork. Mismatches between procedures and practice grow not necessarily because of people's conscious non-adherence, but because of the amount and increasingly tight constraints of procedures.

The vice president of a large airline commented recently how he had seen various of his senior colleagues retire over the past few years. Almost all had told him how they had gotten tired of updating their aircraft operating manuals with new procedures that came out—one after the other—often for no other reason than to close just the next gap that had been revealed in the latest little incident. Faced with a growing pile of paper in their mailboxes, they had just not bothered. Yet these captains all retired alive and probably flew very safely during their last few years.

Procedures are a problematic issue. Their role is often misunderstood and that of "violations" almost always overestimated. More will be said in Chapters 14 and 15.

Adding a bit more technology

We often think that adding just a little bit more technology will help remove human error. After all, if there is technology to do the work, or to monitor the human doing the work, then we have nicely controlled the potential for error. But more technology does not remove the potential for human error. It merely relocates or changes it.

A warning light does not solve a human error problem, it creates new ones. What is this light for? How do we respond to it? What do we do to make it go away? It lit up yesterday and meant nothing. Why respond to it today?

A warning light is just a threshold crossing device: it starts blinking when some electronic or electromechanical threshold is exceeded. If particular values stay below the threshold, the light is out. If they go above, the light comes on. But what is its significance? After all, the aircraft has been flying well and behaving normally, even with the light on. Of course, a warning light is "new technology" only in the most rudimentary sense. Promises and problems of more advanced technology and automation are discussed in Chapter 14.

New technology does not remove human error. It changes it

Removing Bad Apples

Throwing out the Bad Apples, lashing out at them, telling them you are not happy with their performance, may seem like a quick, nice, rewarding fix. But it is like peeing in your pants. It gets nice and warm for a little while, and you feel relieved. But then it gets cold and uncomfortable, and you look like a fool. Lashing out at supposed Bad Apples, at the putative culprits behind all the trouble, is actually a sign of weakness. It shows that you could be at a loss as to what to do in the wake of failure. You actually have no idea how to really make progress on safety. And by bearing down on supposed Bad Apples, you can actually make things a lot worse:

Reprimanding "Bad Apples" is like peeing in your pants. You feel warm and relieved first, but soon you look like a fool

- You fool yourself and your stakeholders (customers, regulator, other employees, the media) that you have done something about the problem;