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Samenvatting

Organisaties komen steeds vaker veranderingen en uitdagende situaties tegen waar ze geen invloed op hebben, en individueel lukt het ze niet om businesskansen in de markt te benutten. Daarom verschuiven de traditionele organisatiestructuren langzaam naar samenwerkingsnetwerken van organisaties (Engels: collaborative networks of organizations), waaronder Virtuele Organisaties (VO). VOs zijn voor korte termijn en doelgericht. VOs moeten op dynamische en vloeiende wijze opgericht en gevestigd kunnen worden, om in te spelen op een ontstane kans in de markt en te concurreren met grote organisaties. Het bestaan van een strategische alliantie van organisaties in een sector, die de noodzakelijke basiscondities en -mechanismen verzorgt, is een bewezen voorwaarde voor het faciliteren van dynamische creatie en succesvolle werking van VOs. Dergelijke langetermijnsamenwerkingsnetwerken, ook wel VO Breeding Environments (VBE) genoemd, zijn al in veel industrile sectoren zichtbaar.

Geanalyseerde gegevens verzameld bij samenwerkende organisaties in VOs tonen aan dat het meeste VO-falen veroorzaakt worden door gedrag van organisaties. Hieruit volgt dat naast het begrijpen en ontwerpen van welgegronde modellen voor gedrag van organisaties, er mechanismen nodig zijn om gedrag te monitoren en controle over gedrag uit te oefenen. Als een hoofdcontributie van dit proefschrift berekent onze VO Supervisory Assisting Tool (VOSAT) twee metrieken voor elke partnerorganisatie in een VBE: het historisch samenwerkingsgedrag van de partner, hoofdzakelijk berekend op basis van langetermijngedrag dat is gemonitord tijdens voorgaande VOs, en het huidig samenwerkingsgedrag van de partner, berekend op basis van gedrag ten opzichte van de vastgelegde normen in de actuele VO.

Om het historisch gedrag van een organisatie in een VBE te meten worden vier kwalitatieve gedragsdimensies meegenomen: de organisaties integriteit (Engels: integrity), moed (Engels: courage), aangenaamheid (Engels: agreeableness), en openheid (Engels: openness). Elk van deze kwaliteiten wordt gemodelleerd met een verzameling kenmerken (Engels: traits). Een kwantitatieve oorzakelijke be-

nadering is vervolgens gedefinieerd om een aantal bekende omgevingsfactoren te relateren aan de kenmerken van deze vier gedragsdimensies. Uit de oorzakelijke verbanden zijn een aantal formules afgeleid, die voor elke organisatie de mate van individueel samenwerkingsgedrag (Engels: Individual Collaborative Behavior, ICB) berekenen. In onze aanpak vormt deze metriek een maatstaf in de evaluatie van de samenwerkingsbetrouwbaarheid (Engels: collaborative trustworthiness) van elke partnerorganisatie, welke nodig is tijdens de VO operation phase.

Om de kwaliteit van het huidige gedrag van een partner in een VO te behandelen, stellen we een nieuw normatief multiagentmodel voor VOs voor, waarin vier soorten gedragsnormen worden onderscheiden: (i) socio-regulatory nomen, (ii) co-working normen, (iii) committing normen, en (iv) controlling normen. Ons model heet daarom het S3C model voor de behandeling van normen. Onze aanpak voor committing normen en co-working normen leidt tot de introductie van nieuwe formalisaties en mechanismen, gebaseerd op individuele en gezamenlijke beloften tussen VO-partners. Dus, VO-partners leggen zich toe op het uitvoeren van taken op een bottom-up manier, in tegenstelling tot een VO-cordinator die taken toekent aan partners op een top-down manier. De bottom-up aanpak past veel beter bij de samenwerkingsaard van VOs, vergelijkbaar met federatieve partnerschappen tussen organisaties. Daarnaast wordt het vertrouwensniveau (Engels: trust level) van elke partner berekend op basis van de resultaten van het monitoren van socio-regulatory normen, co-working normen, en committing normen, alsmede de partners ICB. Dit wordt gedaan door middel van de AHP-fuzzy comprehensive evaluation method. De controlling normen passen drie metrieken toe gericht op het karakteriseren van VO-partners, namelijk hun vertrouwensniveau, werkdruk, en communicatieniveau. Als een van de controlling normen wordt overtreden door een VO-partner, dan wordt dat door VOSAT herkend en waarschuwt VOSAT de VO-cordinator. Een dergelijke overtreding is een risico voor het bereiken van de VO-doelen. Met deze metrieken is een Bayesiaans netwerk gecreerd om de kans op falen te meten voor elk van de geplande deeltaken, taken, deeldoelen, en het algemene doel van de VO.

