Operational Risk Management A Practical Approach to Intelligent Data Analysis

ł

ŗ

Edited by

Ron S. Kenett

KPA Ltd, Raanana, Israel; University of Turin, Italy; and NYU-Poly, Center for Risk Engineering, New York, USA

Yossi Raanan

KPA Ltd, Raanana, Israel; and College of Management, Academic Studies, Rishon Lezion, Israel



A John Wiley and Sons, Ltd., Publication

Contents

ŧ

	Foreword	xi	ii
	Preface	x	v
	Introduction		
	Notes on Contributors		xxv
	List of Acronyms	xxx	v
PA	ART I INTRODUCTION TO RISK MANAGEMENT		1
1	Risk management: a general view		3
	Ron S. Kenett, Richard Pike and Yossi H	Raanan	
	1.1 Introduction		3
	1.2 Definitions of risk		8
	1.3 Impact of risk		9
	1.4 Types of risk		9
	1.5 Enterprise risk management	· 1	0
	1.6 State of the art in enterprise risk	management 1	1
	1.6.1 The negative impact of ris	sk silos 1	1
	1.6.2 Technology's critical role	1	3
	1.6.3 Bringing business into the	fold 1	4
	1.7 Summary	1	5
	References	1	7
2	Operational risk management: an ov	erview 1	9
	Yossi Raanan, Ron S. Kenett and Richar	rd Pike	
	2.1 Introduction	1	9
	2.2 Definitions of operational risk ma	nagement 2	0
	2.3 Operational risk management tech	iniques 2	2
	2.3.1 Risk identification	2	2

viii CONTENTS

	2.3.2	Control assurance	24
	2.3.3	Risk event capture	25
	2.3.4	Risk and control assessments	25
	2.3.5	Key risk indicators	27
	2.3.6	Issues and action management	28
	2.3.7	Risk mitigation	29
2.4	Opera	tional risk statistical models	30
2.5	Operational risk measurement techniques		32
	2.5.1	The loss distribution approach	32
	2.5.2	Scenarios	33
	2.5.3	Balanced scorecards	34
2.6	Summ	nary	35
Refe	rences		37

PART IIDATA FOR OPERATIONAL RISK
MANAGEMENT AND ITS HANDLING39

3	Ont	tology-based modelling and reasoning in operational risk	s 41
	Christian Leibold, Hans-Ulrich Krieger and Marcus Spies		
	3.1	Introduction	41
		3.1.1 Modules	43
		3.1.2 Conceptual model	43
	3.2	Generic and axiomatic ontologies	47
		3.2.1 Proton extension	47
		3.2.2 Temporal ontologies	48
	3.3	Domain-independent ontologies	50
		3.3.1 Company ontology	50
	3.4	Standard reference ontologies	54
		3.4.1 XBRL	54
		3.4.2 BACH	55
		3.4.3 NACE	55
	3.5	Operational risk management	56
		3.5.1 JIT operational risks	56
	3.6	Summary	58
	References		
4	Sem	nantic analysis of textual input	61
	Horacio Saggion, Thierry Declerck and Kalina Bontcheva		
	4.1	4.1 Introduction	
	4.2	Information extraction	62
		4.2.1 Named entity recognition	64

	4.3	The general architecture for text engineering	65
	4.4	Text analysis components	66
		4.4.1 Document structure identification	66
		4.4.2 Tokenisation	67
		4.4.3 Sentence identification	67
		4.4.4 Part of speech tagging	67
		4.4.5 Morphological analysis	68
		4.4.6 Stemming	68
		4.4.7 Gazetteer lookup	68
		4.4.8 Name recognition	68
		4.4.9 Orthographic co-reference	69
		4.4.10 Parsing	70
	4.5	Ontology support	70
	4.6	Ontology-based information extraction	73
		4.6.1 An example application: market scan	74
	4.7	Evaluation	75
	4.8	Summary	76
	Refe	erences	77
5	A ca	ase study; of ETL for operational risks	79
		erio Grossi and Andrea Romei	
	5.1	Introduction	79
	5.2	ETL (Extract, Transform and Load)	81
		5.2.1 Related work	82
		5.2.2 Modeling the conceptual ETL work	82
		5.2.3 Modeling the execution of ETL	83
		5.2.4 Pentaho data integration	83
	5.3	Case study specification	84
		5.3.1 Application scenario	84
		5.3.2 Data sources	85
		5.3.3 Data merging for risk assessment	87
		5.3.4 The issues of data merging in MUSING	89
	5.4	The ETL-based solution	91
		5.4.1 Implementing the 'map merger' activity	92
		5.4.2 Implementing the 'alarms merger' activity	93
		5.4.3 Implementing the 'financial merger' activity	94
	5.5	Summary	95
	Refe	erences	95
6		k-based testing of web services	99
		oying Bai and Ron S. Kenett	~ ~
	6.1	Introduction	99
	6.2	Background	103

