TECT Final Conference
Collegium Budapest, 15th-17th September 2010
Session 2: Dynamic Complexity of Cooperation-based self-organizing networks in the First Global Age (DyncoopNet)

Cooperation in the 16th century

The Simon Ruiz network case study: from sources to network modeling.

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Structure of the presentation

1 Problem and approach

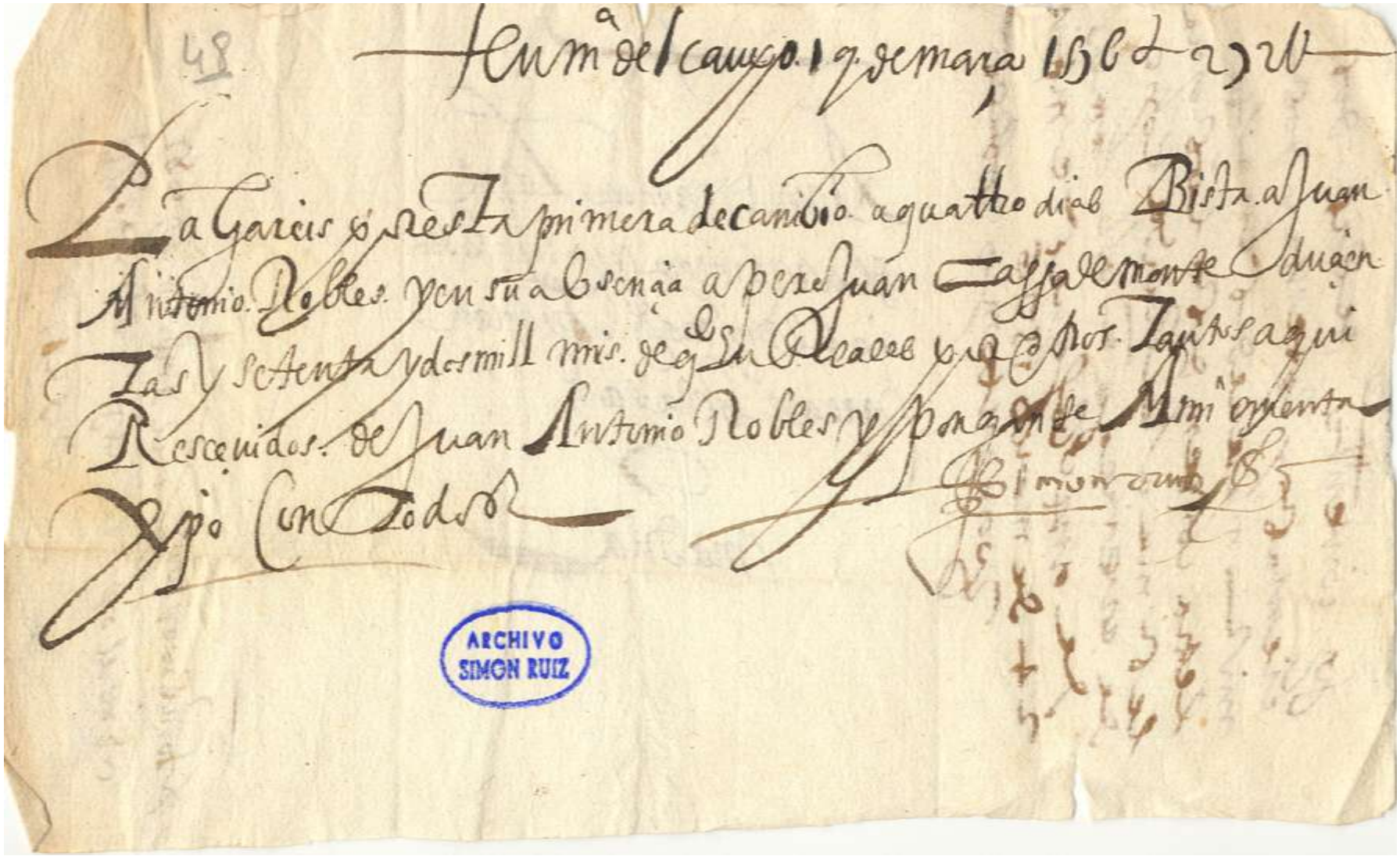
2. From historical sources to network models

3. Preliminary results.

1. The problem

- How to extract cooperation patterns from thousands of manuscripts from the 16th century?
- How to visualize and comprehend Simon Ruiz's network?

