



# Man-made Catastrophes and Risk Information Concealment

UNCORRECTED PROOF



Dmitry Chernov · Didier Sornette

# Man-made Catastrophes and Risk Information Concealment

Case Studies of Major Disasters  
and Human Fallibility



Dmitry Chernov  
ETH Zurich  
Zürich  
Switzerland

Didier Sornette  
ETH Zurich  
Zürich  
Switzerland

ISBN 978-3-319-24299-6 ISBN 978-3-319-24301-6 (eBook)  
DOI 10.1007/978-3-319-24301-6

Library of Congress Control Number: 2015950008

Springer Cham Heidelberg New York Dordrecht London  
© Springer International Publishing Switzerland 2016

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media  
(www.springer.com)



The original version of the book frontmatter was revised: For detailed information please see Erratum. The Erratum to this book frontmatter is available at DOI [10.1007/978-3-319-24301-6\\_6](https://doi.org/10.1007/978-3-319-24301-6_6)

UNCORRECTED PROOF



# Preface

The manuscript consists of five chapters. First, an introduction sets the landscape and motivations. The second chapter is a series of 25 detailed case studies (plus 20 other cases more superficially covered), where the concealment of risk played an important and obvious role in the causation of the reported catastrophes. In the third chapter, the relevant aspects, which contributed to the risk concealment, are systematically gathered and analyzed. In the fourth chapter, possible signs for imminent risks in current technologies—such as fracking, cyber risks, and genetic engineering—are investigated. In the fifth chapter, a few positive examples are collected that show how with an open, transparent culture of communication corresponding risks could be reduced.

Our main goal is to show by the force of characteristic examples how prevalent the problem of concealment of information is in its many incarnations. The reader, layman or risk management, should come out of the reading of our examples with an aha moment, realizing how ubiquitous and important this dimension of human behavior is with respect to critical objects. This paints quite a different picture of the risk of critical objects that we have to deal with than is often understood. We show that essentially any kind of organization (industry, finance, military, social, associated with natural disasters, and retail) is vulnerable to risk information failures, both decades ago and in the present, and very likely in the future, both in top-down centralized institutions and at the other extreme in firms espousing the free market ideology. We think that this is the main strength of the book to demonstrate the ubiquity and permanent nature of the problem of risk information concealment. Therefore, there is a strong need to expose the relevant agents to the cases that we have documented, showing them that any organization including theirs is vulnerable and that a proactive attention to the dangers is needed. Chapter 3 offers a checklist that the risk manager or director of an institution should turn to again and again to check whether his or her organization may be drifting astray to exhibit some of the listed vulnerabilities or favorable factors promoting or facilitating risk information concealment. By offering many examples, we provide the decision maker and responsible individual with many scenarios to compare with that can help put in perspective their own situation.



This book is different from the myriad of books at the popular science level that present all kinds of conspiracy theories on mismanagement as being responsible for every catastrophe. In contrast, we make serious efforts to verify such assumptions by well-researched case studies. However, it seems unavoidable that some experts will criticize our endeavor, pointing out that we already have assumed upfront that the seemingly obvious or at least most likely reason for such catastrophes was fraudulent risk concealment or mismanagement. Indeed, in hindsight, it seems always plausible to attribute mistakes to either fraudulent behavior or carelessness. Any a posteriori rendering of a catastrophe will invariably and inevitably contain its share of revealed concealment and mismanagement—even in an idealized reality one could not imagine a catastrophe without such factors. But this does not establish the causal links to the catastrophe itself (rather than, e.g., random or stochastic ones). In many cases where so far no catastrophe has happened, one cannot rule out that no concealment or mismanagement has happened at some stage. One could criticize that our interpretations are one-sided, with too much focus on the risks of information concealment, at the expense of potentially even more important other factors. We have tried to the best of our abilities to avoid these traps by presenting carefully balanced descriptions of the involved processes. But we cannot claim that we have been entirely successful, given the issue of false positives and false negatives discussed at the end of Chap. 3. In the end, only advanced forecasts can be free of data snooping and other statistical biases of ex post analyses. This book can thus be viewed as an inspiration for a full-fledged program to identify, classify, and make operational the symptoms that emerge from the case studies (or any data collection) as having a particularly strong incidence on the increase in the risk in leading up to catastrophes. This book provides the background for any manager, decision maker, and responsible person to develop an acute awareness of the nature and risks of risk information concealment in its various forms.

