From evidence to criminal agents

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I. EXTENDED ABSTRACT

THE research outlined in the paper is part of the GLODERS research project, directed towards development of an ICT model for understanding the dynamics of Extortion Racket Systems (ERSs). These are criminal organisations of which the Mafia is but one example [1]. Here we concentrate on a scenario, describing the internal dynamics within a criminal organisation [2,3] that caused the breakdown on this particular criminal network. This data driven scenario builds on Police interrogations resulting from a number of investigations. Currently the research is in the step of transforming the analysis of semantic web of relation in the data into the code of a first model to analyse the effects of the model rules in simulation runs. This first test-bed model will be presented at the conference.

The Scenario applies a grounded theory approach [4] based on police interrogations in 2005 and 2006 of various police investigations of a criminal gang. Established in the early 1990s its business model consisted of drug trafficking and laundering the illegal money. Drug trafficking was done by 'black collar criminals' with access to the production and distribution of drugs. 'White collar criminals' were ordinary businessmen responsible for the money laundering. They got roped into the business in the early 1990s. Police files identified (at least) one white collar criminal working in the real estate business. It is important that the real estate trader had a good reputation in the legal society. This allowed him to invest illegal money in the legal market and give the return of investment back to the investor. Money laundering is essentially based on a norm of trust: the black collar criminals need to hand over the money to their partners and trust them that they will get the return of investment back from the trustee. In a covert organisation this cannot be secured by formal contracts. Therefore trust is essential. The network lasted for about 10 to 15 years until it collapsed. An initial divide went out of control, and the mistrust could not be encapsulated but spread rapidly through the whole network. Once trust was corrupted, a run on the bank was initiated. Attempts to get the money back led to extortion. Thereby the white collar criminal became victim of his criminal business partners. A formerly symbiotic relationship between black and white collar criminals (a long term relation of a win-win situation for both) became parasitic (i.e. a lasting but no longer profitable situation). This generated a cascading effect through the network which destroyed the overall network in a violent blow-up. This characteristic of the case makes the data particularly interesting to identify essential elements in the mechanisms of conflict resolution in the absence of a juridical court, i.e. the failure allows to identifying the elements which must not be missing.

Methodologically the approach from qualitative evidence to agent rules is particularly appropriate for dissecting cognitive complexity. The path from police interrogations to agent based models started by analysing the textual data with MaxQDA as a tool for qualitative text analysis [4]. Text passages were summarised into codes deriving concepts from data. Concepts stand for classes of objects, events or actions which have some major properties in common. This provides the path from qualitative data to a coded textual corpus which structures the content of the data by identifying recurrent themes such as 'violence' or 'monetary transactions' with CAQDAS tools such as MaxQDA. The coding derived with MaxQDA served as the basis for concept relation identification with the CCD tool (a software for creating Consistent Conceptual Descriptions) [5]. The CCD tool provides an environment for developing a conceptual model by a controlled identification of condition-action sequences (denoted as action diagram) which represent the micro-mechanisms at work in the processes described in the data. Whereas the data describes individual instantiations, the condition-action sequences represent mechanisms insofar as they describe general event classes. However, empirical traceability is ensured by tracing the individual elements of the action diagram resulting from the identification of condition-action sequences in the CCD tool back to text annotation in the data. These annotations are extracted from the coding derived with MaxQDA. This

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provides the path from a coded textual corpus to the recognition of behavioural patterns. This web of semantic relations derived from the empirical analysis is the basis for the development of an agent architecture. Theoretically this architecture builds on a theory of normative agents [6] which provides the grammar for social norms. It extends the theory by reasoning about aggression, namely whether aggression is norm enforcement (i.e. punishment) or norm violation (i.e. violation of trust between group members). The theoretical foundation of normative agents provides the path from behavioural patterns recognition to a set of regulative norms in agent architectures. The architecture provides the foundation for a software implementation.

For the purpose of an extended abstract the path from qualitative evidence to agent rules will be illustrated by one example from the data analysis and one example from the transformation of the empirical evidence in an agent architecture. First, one example of the action diagram resulting from the data analysis will be shown, describing the process of ordinary money laundering.

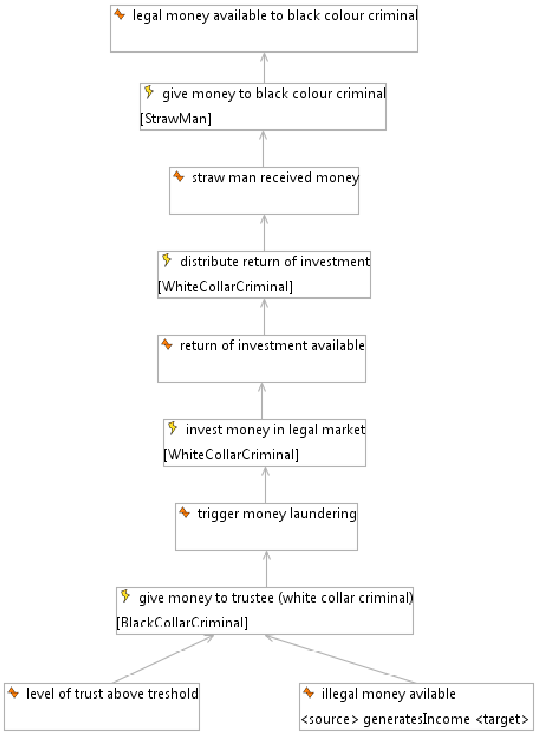

Fig. 1 Ordinary business of money laundering

In the talk it will be shown how this can be traced back to annotations from the evidence base. One example is the following annotation demonstrating the starting condition that illegal money is available

Annotation (illegal money available): ”In the period between 1990 and 1992 police investigations had been undertaken. These revealed a criminal organisation concerned with drug trafficking. The report from 1992 estimated the income and the costs. It is estimated a transaction volume of nearly 300 million.”