1.1 Source: bill of exchange



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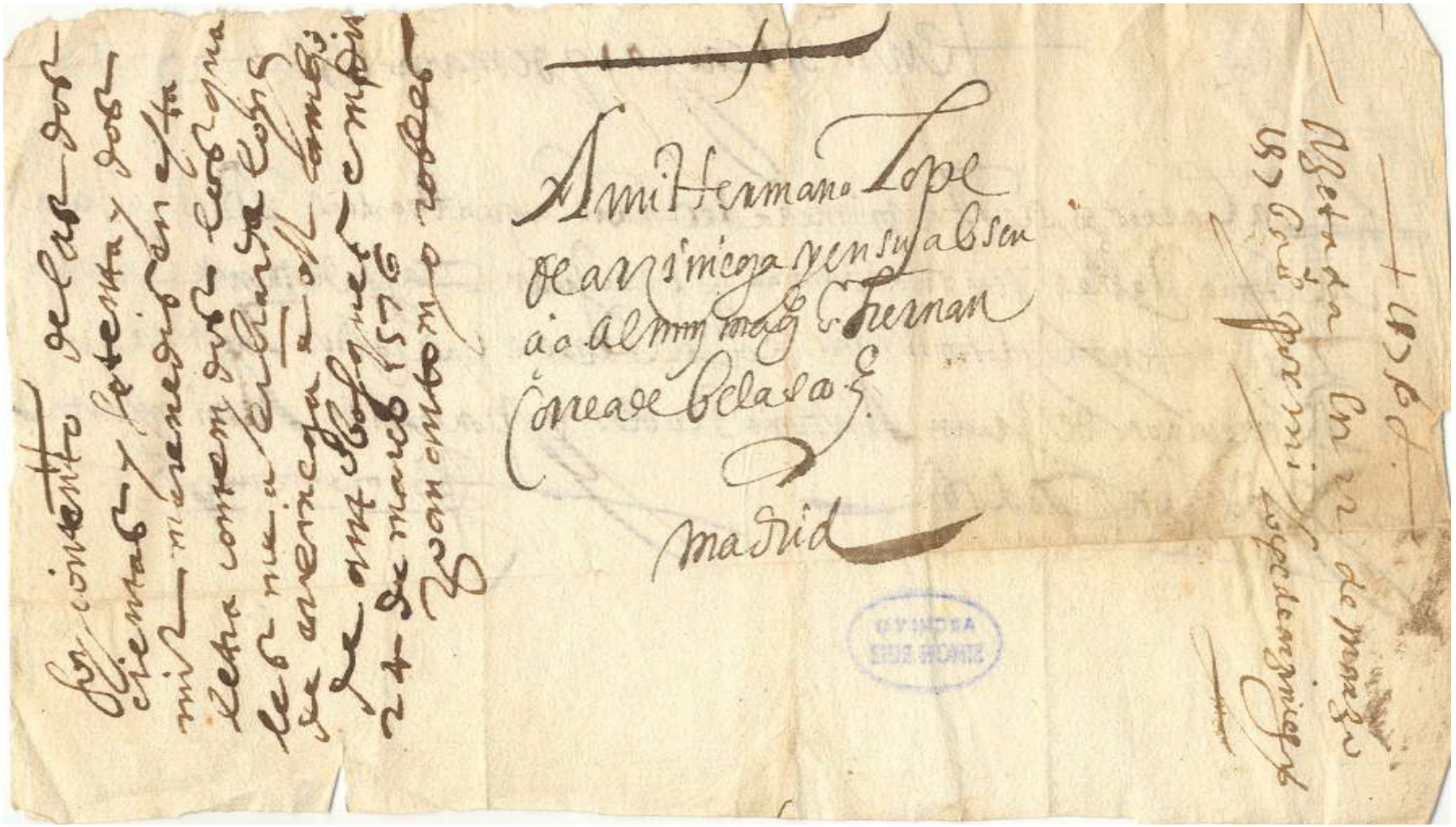
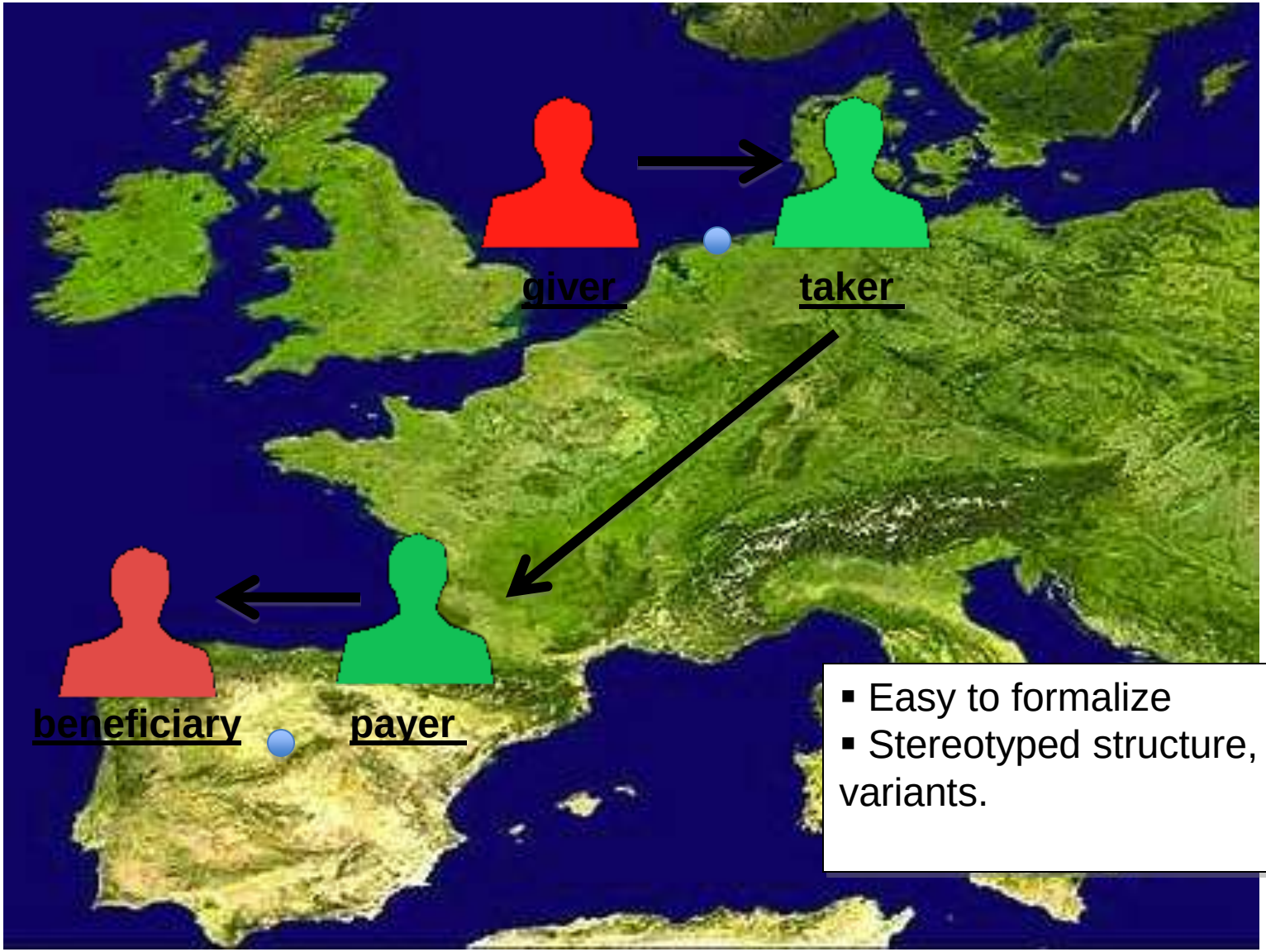
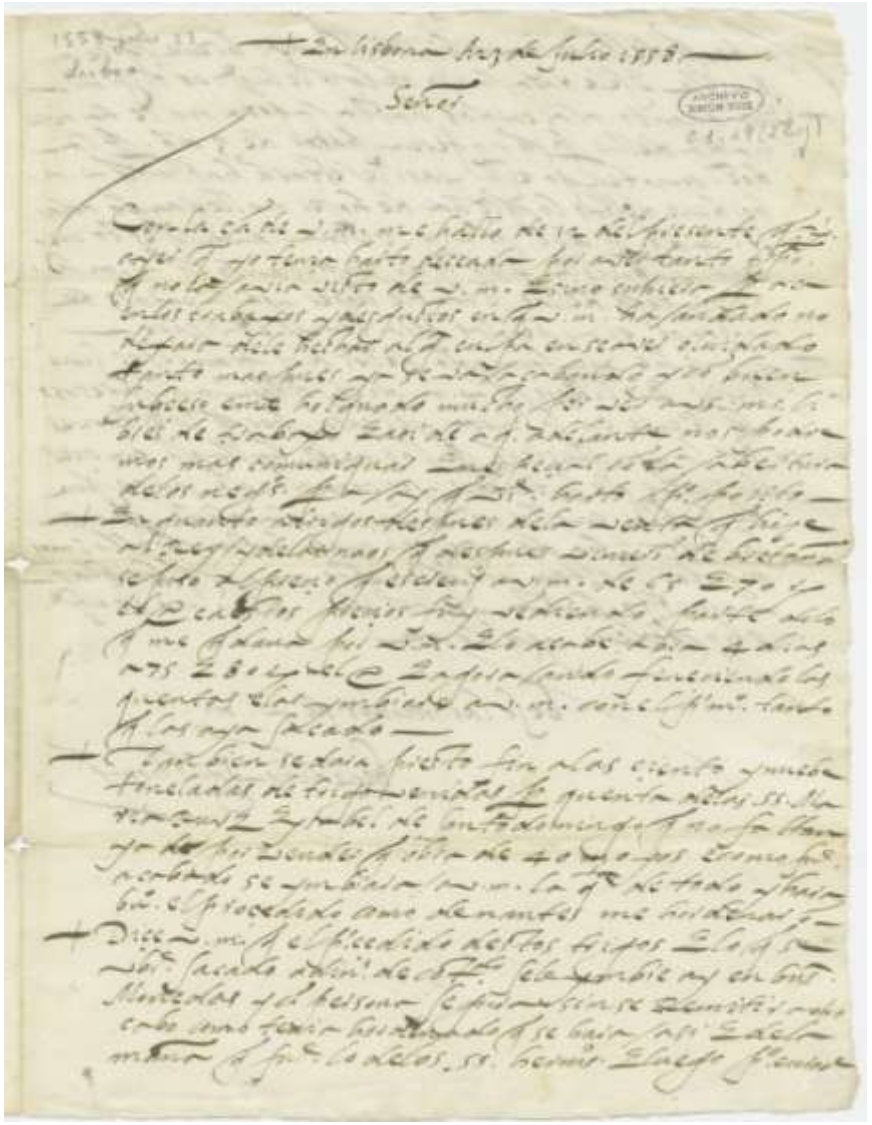


