

Software Agents and the Law Part. 1. Lovely Rita

Utrecht, December 10, 2003

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What are they?

- Software agents (called also digital or electronic agents)
 - computational entities
 - capable of autonomous action in complex contexts.

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Their competence (I)

- Agent are characterised (to different degrees and in different combinations) by the following:
 - reactiveness to the changing conditions of the environment (agents adjust their own behaviours according to the changes they sense),
 - pro-activeness (agents are able to decide according to their goals, i.e. they are goal driven),
 - persistency (the life of agents is supposed to be long lasting),

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Their competence (II)

- the capability to interact with others coherently (agents use ontologies and message-based communication),
- intelligence (agents are able to acquire and process information and to learn from experience),
- flexibility (agents are able to face unpredictable scenarios),
- mobility (agents move through networks, in order to use resources and to locate partners).

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Rational agents: the BDI model

- BDI (Beliefs-Desires-Intentions)
- The agent has
 - Beliefs (about the environment and about itself)
 - Desires (he would like that some states obtain)
- On the basis of its beliefs and desires, the agent
 - Builds cognitive models of its environment (theoretical reasoning)
 - Builds plans on how to achieve its goals (practical reasoning)
- Finally, the agent
 - Forms the intention to implement those plans
 - Acts accordingly

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Agent technologies: Reactive agents

- The agent has the propensity (disposition) to react to stimuli coming from its environment activating certain behavioural models (if hot, get away!), (if good, eat it!)
- Those behavioural model can overlap with each other, yielding a combined result
- When the agent receives a stimulus, it behaves according to this combined results

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Agent technologies: adaptive agents

- The agent
 - Replicates old behaviour
 - Sometimes, tries new ones (randomly, or according to some strategy)
 - If the new behaviour is effective under certain conditions, the attitude to replicate it under similar conditions is increased
 - If the new behaviour is ineffective under certain conditions, the attitude to replicate it under the same conditions is diminished

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A further feature of agents

- Each of them has its own purposes and its own knowledge (no master plan to govern all their activities):
 - Advantage: Each agent behaves according to its purposes and knowledge, reacts in a flexible and creative way to its specific circumstances.
 - Disadvantage: no necessary co-ordination with other agent. Sometime when each agent is separately following its agenda the result may be negative for everybody (prisoner dilemma, tragedy of the commons).
 - Problem: how to reconcile the autonomy of individuals and the preservation (or achievement) of certain systemic properties?

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Solutions

- Central planning (but then we lack the advantage of flexibility and autonomy)
- Setting constraints on the behaviour of agents (build agent that cannot lie, or cannot destroy each other, etc.)
- Setting norms for agent societies (agents that can include rules in their decisional processes, and possibly that can adopt shared rules when the circumstances are appropriate)
- Building altruistic agents, which besides being self-interested (trying to persist and to achieve the benefit of their user) also take into account the common good (and try to get to a shared view of the common good)

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Agents in the internet

- Agents help in coping with the excess of
 - accessible information
 - possible actions
- They contribute to accelerate the dynamics of electronic commerce:
 - Searching for products
 - Searching for partners
 - Electronic negotiation

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Agents and the economy of the net

- Agents may provide everybody with knowledge about market opportunities:
 - Improve the position of customers?
 - Reduce differences on prices
 - Put pressure of smaller sellers
 - Promote different types of competition
- Agent reduce transaction costs. This can have major impacts:
 - All contractual clauses can be bargained
 - Defeasible legal rules may become irrelevant
 - Disposable legal rights can become irrelevant to economic choices (Coase)

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Types of agents

- Information agents
 - on the basis of information needs of their users, they select relevant sources, and present the information in an appropriate way.
 - They support advanced pull technologies, so allowing one to select and download (via one's own agent) exactly the information one needs
 - In particular, they may look in the internet for the commercial offers that are more convenient for their users

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Interface agents

- They facilitate the use of software programs and the interaction with virtual environments
 - Providing help facilities
 - Acting as virtual guides
 - Acting as virtual shop assistants
 - Etc.

