Integrating DROOLS and R software for intelligent map system

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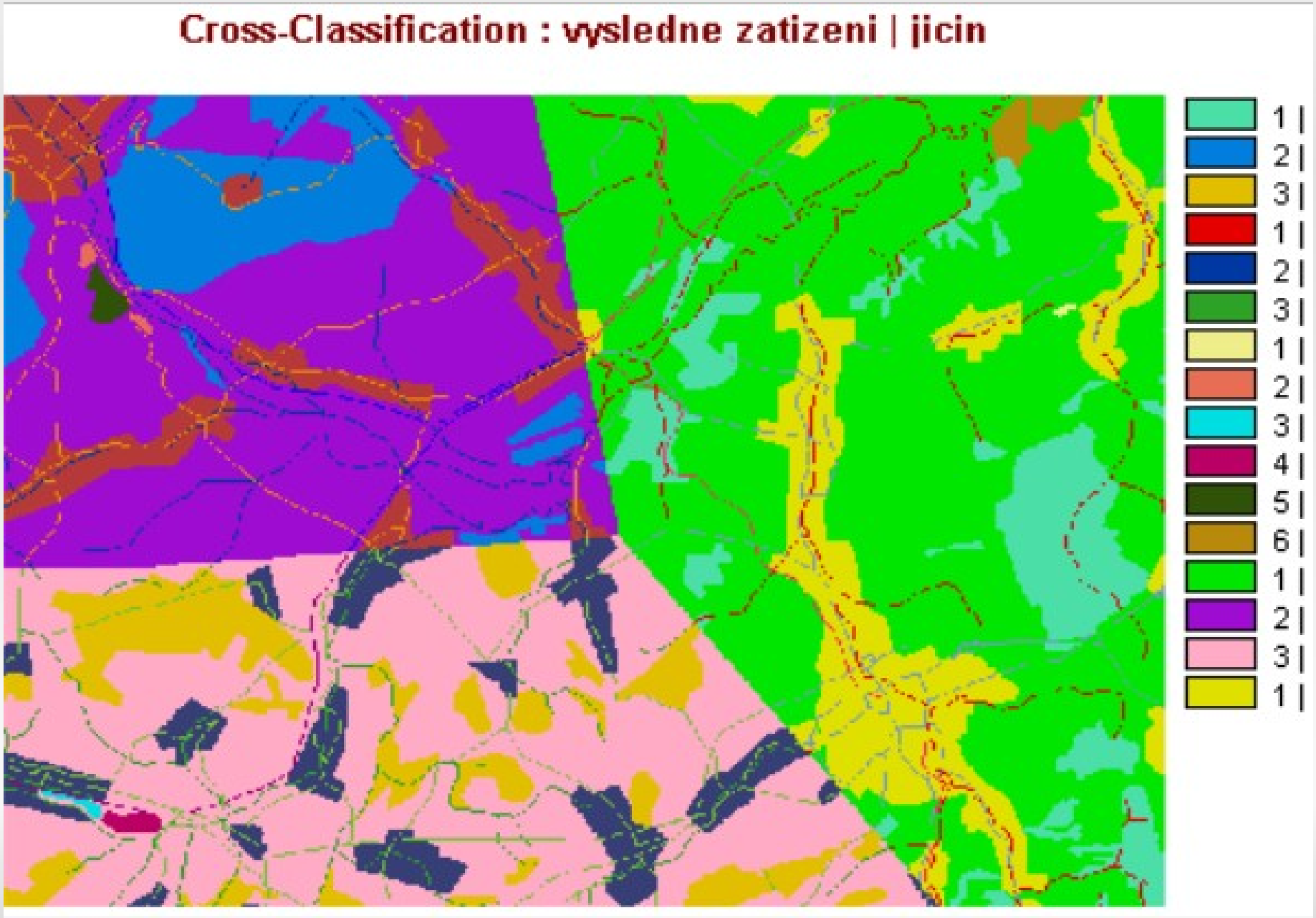
Aim of the system

- Help with map creation for non cartographers
- Two ways
  - Answer a question in a process of a map sheet creation
  - Check a created map sheet for mistakes