1.1 How a bill works



- Easy to formalize
- Stereotyped structure, few variants.

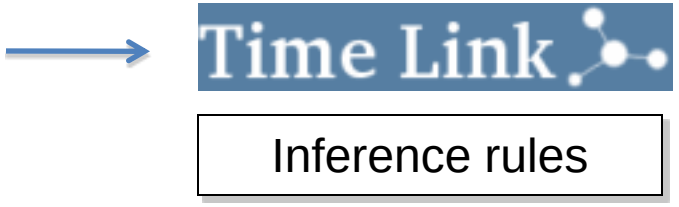
1.1 Commercial correspondence



- Two agents, at least: the **sender** and the **receiver**.
- Refers to business between them, giving context to the relation.
- Great diversity of other agents who appear with different roles.
- Great diversity of interpersonal relations mentioned.
- Difficult to formalize and register in database.

2. From sources to data models

- TimeLink: a tool for historical research with a strong emphasis on network analysis and prosopography.
- Input: annotated transcriptions of the sources
- Consolidates personal information from different sources
- Infers relations and network from agent roles in the sources.



Inferring networks

- From roles in sources TimeLink uses rules to infer relations.
- It also uses explicit registered relations, for instance from correspondence.
- From the inferred relations networks can be reconstructed.

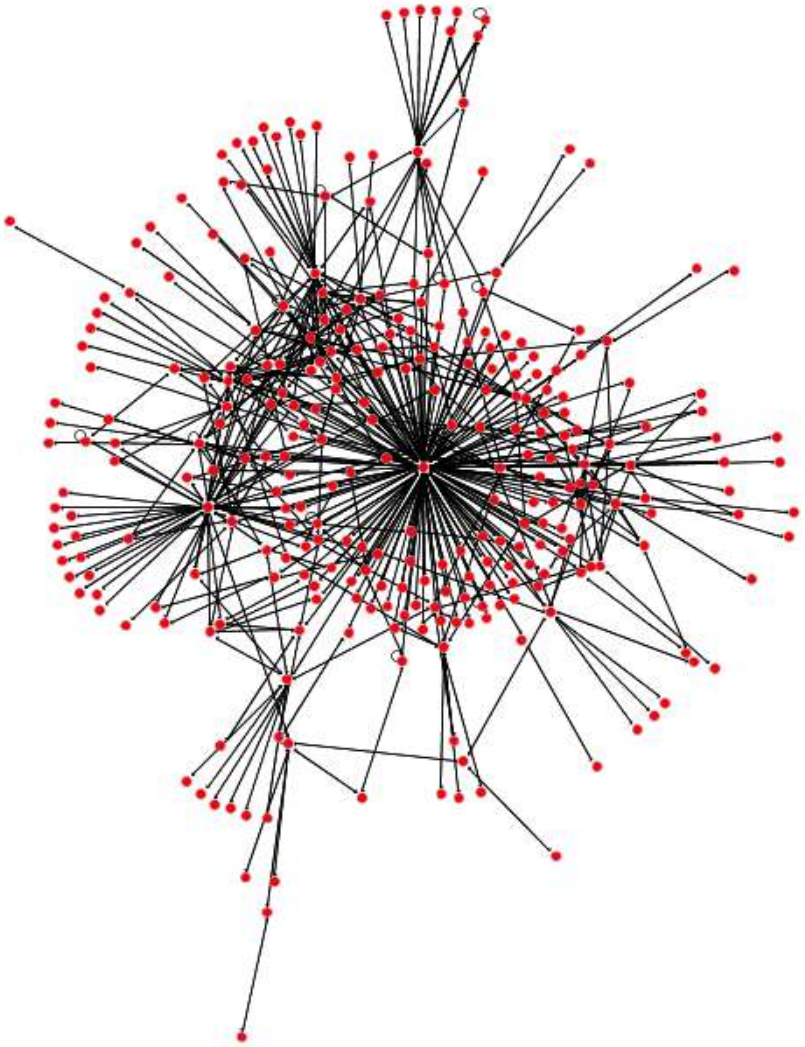
Identifying people

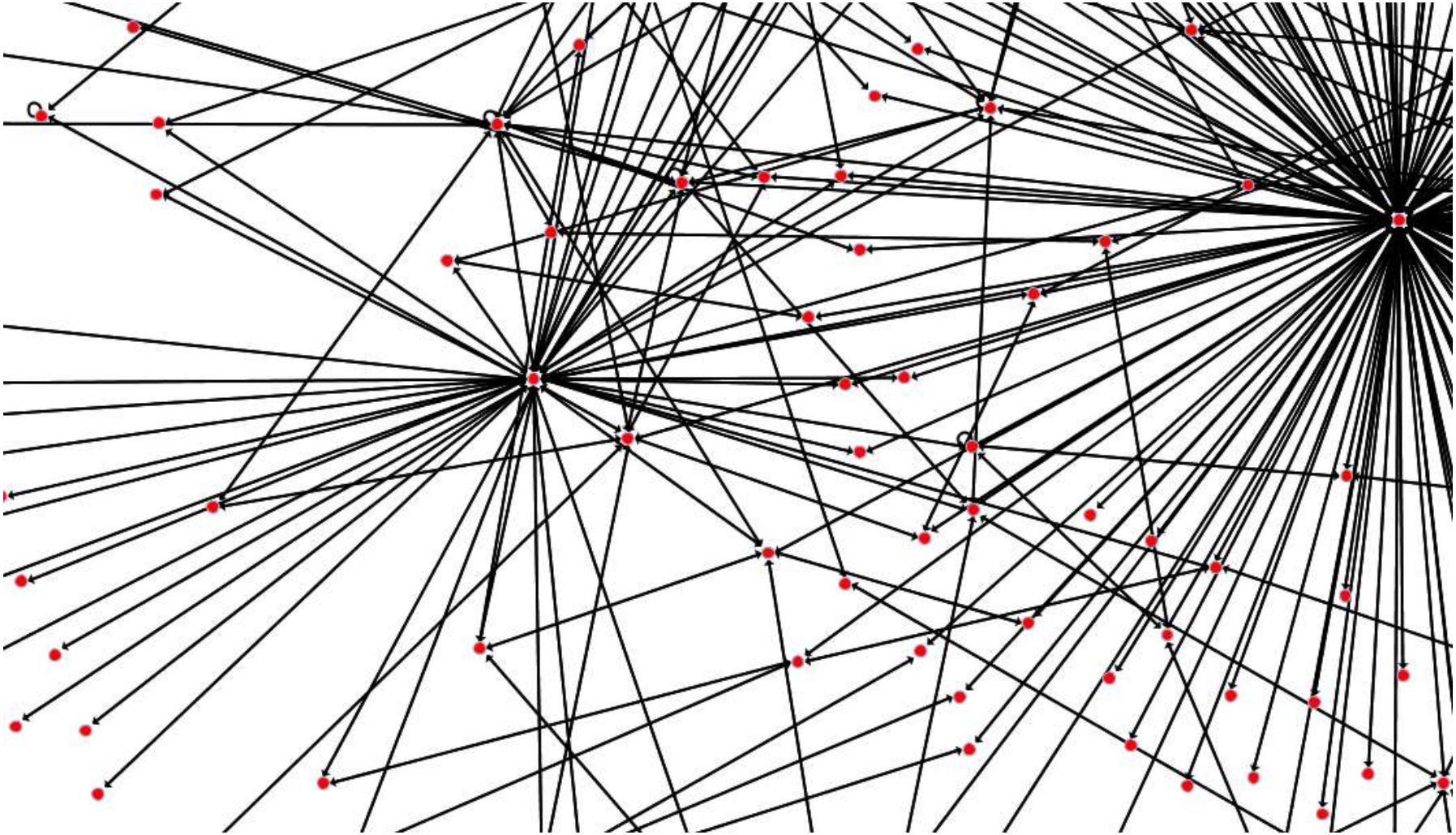
- An identification step is necessary:
  - Name variations for the same person
  - Different persons with the same name
- Difficult and slow process.
- Automation difficult because any error can impact greatly in network topology.