Our approach is more pragmatic than academic, in the sense that we are not engaging a specific model or theory and we are not positioning our study in the context of any specific academic debate or school of thought, in particular regarding any psychological or sociological modeling of human fallibility. Our approach starts with empirical facts to gather as much as possible evidence of both the universal patterns and the idiosyncratic structures, documented by the 25 studied cases (too many, some critics would say). This allows us to free ourselves from a priori (mis-)conceptions. By the evidence and sheer clarity of the cases, we delineate the general ubiquitous presence of risk concealment as well as the factors catalyzing it. This does not prevent us from referring to relevant concepts and theories when useful, providing a second layer of interpretation. We have always in mind the practical person and the risk manager as well as decision maker, focusing on the kind of information that could be useful to him or her and on how to present it, searching for the gaps that could be identified as dangerous. In short, in this work, we focus on evidence-based practical and useful factors and hope this will serve as useful inputs for future academic and scholarly investigations on the roots of the problem.

Other critics will point out that our coverage of cases is imperfect and incomplete. Indeed, we would have liked to add more cases but had to stop somewhere.



As Herbert A. Simon (the Nobel Memorial Prize winner in economics) would say, we stopped when we reached a level of “satisficing,” feeling that we had sufficiently many cases to cover the broad universe of human activities linked with critical objects. Some of the events such as the Ufa train disaster have been chosen because we believe we had unique access to sources of information that would bring novel insights compared to what has been previously written on these cases. Indeed, in a number of cases especially occurring in the previous Soviet Union and then in Russia, we had the possibility to interview some of the main actors of the industry that were active before and during the disasters, providing novel understanding. Thus, in contrast to the criticisms sometimes directed to books such as those of Sagan<sup>1</sup> and Schlosser<sup>2</sup>, which are 100 % US-centered and thus incomplete for a generalization to other countries and cultures, we have tried to offer a more balanced viewpoint, aiming at broader and general insights. While the USA is a central character in many of our reported cases, we also cover several important other cases in Russia, Japan, Europe, and elsewhere. We believe this makes the book and our arguments stronger.

It is likely that many of our conclusions might be considered controversial, but we have consciously refrained from any political agenda and biased preconception and have tried to dig into the facts and present them as fairly as possible. Consider the Toyota recall case as a vivid illustration of our process of trying to go to the core of the facts and present a balanced view, often different from the clear-cut case that many pundits and the media converge to, in our opinion, too hastily. In the Chernobyl case, we were careful not to blindly accept the main claim of Gorbachev himself in his memoirs that the Chernobyl disaster contributed significantly to the demise of the Soviet Union.<sup>3</sup> We explain in more detail in the text the politically motivated nature of such claim by Gorbachev and try to disentangle the complex nature of information and disinformation spread by the Politburo at the time.

How should one use this book? In addition to the intrinsic historical interest and often eye-opening insights revealed by our reconstructions, we believe that there is a lot of value in comparative history: While it is often claimed that history never repeats and that generals are always preparing for the last war, our own research and our compilation and detailed analyses of 25 case studies suggest broad universal factors that recur again and again. This is perhaps not surprising since managing a human organization involves people with their characteristic psychology and predictable behavioral traits. As Ariely emphasized in his book with its explicit self-explanatory title,<sup>4</sup> all of us are endowed with quick and dirty

---

<sup>1</sup>Scott D. Sagan (1995) *The Limits of Safety*, Princeton University Press, Philadelphia.

<sup>2</sup>Eric Schlosser, *Command and Control* (2014) Nuclear Weapons, the Damascus Accident, and the Illusion of Safety, Penguin Books.

<sup>3</sup>Mikhail Gorbachev (2006) *Turning Point at Chernobyl*, Project Syndicate, <http://www.project-syndicate.org/commentary/turning-point-at-chernobyl>.