Daarnaast geeft VOSAT suggesties ter ondersteuning van het maken van beslissingen omtrent mogelijke interventies in geplande taken, om VO-falen te voorkomen, samenwerking in VOs te bevorderen, en daardoor de succeskans van VOs enorm te verbeteren. Om een voorbeeld te geven, VOSAT kan een VO-cordinator ondersteunen tijdens de operation phase, door een suggestie te maken voor geschikte alternatieve partners onder hen die zich aanbieden om een riskante deeltaak over te nemen. Een tweede voorbeeld van hoe VOSAT de VO-cordinator tijdens de operation phase kan ondersteunen bij het verbeteren van samenwerkingsgedrag, en daarmee de succeskans van een VO te vergroten, is door het opnemen en rangschikken van de prestaties en het samenwerkingsgedrag van VO-partners, om op basis hiervan indirect beloningen te verdelen binnen de VO. Een derde voorbeeld van hoe VOSAT de taken van de VO-cordinator faciliteert, is bij de selectie van de meest geschikte partners tijdens de formatie/creatiefase van

een VO. In dit proefschrift staat een voorbeeld van dit geval voor de VOs in de services-industrie. In dit voorbeeld wordt gedemonstreerd hoe het historisch en huidig gedrag van kandidaatpartners hun mogelijke selectie voor deelname in een nieuwe VO kan benvloeden. Dit proefschrift ontwerpt en ontwikkelt dus hulp-mechanismen, -tools, en -systemen ter ondersteuning van VO-cordinators, met een toename van zowel veerkracht als succeskans van VOs als resultaat.

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Abbreviations

2OPL	Organization Oriented Programming Language
A	Availability
AG	Agreeableness
AHP	Analytic Hierarchy Process
ANP	Analytic Network Process
ARCON	A Reference model for Collaborative Networks
BDI	Beliefs, Desires and Intentions
BN	Bayesian Network
BS	Business Success
C3Q	Capability, Cost, Conspicuity, and the Quality specification criteria
CA	Creativity
CB	Current Responsibility
CCCI	Correlation, Commitment, Clarity, and Influence
CG	Courage
CI	Consistency Index
CM	Competence
CMR	Communication Rate
CN	Collaborative Network
CNOD	Committing Norms Obedience Degree
CO	Cooperativeness
CoQ	Co-work Quality
CP	Capability
CPS	Cooperative Problem Solving
CPT	Conditional Probability Tables
CR	Conflict Resolution
CT	Cooperative Traits
DAG	Directed Acyclic Graph
DoW	Description of Work
Endo-E	Endogenous Elements

ES	Employee Size
ETA	Event Tree Analysis
Exo-I	Exogenous Interaction
FA	Fairness
FB	Failures in Behavior
FC	Others' fault Compensation
FL	Flexibility
FQ	Fulfilment of QSC
FT	Flexibility Ability
FTA	Fault Tree Analysis
GTIT	Goal-Task-Interdependency-Template
GTM	Goal-oriented Trust Model
HCL	Hybrid Causal Logic
HMDT	Hierarchical Multi-attribute Decision-support-based Trust estimation
HN	Honesty
HW	Heavy Workload
ICB	Individual Collaborative Behavior
ICT	Information and Communication Technologies
II	Inventiveness
IN	Integrity
IQ	Influence of QSC
IR	Interaction Rate
IRN	Institutional Reality and Norms in VOs
IS	Intolerance to Stress
LA	Leadership Ability
LC	Lack of Communication
LT	Lack of Trust
MBTI	Myers-Briggs Type Indicator
NAC	Norm Abidance Component
NBO	Not Being Opportunistic
NF	Not Fulfilling
NMAS	Normative Multi-agent System
NMC	Norm Monitoring Component
NMR	Norm Manipulating Rules
OCI	Organizational Character Index
OE	Openness to new Experience
OLA	Operational Level Agreement
OWL	Web Ontology Language
PA	Problem Avoidance
PF	Promise Fulfilment
PI	Promise Importance
PN	Punctuality

PO	Pro-activity
PR	Past Responsibilities
PRIT	Partner-Responsibility-Interdependency-Tree
PSC	Partner Selecting Component
PT	Pro-activity Ability
QF	Q-Factor
QoS	Quality of Service
QSC	Quality Specification Criterion
R	Reliability
RFC	Ratio of Failure in Communication
RI	Random consistency Index
ROC	Ratio of work Overload Commitment
RPC	Risk Predicting Component
RR	Reaction Rule
RT	Response Time
RS	Resource Size
S3C	Socio-regulatory, Committing, Co-working and Controlling norms
SCM	Supply Chain Management
SLA	Service Level Agreements
SMEs	Small and Medium Enterprises
SNOD	Socio-regulatory norms obedience degree
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SOC	Service Oriented Computing
SP	Proactively Supportive
SRA	Scientific Research on the Agriculture
T	Throughput
TEC	Trust Evaluating Component
TOC	Table Of Content
TR	Truthfulness
TT	Trustworthiness
VBE	Virtual organizations Breeding Environment
VE	Volunteering
VO	Virtual Organization
VOSAT	VO Supervisory Assisting Tool
WOL	Work OverLoad
WP	Work Package
WSDL	Web Service Description Language
WSMO	Web Service Modeling Ontology

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