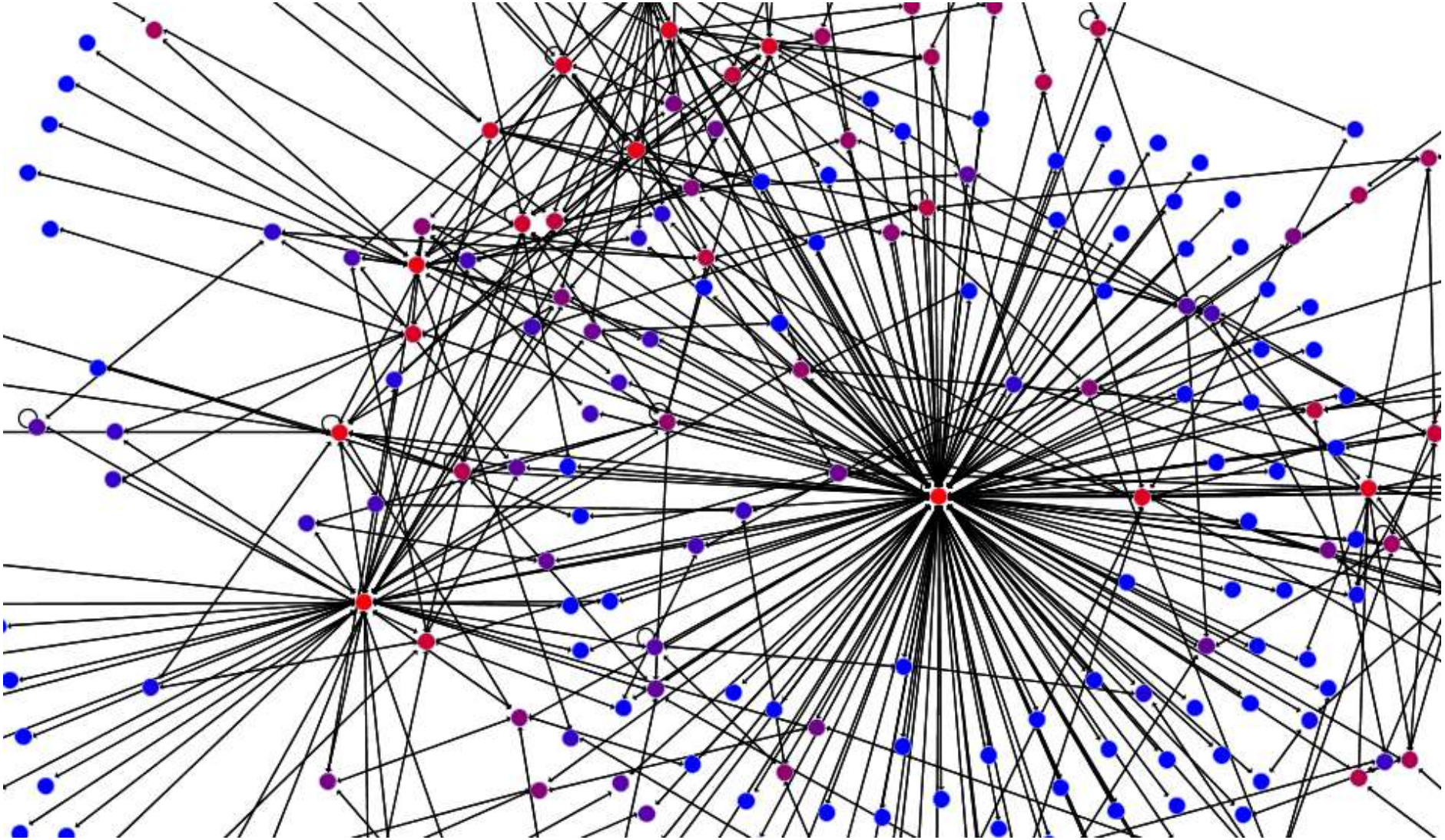
Current database status

- 5751 bills and letters
- 37245 references to persons
- 510 biographies aggregating 11386 references
- 25927 references to persons yet to be aggregated

3. Cooperation in Simon Ruiz Network – preliminary results

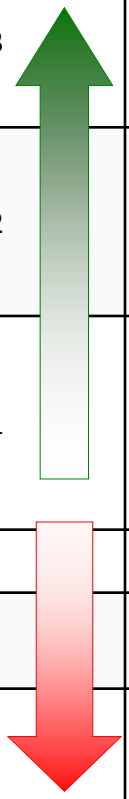




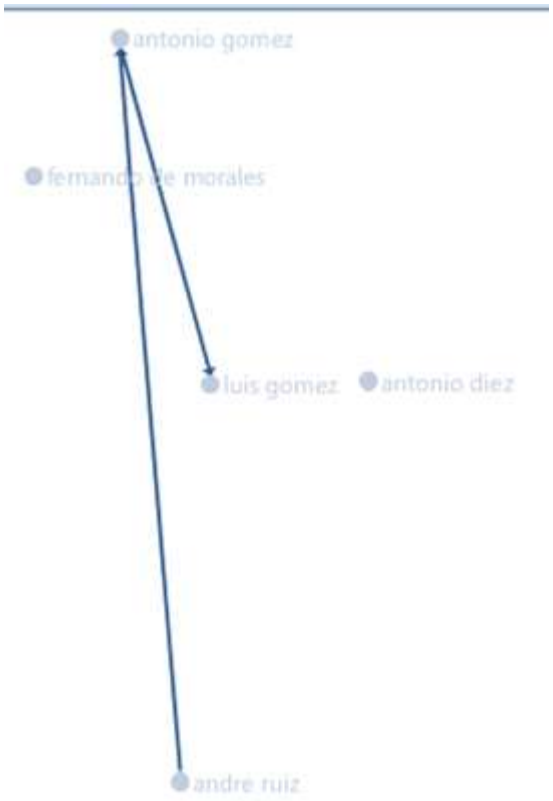


3.1.Cooperation levels (1558-1570)

+3	COLLABORATION	Expresses long date dependency relations. This intense grade of cooperation includes, e.g. the inclusion of a new agent in the network, the equal sharing of gains and losses and the division of tasks through an interconnected specialization, such as commisionners.
+2	CO-ORDINATION	Demands mutualism between two agents. It can be named as investment relationships, where the two parties exchange services. It includes mutual social help between some social circles, to introduce new agents in a business, giving technical advice, facilitating loans, etc.
+1	COMUNICATION	It is a minimum requirement to cooperation, sharing some amount of information, which will raise the predictability of business, reduce costs and open certain markets. It could also include a warning from an outsider, an advice on new sale and investment opportunities, giving a recommendation on behalf of someone.
-1	DEFECTION	One of the agents refuses to cooperate, when he is expected to.
-2	CHEATING	Deliberate non-cooperation, with gains from the benefits from others, without costs, with the inherent risk of being punished.
-3	COMPETITION	Indivíduals who exclude themselves from the network, boycotting the cooperation within the network and cut off unilateraly relations with formar comercial partners.