<sup>4</sup>Dan Ariely (2010) *Predictably Irrational: The Hidden Forces That Shape Our Decisions*. Harper Perennial, New York.



moduli of calculations, the emotional parts of our brain, which systematically make us react in certain predictable ways that are not necessarily fully rational. By having constantly in mind these examples that provide as many scenarios for possible risk information concealment to occur, one can keep aware of these biases and potential mishaps, avoiding habituation and the illusion of control. In particular, the synthesis provided by the figure at the beginning of Chap. 3 is especially useful for anyone to check his or her own organization with respect to what could go wrong. Continuously checking how the processes unfolding in one's organization live up against this list is a particularly healthy, and simple, way of keeping alert and honest.

Zürich  
September 2015

Dmitry Chernov  
Didier Sornette

UNCORRECTED PROOF





# Acknowledgments

We are indebted to many colleagues for their encouragement and for informative and constructive feedback on earlier versions. We would like to mention especially Salavat Abdulin (Chelyabinsk, Russia), Marco Avellaneda (New York University, USA), David Basin (ETH Zurich), Peter Cauwels (ETH Zurich), Michael A.H. Dempster (University of Cambridge, UK), Ingrid Eckerman (Swedish Doctors for the Environment, Sweden), Antonio Foglia (Belgrave Capital Management Ltd. and Banca del Ceresio, Lugano), Stefan Frei (Swisscom), Leonid Grinin (Institute of Oriental Studies of the Russian Academy of Sciences, Russia), William H. Janeway (Warburg Pincus and the Institute for New Economic Thinking), Taisei Kaizoji (International Christian University, Tokyo, Japan), Victor Khramov (Chelyabinsk, Russia), Andrey Korotayev (Higher School of Economics, Russia), Wolfgang Kröger (ETH Zurich, Switzerland), Victor Kudryavy (Eurocement, Russia), Jean Laherrère (retired oil geologist, Total), Thomas Maillart (Swiss SNF fellow at UC, Berkeley), Lidia Mikhailova (Chelyabinsk, Russia), Sergey Nefedov (Ural Federal University, Russia), Nick Onley (United Kingdom), Shamil Rahmatullin (Ufa, Russia), Radalif Shamsutdinov (Ufa, Russia), Thierry Sornette (Black Arrow, Qatar), Bruno Sudret (ETH Zurich), Hideki Takayasu (Sony Computer Science Laboratories and Meiji University, Japan), Michael Teitz (InterMediaCom, Russia), Sergey Tsirel (Plekhanov Technical University, Russia), Tsutomu Watanabe (University of Tokyo, Japan), and Wei-Xing Zhou (East China University of Science and Technology, China). A special thanks to Christian Caron, our editor at Springer, who followed the development of this project and provided important constructive feedback. The cover figure and all the cartoons in this book are credited to Alexey Iorsh.



# Contents

<b>1</b>	<b>Setting the Landscape</b> .....	<b>1</b>
<b>2</b>	<b>Examples of Risk Information Concealment Practice</b> .....	<b>9</b>
2.1	Industrial Sector .....	9
2.1.1	Vajont Dam Disaster (Italy, 1963) .....	9
2.1.2	Three Mile Island Nuclear Accident (USA, 1979) .....	15
2.1.3	Bhopal Pesticide Plant Gas Leak (India, 1984) .....	33
2.1.4	Challenger Space Shuttle Disaster (USA, 1986) .....	40
2.1.5	Chernobyl Nuclear Disaster (USSR, 1986) .....	52
2.1.6	Exxon Valdez Oil Spill (USA, 1989) .....	78
2.1.7	Ufa Train Disaster (USSR, 1989) .....	86
2.1.8	Sayano-Shushenskaya Hydropower Station Disaster (Russia, 2009) .....	94
2.1.9	Deepwater Horizon Oil Spill (USA, 2010) .....	115
2.1.10	Raspadskaya Coal Mine Burnout (Russia, 2010) .....	125
2.1.11	Fukushima-Daiichi Nuclear Disaster (Japan, 2011) .....	131
2.1.12	Other Cases of Risk Information Concealment .....	153
2.2	Financial Sector .....	156
2.2.1	Barings Bank Collapse (Singapore-UK, 1995) .....	157
2.2.2	Enron's Bankruptcy (USA, 2001) .....	161
2.2.3	Subprime Mortgage Crisis (USA, 2007–2008) .....	180
2.3	Military, Social and Natural Disasters .....	203
2.3.1	Unreadiness of the Soviet Red Army for the Nazi Invasion (1941) .....	203
2.3.2	Worldwide Spanish Flu and SARS Outbreaks (1918–1919, 2003) .....	215
2.3.3	Great Wildfires in the European Part of Russia (Russia, 2010) .....	222
2.3.4	Krymsk Flooding (Russia, 2012) .....	226
2.4	Retail Production Industry .....	232
2.4.1	Nature of the Industry .....	232