x CONTENTS

	6.2	.1 Risk-based testing	103	
		2.2 Web services progressive group testing	104	
		.3 Semantic web services	105	
	6.3 Pro	bblem statement	106	
	6.4 Ris	sk assessment	107	
	6.4	.1 Semantic web services analysis	107	
	6.4	.2 Failure probability estimation	110	
	6.4	.3 Importance estimation	112	
	6.5 Ris	sk-based adaptive group testing	114	
	6.5	5.1 Adaptive measurement	115	
	6.5	5.2 Adaptation rules	117	
		aluation	117	
	6.7 Su	•	118	
	Reference	ces	121	
PA	ART III	OPERATIONAL RISK ANALYTICS	125	
7		models for operational risks	127	
	Paolo Giudici			
		ckground	127	
		tuarial methods	128	
		orecard models	130	
		egrated scorecard models	133	
	7.5 Su		134 134	
	References			
8	-	n merging and calibration for operational risks	137	
	Silvia Fi	0		
		roduction	137	
		ethodological proposal	138	
		plication	141	
	8.4 Su	5	148	
	Reference	ces	148	
9	Measures of association applied to operational risks			
	Ron S. Kenett and Silvia Salini			
		roduction	149	
		e arules R script library	153	
		me examples	154	
	9.3	•	154	
	9.3 9.3	• •	155	
		mmary	160 163	
	9.4 Su Reference	•	165	
	INCICICII(100	

CONTENTS	xi

	PA	RT I	V OPERATIONAL RISK APPLICATIONS AND INTEGRATION WITH OTHER DISCIPLINES	169
•	10		ational risk management beyond AMA: new ways	
		-	antify non-recorded losses	171
			io Aprile, Antonio Pippi and Štefano Visinoni	171
			Introduction	171
			10.1.1 The near miss and opportunity loss project	171
			10.1.2 The 'near miss/opportunity loss' service	172
			10.1.3 Advantage to the user	173
			10.1.4 Outline of the chapter	173
			Non-recorded losses in a banking context	174
			10.2.1 Opportunity losses	174
			10.2.2 Near misses	175
			10.2.3 Multiple losses	177
			Methodology	177
			10.3.1 Measure the non-measured	177
			10.3.2 IT events vs. operational loss classes 10.3.3 Quantification of opportunity losses:	178
			likelihood estimates	180
				180
			10.3.4 Quantification of near misses: loss approach level10.3.5 Reconnection of multiple losses	181
			Performing the analysis: a case study	184
			10.4.1 Data availability: source databases	184
			10.4.2 IT OpR ontology	184
			10.4.2 Critical path of IT events: Bayesian networks	180
			10.4.4 Steps of the analysis	187
		,	10.4.5 Outputs of the service	189
			Summary	194
		Refer		195
		Refer	ences	190
	11	Micha	bining operational risks in financial risk assessment scores ael Munsch, Silvia Rohe and Monika Jungemann-Dorner Interrelations between financial risk management	199
			and operational risk management	199
			Financial rating systems and scoring systems	200
		11.3	Data management for rating and scoring	202
			Use case: business retail ratings for assessment of probabilities of default	204
			Use case: quantitative financial ratings and prediction of fraud	208
		11.6	Use case: money laundering and identification of the beneficial	
			owner	210
			Summary	213
		Refer	ences	214

12	Intelligent regulatory compliance	215
	Marcus Spies, Rolf Gubser and Markus Schacher	
	12.1 Introduction to standards and specifications for business	
	governance	215
	12.2 Specifications for implementing a framework for business	-
	governance	217
	12.2.1 Business motivation model	218
	12.2.2 Semantics of business vocabulary and business rules	219
	12.3 Operational risk from a BMM/SBVR perspective	222
	12.4 Intelligent regulatory compliance based on BMM and SBVR	225
	12.4.1 Assessing influencers	227
	12.4.2 Identify risks and potential rewards	227
	12.4.3 Develop risk strategies	229
	12.4.4 Implement risk strategy	229
	12.4.5 Outlook: build adaptive IT systems	229
	12.5 Generalization: capturing essential concepts of operational risk	/
	in UML and BMM	232
	12.6 Summary	236
	References	237
		231
13	Democratisation of enterprise risk management	239
	Paolo Lombardi, Salvatore Piscuoglio, Ron S. Kenett,	
	Yossi Raanan and Markus Lankinen	
	13.1 Democratisation of advanced risk management services	239
	13.2 Semantic-based technologies and enterprise-wide	
	risk management	240
	13.3 An enterprise-wide risk management vision	243
	13.4 Integrated risk self-assessment: a service to attract customers	245
	13.5 A real-life example in the telecommunications industry	249
	13.6 Summary	250
	References	251
14	Operational risks, quality, accidents and incidents	253
	Ron S. Kenett and Yossi Raanan	
	14.1 The convergence of risk and quality management	253
	14.2 Risks and the Taleb quadrants	256
	14.3 The quality ladder	258
	14.4 Risks, accidents and incidents	262
	14.5 Operational risks in the oil and gas industry	264
	14.6 Operational risks: data management, modelling and decision	
	making	272
	14.7 Summary	273
	References	274
	Index	281