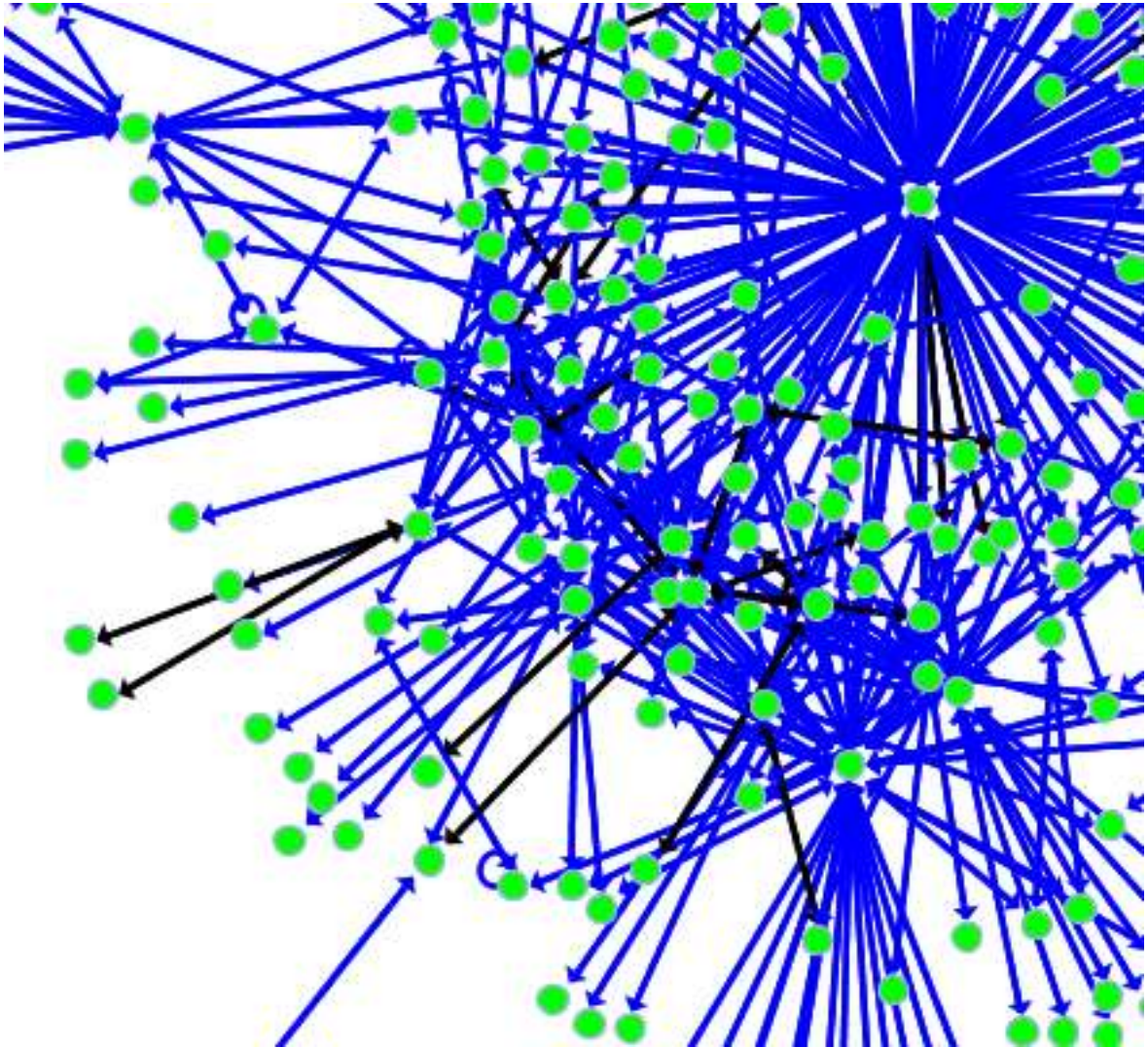
3.1 Cooperation Levels - communication



Types of warning relations:

- Favourable or against opinions for doing business;
- The arrival or delay of different trade products: wheat, spices, dying plants, medicinal products;
- Recomendation for payment of bills of exchange;
- Recomendation of new business partners;
- Avoidence of conceading credit, for untrustworthy conjuncture or person.

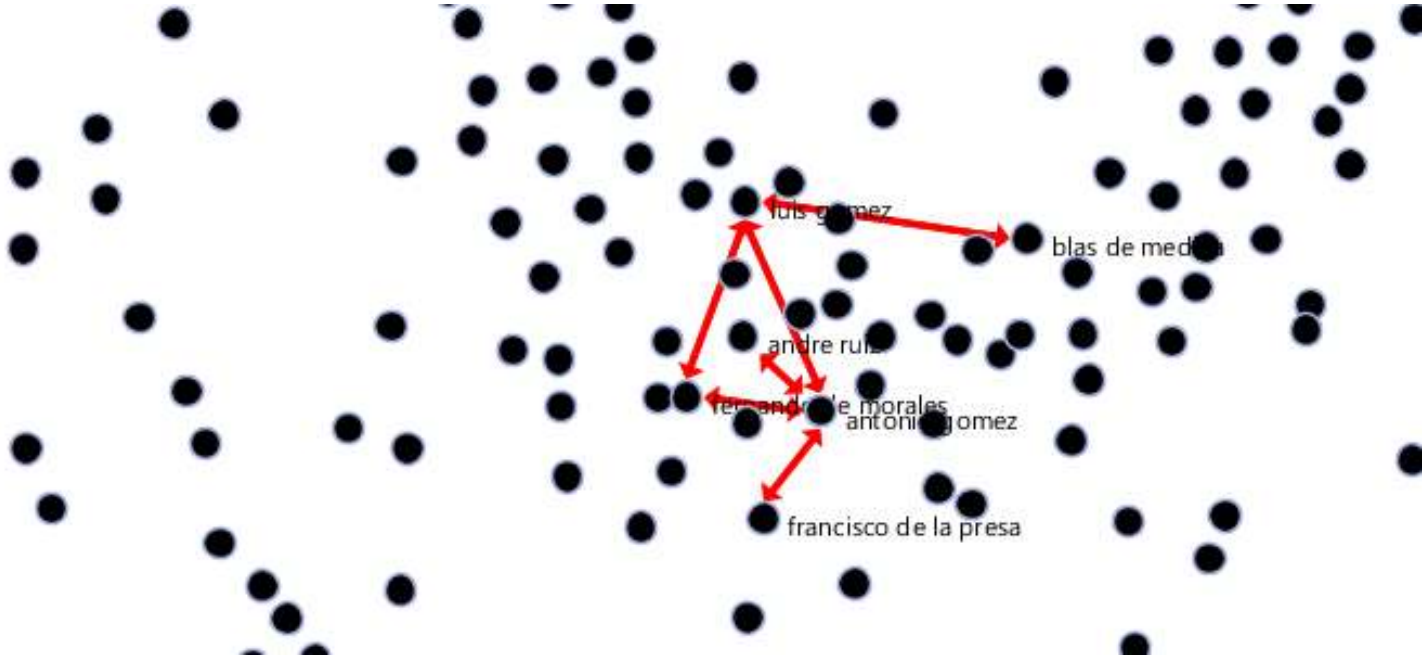
3.1 Cooperation Levels – co-ordination



Types of co-ordination relations:

- Most of them are repeated relationships;
- Relationships of mutual exchange: taker and payer.
- Importance of central hubs for gaining new contacts and extend financial contacts.