2.4.2	Complexity, Cost Reductions, Arrogance and The Toyota Problems (USA–Japan, 2000s) . . . . .	233
2.4.3	The 17-Year Poly Implant Prothese Fraud (France, 1993–2010) . . . . .	240
2.4.4	Other Cases with Risk Information Concealment: Tobacco and Food Industries . . . . .	243
<b>3</b>	<b>Causes of Risk Information Concealment . . . . .</b>	<b>247</b>
3.1	External Environment of an Organization . . . . .	249
3.1.1	Global Short-Term Political and Business Philosophy . . . . .	250
3.1.2	Deregulation . . . . .	251
3.1.3	Cozy Relationships Between Government Representatives and Representatives of Industries . . . . .	253
3.1.4	Low Qualification and Unattractive Wages of Representatives of Government Regulators . . . . .	254
3.1.5	Weak Control Over Complex Systems . . . . .	254
3.1.6	Political Instability and Struggle Between Political Camps . . . . .	255
3.1.7	National Arrogance . . . . .	255
3.1.8	Fear of Massive Panic . . . . .	257
3.1.9	National Security Secrecy . . . . .	257
3.2	Internal Ecology of an Organization . . . . .	258
3.2.1	Short-Term Financial and Managerial Objectives and Unrealistic Projections of Future Development . . . . .	258
3.2.2	Permanent “Rush Work” Culture . . . . .	259
3.2.3	“Success at Any Price” and “No Bad News” Culture . . . . .	259
3.2.4	“Ivory Tower Syndrome” or Fragmentary Perception of the Whole Picture of Risks Among Top Managers . . . . .	260
3.2.5	Absence of Specific Knowledge and Experience Among Members of Boards of Directors . . . . .	261
3.2.6	Weak Internal Control Within an Organization . . . . .	261
3.2.7	Frequent Labor Turnover . . . . .	261
3.2.8	Habituation (Loss of Fresh Vision on Problems and Risks Because Nothing Has Gone Wrong in the Past) . . . . .	262
3.2.9	Wishful Thinking/Self-Suggestion/Self-Deception Among Decision Makers . . . . .	264
3.2.10	The Remoteness of Units/Facilities . . . . .	264
3.3	Risk Communication Channels . . . . .	265
3.3.1	Long Chains of Communication for Risk Information. Absence of a Direct, Urgent 24-7-365 Channel Between Field Staff and Executives. Field Staff who do not have Authority to Immediately Stop a Process if they Suspect Evidence of Risk . . . . .	265
3.3.2	No Internal or External Incentives for Whistleblowers . . . . .	266
3.3.3	Poor Inter-organization Risk Transmission . . . . .	267