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Negotiation agents

- They contribute to the making of contracts
 - They find possible partners,
 - They make offers,
 - They evaluate offers
 - They make agreement
 - They execute contract
 - They control the contractual execution of the counterparty
 - Etc.

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Legal issues and agents

- Can electronic agents be legal persons? What does it mean to be a person?
- Can electronic agents be agents (representatives) in the legal sense (have the power of making contact and other legal acts for their users)
- Can agents have legally relevant cognitive states (intentions, beliefs, good faith, ecc.)?
- Can agents have normative attitudes (can they adopt or violate norms)?

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Legal issues and agents (II)

- A computer system made of agents is (or should be) a kind of legal system?
- How shall we replicate legal institutions (e.g. legislation, courts, police) in the agents' world
- What connections between such a normative system and the legal system?

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Other legal issues

- In the domains of
 - Contract law
 - Tort law
 - Consumers law
 - Agency law
 - Intellectual property law
- Let us see an example: the lovely Rita case

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It is 17:55. Enrico leaves his office, hurries up toward his car. It is too late though, **Rita a meter maid** has just placed a fine on the windscreen of his car.

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No room for negotiating, but maybe the occurrence is not so adverse as it seemed... Enrico asks **Rita** to have a coffee together



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RRI, Radio Rock International, is broadcasting music Enrico has an idea, he remembers of an old Beatles' song, "**Lovely Rita Meter Maid**" and wishes to dedicate it to the girl.

He calls **Jonathan**, the DJ, and asks him to play the song.



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Meanwhile, inside RRI studio, **Alexandra**, the technical assistant fills a form for their software agent, **Hermes**

HERMES - task description	
Author(s)	Lennon, McCartney
Title	Lovely Rita Meter Maid
Performer(s)	Beatles

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Who are you, Hermes? (I)

- Hermes is a software agent:
 - implementing a model patented as "Music Middleman" by **AECS** (Applied E-Commerce Science), a US corporation;
 - Build through a software copyrighted by **ZNS** (ZweiNullSieben) a German corporation;
 - Licensed to RRI (Radio Rock International), an Italian radio;
- The terms of the AECS-ZNS contract:
 - ZNS is allowed to build systems implementing "Music Middleman", it is forbidden to make any other use of this technology, it is obliged to pay a fee to AECS, etc....
- The terms of the ZNS-RRI contract:
 - RRI is allowed to use Hermes, empowered to assign him tasks, forbidden to access or modify his code, obliged to pay a monthly fee ...
 - Zns is obliged to maintain Hermes, to provide him with market information ...

Who are you, Hermes? (II)

- Who owns Hermes?
 - The owner of the technology (the patent holder)?
 - The owner of the software (the copyright holder)?
 - The owner of a right of use (the licensee and the "sub-licensees")?
- Hermes gets information from:
 - ZNS database manager;
 - Alexandra and RRI staff;
 - his own autonomous inquires;
 - other agents

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Who are you, Hermes? (III)

- Who controls Hermes?
 - The patent holder (who decides upon the use of the technology)?
 - The copyright holder (who can access and modify software)?
 - The licensee and the "sub-licensee" (who issue assignments and communicate information)?
 - The agent himself (who knows the circumstances and decides what to do)?

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Who are you, Hermes? (IV)

- Who controls Hermes?
 - The patent holder (who decides how to use the technology)?
 - The copyright holder (who can access and modify software)?
 - The licensee and the "sub-licensee" (who issue assignments and transmit information)?
 - The agent himself (who knows the circumstances and decides what to do)?

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Who are you, Hermes? (V)

- Who is responsible for Hermes (if he harms somebody)?
 - The patent holder (who designed the technology)?
 - The copyright holder (who implemented the software and provided general knowledge)?
 - The licensee and the "sub-licensee" (who assigned tasks and endowed him with specific knowledge)?
 - Hermes himself (who evaluated circumstances and took his own decisions)?
 - A devious third party (who manipulated his environment or his internal state)?