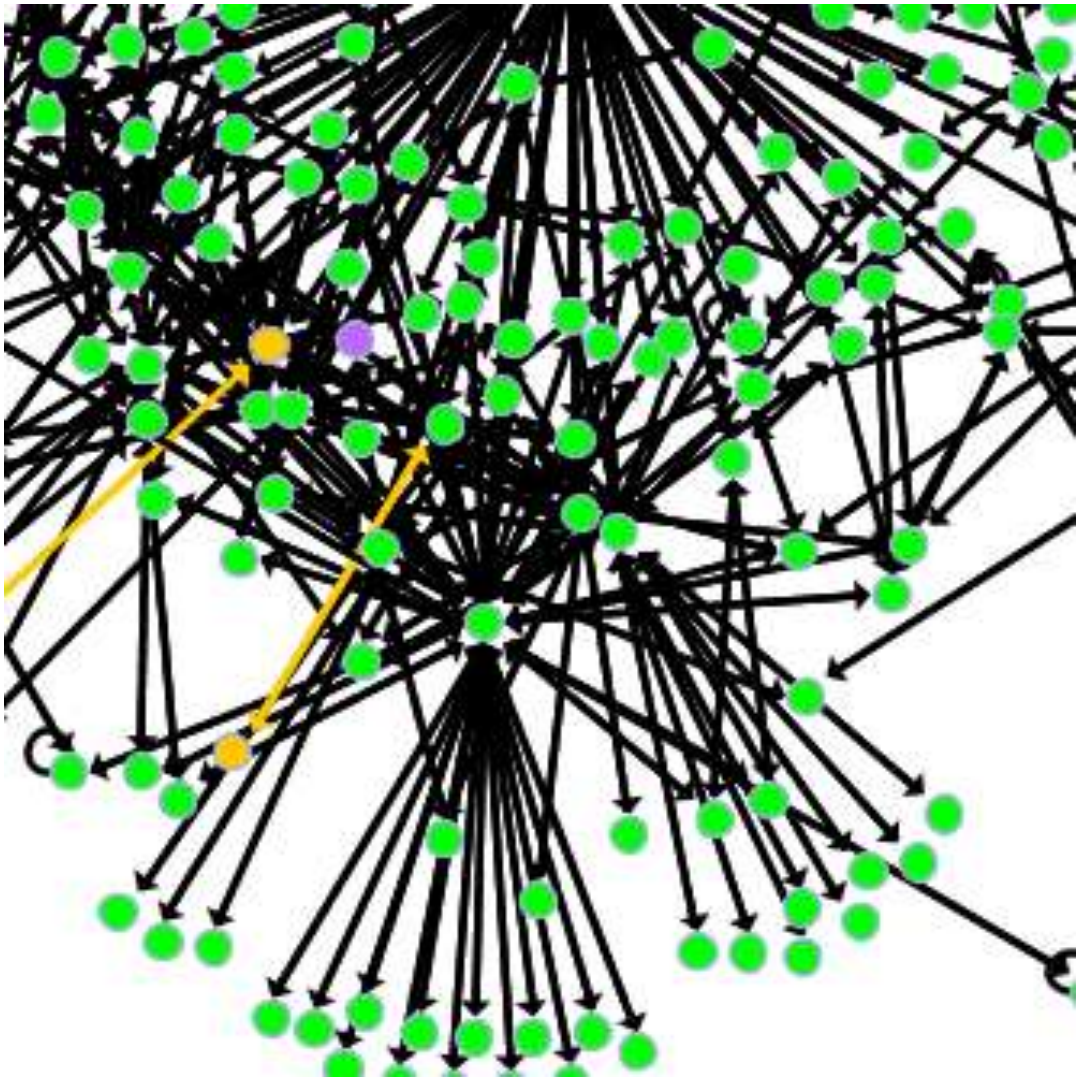
3.1 Cooperation Levels - collaboration



Types of collaboration relations:

- Helping partners – loaning money, bribing, f.e.;
- Partnerships in certain businesses – ponctual but repetitive;
- Sharing of gains and costs;
- Being in service of a certain character.

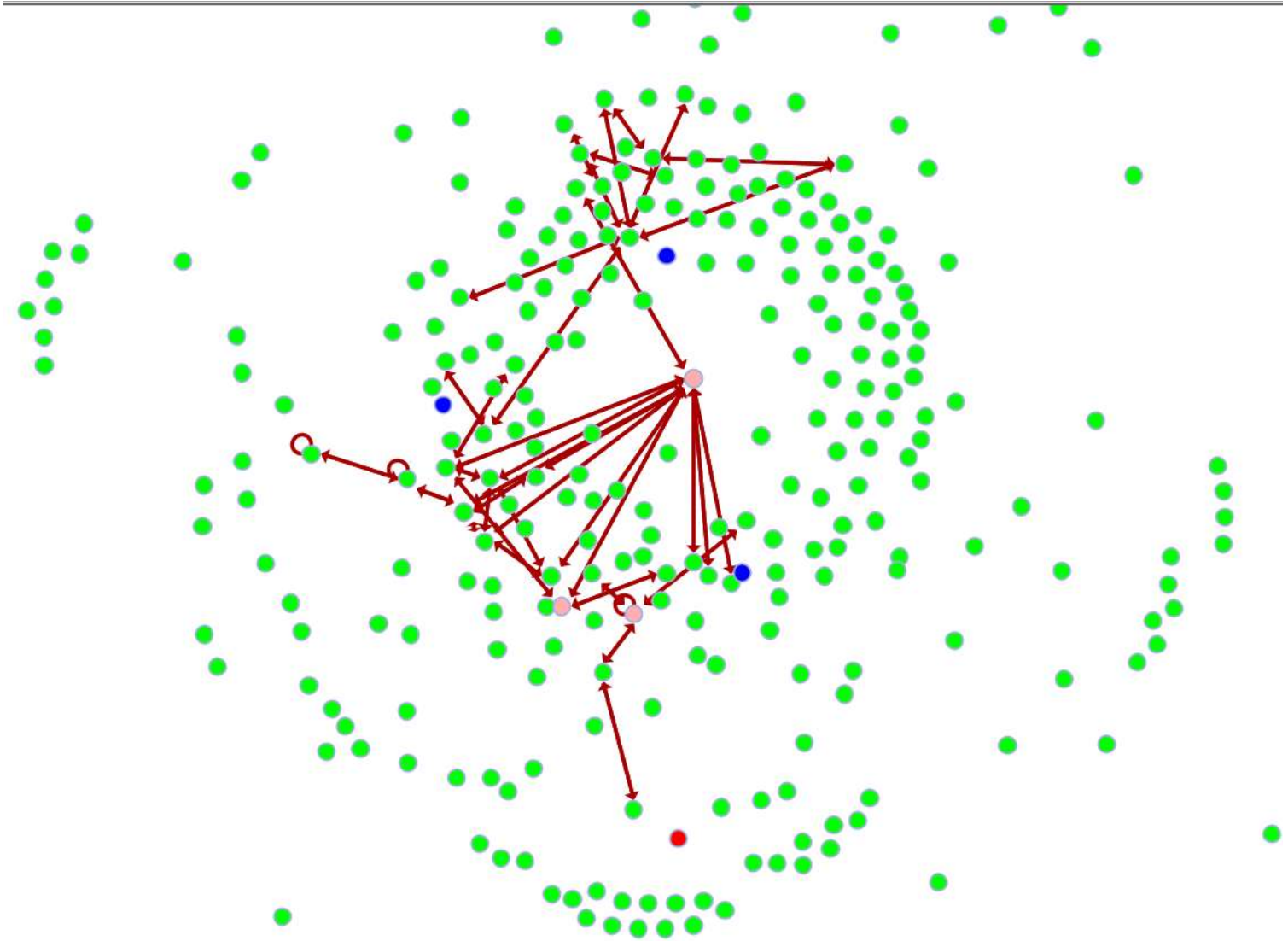
3.1 Cooperation Levels – cheaters & defectors



Defecting – don't give warning, when he should;

Cheating – saying that he has payed, when he didn't;
-- stealing expensive products for smuggling .