3.3.4	Absence of Direct Horizontal Communication Between Departments of an Organization (Communication Between Units Only Occurs Through Superiors) . . . . .	267
3.4	Risk Assessment and Risk Knowledge Management . . . . .	268
3.4.1	Absence of a Prompt Industry-Wide Risk Assessment System . . . . .	268
3.4.2	Unwillingness to Investigate in Details the Causes of an Accident and Absence of Permanent Risk Assessment Systems Within Organizations (Recording, Evaluating and Ranking Risks Over Decades) . . . . .	269
3.4.3	High Frequency of Unconfirmed Alerts . . . . .	270
3.4.4	Ignorance Among Critical Personnel and Managers of Other Accidents or Near-Miss Cases Within the Organization, the Industry and Abroad, Absence of a Risk Knowledge Management System (Accumulation, Systematization, and Transmission) . . . . .	271
3.5	Personal Features of Managers and Employees . . . . .	271
3.5.1	Problem of “Looking Good in the Eyes of Superiors” and Reluctance to Admit Personal Mistakes Because of Fear of Being Seen as Incompetent . . . . .	272
3.5.2	Unrealistic Projections of Personal Performance . . . . .	272
3.5.3	Fear of Criminal Prosecution After Serious Fault . . . . .	272
3.6	Results and Synthesis . . . . .	273
<b>4</b>	<b>Major On-going Cases with Information Concealment Practice . . . . .</b>	<b>281</b>
4.1	Shale Energy Development in the USA . . . . .	283
4.1.1	Economics of Exploration of Unconventional Oil and Gas Resources in the US, Geopolitical Challenges and Oil Prices . . . . .	284
4.1.2	Environment Aspects of Hydrologic Fracturing Technology . . . . .	286
4.1.3	Collapse of Natural Gas Prices in the United States (2008–2009) . . . . .	295
4.1.4	Manipulation of the Estimation of Unconventional Oil and Gas Resources . . . . .	298
4.1.5	Stressed Financial Situation of American Shale Operators . . . . .	301
4.2	Genetically Modified Organisms . . . . .	305
4.2.1	Short-Term Profitability Versus Long-Term Sustainability . . . . .	307
4.2.2	Cozy Relationship Between Government Regulators and the Industry . . . . .	308



4.2.3	Lack of Independent Risk Assessment. . . . .	309
4.2.4	Optimistic Statements of Economic Benefits. . . . .	312
4.3	Real Debt and Liabilities of US Government and Real GDP of China . . . . .	313
4.3.1	Challenges in Assessing the Real National Debt of the United States . . . . .	313
4.3.2	Challenges in Assessing the Real Chinese GDP . . . . .	315
4.4	The Global Cyber Arms Race and Concealment of Vulnerabilities in the Software Industry. . . . .	317
4.4.1	The Tumultuous Affair Between Iran and the USA. . . . .	317
4.4.2	History-Making Cyber Warfare Between Nation States . . .	318
4.4.3	Explosive Growth of Complexity in Software . . . . .	323
4.4.4	The Special Business Model of Software. . . . .	327
4.4.5	Collaboration Between Software Vendors and National Security Agencies . . . . .	330
4.4.6	Worst-Case Scenarios and Needed International Collaboration. . . . .	332
<b>5</b>	<b>Successful Risk Information Management . . . . .</b>	<b>337</b>
5.1	Toyota's Production System. . . . .	337
5.2	The Sony Battery Recall in 2006 . . . . .	339
5.3	The Seveso Directive and Beyond . . . . .	340
	<b>Erratum to: Man-made Catastrophes and Risk Information Concealment . . . . .</b>	<b>E1</b>



## About the Authors

**Dmitry Chernov** is a researcher in the Chair of Entrepreneurial Risks at ETH Zurich. He has more than 15 years of experience as a corporate communication consultant in the former Soviet Union Republics, focusing on improving investor and government relations, as well as crisis communication within the following industries: oil and gas, chemical, electric power, metals and mining, telecommunication, transport, etc. He specializes on researching solutions for efficient risk information transmission that enables timely decision-making before and during industrial disasters.

**Didier Sornette** is Professor on the Chair of Entrepreneurial Risks at the ETH Zurich, Director of the Financial Crisis Observatory, Co-founder of the ETH Risk Center and member of the Swiss Finance Institute. He has received many prizes and honors, among them the 2000 Research McDonnell award and the Risques-Les Echos prize 2002. He is a Fellow of the World Innovation Foundation (2004) and, since 2013, of the American Association for the Advancement of Science. Prof. Sornette has edited and authored a number books, many of them published by Springer and is a member of the Editorial and Advisory Board of the Springer Complexity publishing program.