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Hermes's story (V)

- The statement of Hermes's task
 - Specification of the author: John Lennon, Paul McCartney
 - Specification of the title of the work: "Lovely Rita Meter Maid"
 - Preferred performing artist: The Beatles
 - Alternative performing artist: Any
 - Availability: 6.17 pm
 - Price: the lowest possible, below 5 Euros
 - License type: One time only, before 8pm current date, public performance by broadcast

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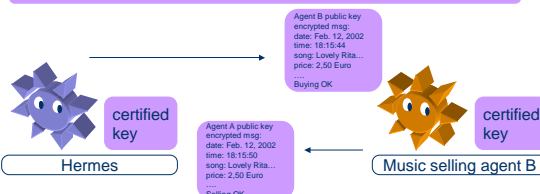
Hermes's story (VI)

- To execute his tasks, Hermes:
 - Consults the register of musical recordings
 - Accesses Zns (his builder) database of on-line music providers
 - Clones himself and contact simultaneously different providers
 - Negotiates with the offerors
 - Evaluates alternative offers against his task descriptions
 - Decides when an offer is good enough to make a deal
 - Makes a contract
 - Executes it

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Hermes decides to purchase the license for broadcasting Lovely Rita Meter Maid by Agent B of Time Warning corporation.

> Handshake is made through the interchange of encrypted time-stamped messages

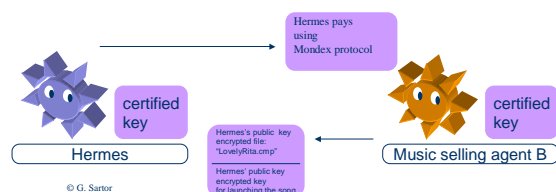


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Hermes pays the fee to Agent B and the latter sends it a compressed encrypted version of the song

> Payment is made through an electronic micropayment system (e.g., Mondex)

> The song is compressed and encrypted; RRI is given the key for launching it



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In the meantime, Hermes ceases transactions with other selling agent.

What if Hermes does not inform the other agents that he ceases transaction, so that they wait and lose other business opportunities

What if Hermes does not pay the song?



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Meanwhile at RRI, Alexandra launches the file. It is 18:17:40. Outside the bar night is falling. The song is in the air. "Lovely Rita meter maid, nothing can come between us... Lovely Rita meter maid, may I inquire discretely, when are you free, to take some tea with me?"



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Hermes's legal qualification

- What is Hermes?
 - A messenger, who only transmits an offer from his principal (RRI and Alexandra) to the offerees
 - A representative, who autonomously determines the content of a contract which he will conclude in the name of his principal (who will acquire rights and duties ensuing from the contract)
 - An independent contractor (an agent without representation), who acquires rights and duties on his own, and later transfers them to his principal.

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Who "wants" to make the contract?

- The principal (Alexandra).
 - She assigned Hermes his tasks and established the constraints,
 - However, she is not aware of the context and the contents of the negotiation
 - However, she does not know the precise content of the contract which is concluded
- Hermes.
 - He autonomously decided when and how to make the deal
 - However he followed her instructions (and his built-in rules)
 - However he was not "conscious"

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What is the extent of Hermes's autonomy?

- What if Hermes goes beyond his powers
 - As stated in the certificate communicate to the counterparty
 - As stated by RRI to Hermes itself
- What if Hermes goes against his assignment?
 - And the counterparty is/should be aware of that
 - And the counterparty is not/should not be aware of that
- What if Hermes "extends" his assignment?
 - And he behaves reasonably
 - And he behaves with evident absurdity/inconsistency

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Defects of consent

- Invalid consent doctrines: A contract is invalid when one party has certain states of mind, resulting of certain circumstances
 - Mistake: a false belief which lead to the stipulation of the contract and was recognisable to counterparty
 - Violence and menace: an unjust threat which determined the stipulation of the contract and was recognisable to counterparty
 - Misrepresentation (deceit): a false belief induced by the counterparty which lead to the stipulation of the contract
- Whose are the relevant states of minds?
 - Hermes's?
 - Alexandra's?

