
Table of Contents

I	Introduction and Objectives	1
1	Introduction	3
1.1	Motivation	3
1.2	Objectives	7
1.3	Structure of the Thesis	8
1.4	Publications List	10
1.5	Research Projects	12
II	Selected Papers	13
2	Review of Privacy Mechanisms for Social Network Services	15
2.1	Introduction	16
2.2	Privacy decision-making process	17
2.3	Advances on privacy mechanisms	25
2.3.1	Preferences-centered requirement	25
2.3.2	Sensitivity inferring requirement	27
2.3.3	Multi-user privacy requirement	31
2.3.4	Relationship inferring requirement	33

2.3.5	Scope inferring requirement	36
2.3.6	Fine-grained requirement	37
2.3.7	Automation requirement	37
2.3.8	Privacy-preserving requirement	41
2.3.9	Explainable requirement	43
2.4	Open challenges	45
2.4.1	Privacy-related metrics	45
2.4.2	Validated model for automation	47
2.4.3	Explainable, argued, and reflective privacy policy solutions	47
2.4.4	Adaptation to user’s modifications	48
2.4.5	Co-privacy	48
2.4.6	Content-fading solutions	48
2.5	Conclusions	49
3	Estimation of Privacy Risk through Centrality Metrics	51
3.1	Introduction	52
3.2	Related work	53
3.3	Privacy risk scenario	56
3.4	Privacy Risk Score (PRS)	57
3.4.1	Calculation of the PRS metric	59
3.4.2	PRS metric in OSN	62
3.5	PRS and centrality metrics	63
3.6	Experiments	67
3.6.1	Simulation environment	67
3.6.2	Settings	69
3.6.3	PRS and global centrality metrics	71

3.6.4	PRS, local, and social centrality metrics	73
3.7	Conclusions	77
4	Metrics for Privacy Assessment when Sharing Information in Online Social Networks	79
4.1	Introduction	80
4.2	Related Work	81
4.3	Privacy Threats in OSN	85
4.4	Privacy Risk Metrics when Sharing Information	86
4.4.1	Metrics Calculation	87
4.5	Experiments	91
4.5.1	Experiment settings	91
4.5.2	Privacy Metrics in Different Network Topologies	93
4.5.3	Correlation between privacy metrics and structural properties	95
4.6	Conclusions	103
5	Empowering OSN Users about the Sensitivity of their Data through Nudge Mechanisms	105
5.1	Introduction	106
5.2	Literature review	107
5.2.1	Definition of personal data	107
5.2.2	Quantifying the value of personal data	108
5.2.3	Sensitivity in the OSN domain	111
5.3	Proposal	113
5.4	Experiment	117
5.4.1	Methodology	117
5.4.2	Results	118

5.5	Discussion	120
5.6	Conclusions	121
6	“Who should I grant access to my post?”: Identifying the most Suitable Privacy Decision on OSNs	123
6.1	Introduction	124
6.2	Literature review	126
6.2.1	Information disclosure and benefit	126
6.2.2	Privacy and overexposure	127
6.2.3	Privacy calculus and privacy decision	128
6.3	Research model and hypotheses development	129
6.3.1	Channel’s factors	129
6.3.2	Sensitivity of the message	130
6.3.3	Differences between types of receptors	131
6.3.4	Online Social Well-being	134
6.4	Methodology	134
6.4.1	Research settings	134
6.4.2	Data collection	135
6.4.3	Measurement	136
6.4.4	Sample characteristics	136
6.5	Analysis and results	137
6.5.1	Measurement model assessment	138
6.5.2	Structural model assessment	138
6.6	Discussions	142
6.6.1	Theoretical implications	144
6.6.2	Practical implications	145

6.6.3	Limitations and future research	145
6.7	Conclusion	146
6.A	Appendix	147
6.A.1	Measurement instrument	147
6.A.2	Descriptive statistics, reliability & validity results	148
7	Enhancing the Privacy Risk Awareness of Teenagers in Online Social Networks through Soft-Paternalism Mechanisms	151
7.1	Introduction	152
7.2	Related work	154
7.3	Nudging Mechanisms	157
7.3.1	Privacy Risk Score (PRS)	158
7.3.2	Nudges	162
7.4	Experiment	164
7.4.1	Platform	165
7.4.2	Setup	166
7.5	Results	168
7.5.1	Demographics and activity	168
7.5.2	Participants' posting behavior	172
7.5.3	Research questions and hypothesis testing	175
7.5.4	Participants' perception about nudges	177
7.6	Discussion	179
7.7	Conclusions	182
8	Assessing the Effectiveness of a Gamified Social Network for Applying Privacy Concepts: An Empirical Study with Teens	185
8.1	Introduction	186

8.2	Literature review	188
8.2.1	Educating teenagers about OSN privacy	188
8.2.2	Social networks and Gamification in education	189
8.2.3	Individual differences	190
8.3	Experimental design	191
8.3.1	Study site	191
8.3.2	Instruments	192
8.3.3	Participants	197
8.3.4	Procedure	198
8.3.5	Measures and data analysis	199
8.4	Results	199
8.4.1	Privacy-seeking behavior	200
8.4.2	Social network engagement	202
8.4.3	Gender & Age behavior differences	204
8.5	Discussion	207
8.6	Conclusion	210
III	Discussion	211
9	General Discussion of the Results	213
9.1	Results on open research lines about privacy	214
9.2	Results of the definition of a privacy risk metric	215
9.3	Results of the proposed sensitivity metric for social network publications	216
9.4	Results on users' benefit-cost trade-off in privacy decisions	218
9.5	Results on nudging users with privacy risk and sensitivity metrics . . .	219

9.6 Results of educating teenage users about privacy with social gamification items	220
10 Conclusions and Future Work	223
Bibliography	227