In the following, the first steps of the process of developing agent architectures for a simulation model from the conceptual description will be illustrated by the example of ‘reasoning about aggression’. The intra-agent processes are defined as modules and specified by flow charts, focussing on processing of data, in this context mainly events for triggering processes, and different kinds of parameters determining the control flow. The most important kind of parameters is related to norms ruling the agents’ behaviour. All actors are ruled by norms. As a result of the detailed examination of the empirical data, a restricted number of norms have been identified which implicitly govern the behaviour of the actors. As an example, for all types of criminals a ‘top-level’ moral norm exists:

`NORM(1) ”moral norm”: NOT VIOLATE TRUST c o`

where `c` is a criminal and `o` is the criminal organisation or network. This norm describes the commitment to the norm of trust within the organisation which holds in the case of unexpected events and is entangled with interpretation of aggressive actions, self-reflection and the consideration of own past actions. Related to this norm, a number of concrete obligations are defined. An example is

`NORM(1.3) ”obligation”: PUNISH` c_i c_j `IF` c_j `VIOLATE NORM(1)`

where c_i is a criminal who punishes the deviant criminal c_j for a norm violation.

Such a punishment triggers a ‘reasoning on aggression’ process within the punished agent, where the agent must decide whether the experienced aggression was such a punishment, or rather a self-interested act of aggression. This process is detailed to some extend in the following description of the architecture of one of the agent types, the black collar criminal.

The ‘Reasoning about aggression’ process (Figure 2) is triggered when the agent recognises an aggression against itself. It comprises the first of three stages of a decision process, eventually leading to possible reactions on the aggression. In the first stage it is decided whether the aggressor is reputable and the motivation for the aggression is not gratuitous. Information on trustworthiness of the aggressor from an ‘image and reputation repository’ (a data structure which stores the agent’s belief on image and reputation of other fellow agents) is regarded here. If the aggressor is reputable, a possibly normative motivated aggression is anticipated and the normative process is triggered at the second stage. A possible result of the normative process might be that the inherent sanction recognition failed (see subsequent section), but the aggression poses a potential threat to the agent. In this case, and in the case that the aggressor is recognised as not reputable, reactions will be triggered by entering the third stage of the process in which the operational mode of the agent is either set to a rational or an emotional frame, amongst others depending on the strength of the initial aggression.

The actual switching to one of the two frames is done in two separate processes not shown here, followed by triggering the ‘Reacting on aggression process’, in which the agent

decides how to retaliate the aggression (either by counter-aggression or by betrayal of the criminal network, depending on the mental frame which the agent has adopted before). This process can also come into play if the agent decides to cheat, i.e. a sanction is recognised within the 'Normative process' but the agent decides not to obey the norm behind the sanction but rather to follow some other (individual) drives.

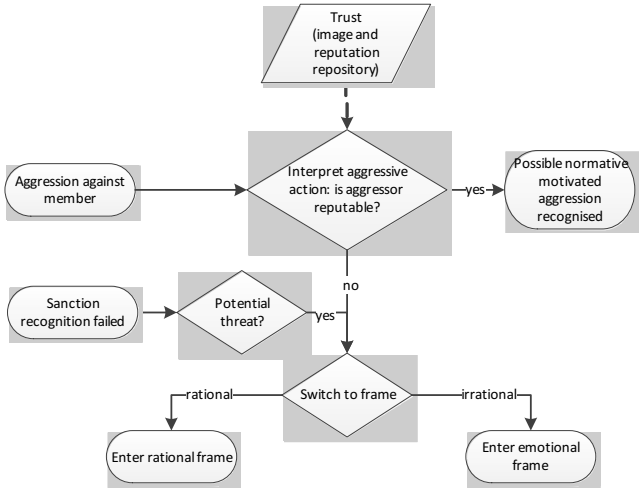

Fig. 2 Intra-agent process for reasoning about aggression (rounded boxes are start and end events for the process, rhombi are decisions, parallelograms stand for parameters influencing decisions)

This talk shows the results of the conceptual modelling of the collapse of a criminal network. The qualitative data analysis informing the conceptual model as well as the first formalisation activities towards a simulation model are outlined with emphasis on important design details, e.g. the realisation of normative behaviour. The conceptual modelling enables dissecting the micro-mechanisms of a complex empirical process which enable a certain degree of generalisation beyond a narrative story of a certain case to shed light on the wheels of social processes. Nevertheless, the evidence based modelling approach retains traceability of the abstract mechanisms to the empirical social world. The model implementation phase has just started. The simulation model will then contribute to computational normative agents [6,7,8,9,10] by implementing reasoning about aggression whether or not to interpret it as sanction.

II. REFERENCES

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