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Has Hermes legal personality?

- Can he have his own legal rights and duties (which are distinguished from the rights and duties of his principal)?
 - Are his interest relevant for the law (directly or indirectly)?
 - His he capable of looking after himself (so that he can exercise his own rights)?
 - Has he got his own property (which is separated from the property of his owner)?
- What about the slaves? In Roman law
 - They could (if authorised) make contracts in the name of their owners;
 - They could have a certain amount of money (peculium), which the third parties could rely upon.

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Can agents have a legal personality? (I)

- We need to distinguish various meaning of legal personality:
 1. An entity is a legal person if is in capable of acquiring rights and duties
 2. An entity is a legal person if it has an independent property, which unsatisfied creditors can attack
 3. An entity is a legal person if it has the basic set of rights and duties (human rights) that each human has or should have

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Can agents have a legal personality? (II)

- Agents may be legal persons under description 1 (when the rights and duties are appropriate to their nature)
- Agents may also be persons under description 2, if appropriate institutional arrangements are provided
- Agents are NOT legal persons under description 3

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Further problems with the legal personality of agents

- Giving rights and duties to agents may lead to problems, since
 - Agents may disappear
 - They may clone themselves
 - They have no physical location (where will their creditor find them and sue them?)
 - What is their residence
 - What is their domicile
 - Etc.

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What solutions (I)

- Assign a legal location to agents and to their patrimony (e.g. in the bank were the money is located):
 - Agents have legal personality (can have their own rights and duties, which are guaranteed by their assets)
 - Agents will identify themselves by using a key which is associated with their assets
 - The user with be liable within the limits of the money he has transferred to the agent's assets (which will be made known to third parties)

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What solutions (II)

- Form a company, and have agents act for the company.
 - This would solve the issue of legal personality (no personality for agents will be needed: their actions will count as actions of the company)
 - The shareholder of the company will be liable only for their shares
 - Third parties could ask the company to make transaction in their interest (through their agents)
 - Third parties could hire agents which will then act in their name

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The responsibility for the wrongful behaviour of Hermes

- Is the owner liable since the agent's behaviour in reality the behaviour of his owner?
- Is the "owner" liable as being the custodian of a thing?
- Is the "owner" liable as being the guardian of the agent? (as if the agent was a child)
- Is the "owner" liable as being the employer of the agent (vicarious liability)? (but then Hermes must realise his own torts)
- Is the "owner" liable as being the principal (mandator) of the agent?
- Is the owner not liable (since only Hermes is only liable on his own for his behaviour)

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Now, back to e-business

- A spy-agent, Mata Hari was delivered along with the song. Mata has to:
 - Allow playing the song (acting as a start-up program)
 - check RRI compliance with the terms of the license;
 - Delete the recording after playing it
 - Bring back to Time Warning a Report.



Mata Hari

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Agents and privacy

- Is Hermes's privacy legally protected?
 - When he contains data concerning his owners?
 - Also when the data only concerns himself (his plans, preferences, or constraints)
- What if Hari violates RRI's privacy?
 - Does an agent knowledge of other people's data realise a forbidden "treatment" of personal data?
 - Who is responsible for the agent's wrongful behaviour?

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What legal constraints?

- Hari
 - must inform Alexandra that somebody is hiding in her computer
 - has to limit the scope of her inquiry to the terms of contracts at hand
 - must not gather information, even related to previous contracts or other issues (e.g., looking for "cracks", illegal reproductions, relations with other companies, etc.)

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Future issues

- Develop the various directions of research so far sketched
- Analyse the legal implication of agents' behaviour
- Suggest appropriate legal arrangements (for different business models)
- Find ways of implementing legal values in social relationships mediated by agents
- Transfer legal institutions into the cyberspace.

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