



Contents

1	Introduction	1
1.1	Motivation	1
1.2	Objectives	6
1.3	Structure of the Thesis	7
2	State of the Art	9
2.1	Introduction	9
2.2	Search Strategies in Distributed Environments	10
2.3	Self-Organization in Distributed Environments	21
2.4	Cooperation Emergence	24
2.5	Final Remarks	27
3	Abstract Model for Service-Oriented MAS	33
3.1	Introduction	33
3.2	Abstract Model for Service Management	35
3.2.1	Dynamics	39
3.3	Conclusions	41
4	Service Management in Virtual Organizations	45
4.1	Introduction	45
4.2	Architecture Model	46
4.3	Service Facilitator (SF)	51
4.4	Service Facilitator in THOMAS Framework	57
4.4.1	Service Implementation	59

4.4.2	Implementation of the SF component	60
4.4.3	Agent Implementation	69
4.5	Application Example	70
4.6	Conclusions	73
5	Decentralized Service Management in Service-Oriented MAS	75
5.1	Introduction	75
5.2	Decentralized Service Discovery Scenario	78
5.2.1	Network Creation	78
5.2.2	Discovery Process	79
5.3	Introducing Homophily in Service-Oriented MAS	80
5.3.1	Value Homophily	81
5.3.2	Status Homophily	85
5.3.3	Choice Homophily	87
5.4	Community Creation based on Homophily	88
5.4.1	Join Protocol	88
5.4.2	Structural Properties	90
5.5	Decentralized Service Discovery Using Homophily	95
5.6	Evaluation	97
5.6.1	Evaluation of Configuration Parameters	100
5.6.2	Service Discovery and Structure Evaluation	107
5.7	Conclusions	115
6	Self-Organization Mechanisms in Service-Oriented MAS	117
6.1	Introduction	117
6.2	Self-Organized Service Discovery Scenario	119
6.3	Agent Internal State	121
6.4	Agent Reasoning Process	125
6.4.1	Internal State Analysis	128
6.4.2	Self-Organization of the Structural Links	131
6.4.3	Population Self-Organization: Leave, Clone, or Remain	132
6.5	Evaluation	136
6.5.1	Changing Structural Relations	138
6.5.2	Population Self-Organization: Leave, Clone, or Remain	149
6.5.3	Combining Self-Organization Strategies	152
6.6	Conclusions	155

7	Cooperation Emergence in Service-Oriented MAS	159
7.1	Introduction	159
7.2	Cooperation in Service Discovery Scenario	161
7.3	Promoting Cooperation	163
7.3.1	Structural Mechanism: Social Plasticity	164
7.3.2	Incentive Mechanism	170
7.3.3	Adaptive Combination of Social Plasticity and Incentives	173
7.4	Evaluation	178
7.4.1	Social Plasticity	179
7.4.2	Incentives	184
7.4.3	Social Plasticity and Incentives	186
7.5	Conclusions	197
8	Conclusions	201
8.1	Contributions	201
8.2	Future Lines of Research	205
8.3	Related Publications	206
8.3.1	Indexed Journals	207
8.3.2	Indexed Conferences	207
8.3.3	Other Conferences	210
8.3.4	Workshops	210
8.3.5	Book Chapters	210
	Bibliography	213