3.2. Trust & Cooperation

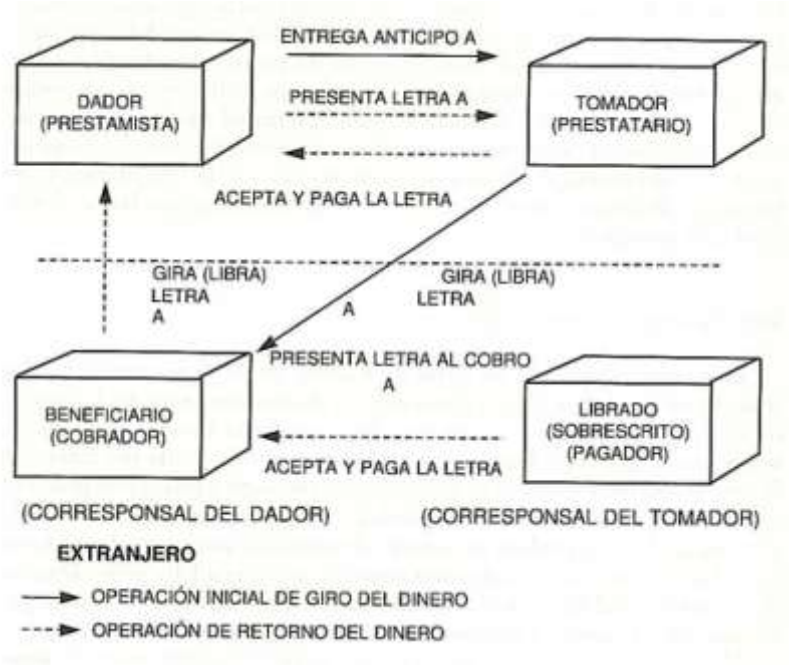


Concluding…

- It is possible to reconstruct a large cooperation network from historical sources.
- Specific cooperation behaviour can be contextualized.
- Direct reciprocity in long term interaction is the main mechanism sustaining cooperation.
- Exploratory data analysis allows relevant insights.
- Network data can support further formal analysis.

Backup slides

1.1 How a bill works



- Easy to formalize
- Stereotyped structure, few variants.

• Money circuit, which implies two previous relations.

• Four main roles for the agents:

giver (previously advances the money to the taker)

taker (writes the letter to the payer and orders to pay the value to someone)

beneficiary (receives the final payment)

payer (pays the money amount to the beneficiary).

• Often refers to other people who are in some way related to the four main roles.

```
lc$asr-01.1558.003/13/4/1558/medina del campo
   atr$via/4
   atr$data de pagamento/proxima feira de agosto
   atr$local de pagamento/bezancon
   atr$valor/3000 escudos de ouro de marco
   atr$aceitacao/aceite

   beneficiario1$andres ruiz/id=asr-01.1558.003-per1
      atr$local/nantes

   beneficiario2$antonio de bonvisi/id=asr-01.1558.003-per2

   dador$simon ruiz/id=asr-01.1558.003-per3

   tomador1$fernando de maluenda/id=asr-01.1558.003-per4

   tomador2$andres de maluenda/id=asr-01.1558.003-per5

   pagador$antonio bonvisi%"e herderos de ludovico
   bonvisi"/id=asr-01.1558.003-per6
      atr$local/bezancon
      rel$sociabilidade/herdeiro/ludovico bonvisi/lbonvisi-1558001

      referido$ludovico bonvisi/id=asr-01.1558.003-per6-per7
```

```
carta$gs-114/3/11/1575/lisboa
/resumo=letras de cambio protestadas.pimenta expedida.pagamentos a serem
feitos em bordeus.panos enviados a segovia/refere=carta de domingo passado

receptor$simon ruiz
   rel$aviso/aviso sobre pagamentos em bordeus/andre ruiz/aruiz-1575114

emissor$antonio gomes/id=agomes-1575114
      rel$colaboracao/pede ajuda a/simao ruiz/sruiz-1575113

evento$letra de cambio protestada
   informador$hernan correa de velasco/id=hcvelasco-1575114/obs=enviou carta
   a 23-10-1575
      atr$local/madrid
   defector$juan sauri/obs=nao quer pagar a letra
   defector$pau sauri/obs=nao quer pagar a letra
   beneficiario$manuel gomes/id=mgomes-1575114
      rel$familiar/filho de/antonio gomes/agomes-1575114
   referido$fernam lopes covillana/obs=refere-se o sobrinho deste que
   enviaria a procuracao

evento$letra de cambio protestada de 2000 e tantos ducados
   beneficiario$antonio fernandes de elvas/id=afelvas-1575114
      rel$familiar/sogro de/manuel gomes/mgomes-1575114
   defector$herdeiros de beltran de licana
   intermediario$geronimo peres e herdeiros/obs=intermedeiam a resolucao do
   problema
   beneficiario$jorge fernandes e irmaos
      rel$familiar/filho de/antonio fernandes de elvas/afelvas-1575114
```

```
if [kleio(K),fonte(F),lc(L),tomador(R)] and
   [kleio(K),fonte(F),lc(L),'tomador-representante'(P)]
then
   relation(confianca,procurador,P,R).

if [kleio(K),fonte(F),lc(L),tomador1(R)] and
   [kleio(K),fonte(F),lc(L),'tomador1-representante'(P)]
then
   relation(confianca,procurador,P,R).

if [kleio(K),fonte(F),lc(L),tomador2(R)] and
   [kleio(K),fonte(F),lc(L),'tomador2-representante'(P)]
then
   relation(confianca,procurador,P,R).

if [kleio(K),fonte(F),lc(L),tomador3(R)] and
   [kleio(K),fonte(F),lc(L),'tomador3-representante'(P)]
then
   relation(confianca,procurador,P,R).
```