Aim of the system



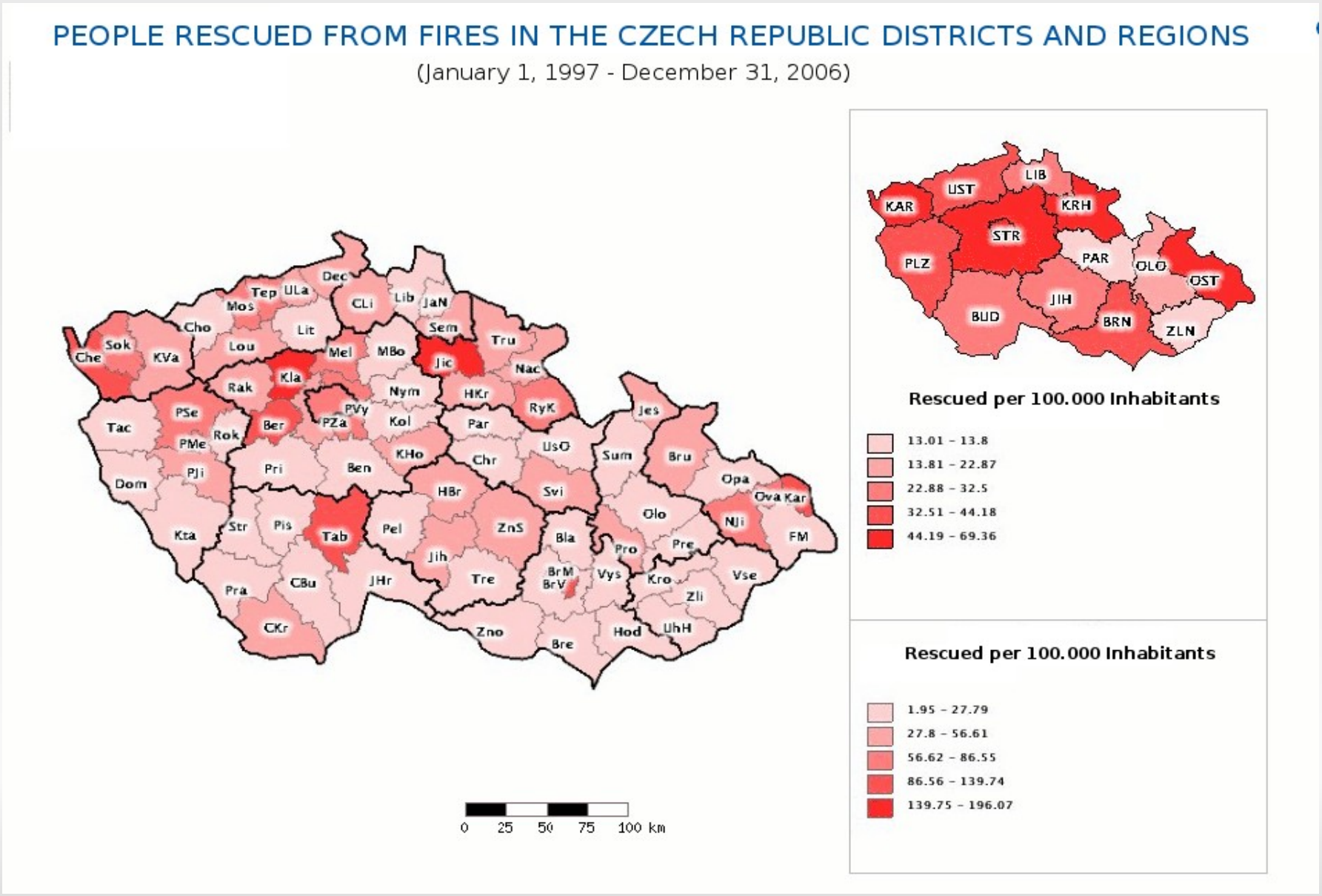
Pilot project focus

- Choropleth maps
- Cartograms
- Tested on Atlas of Fire Protection in the Czech Republic (Ministry of Interior)

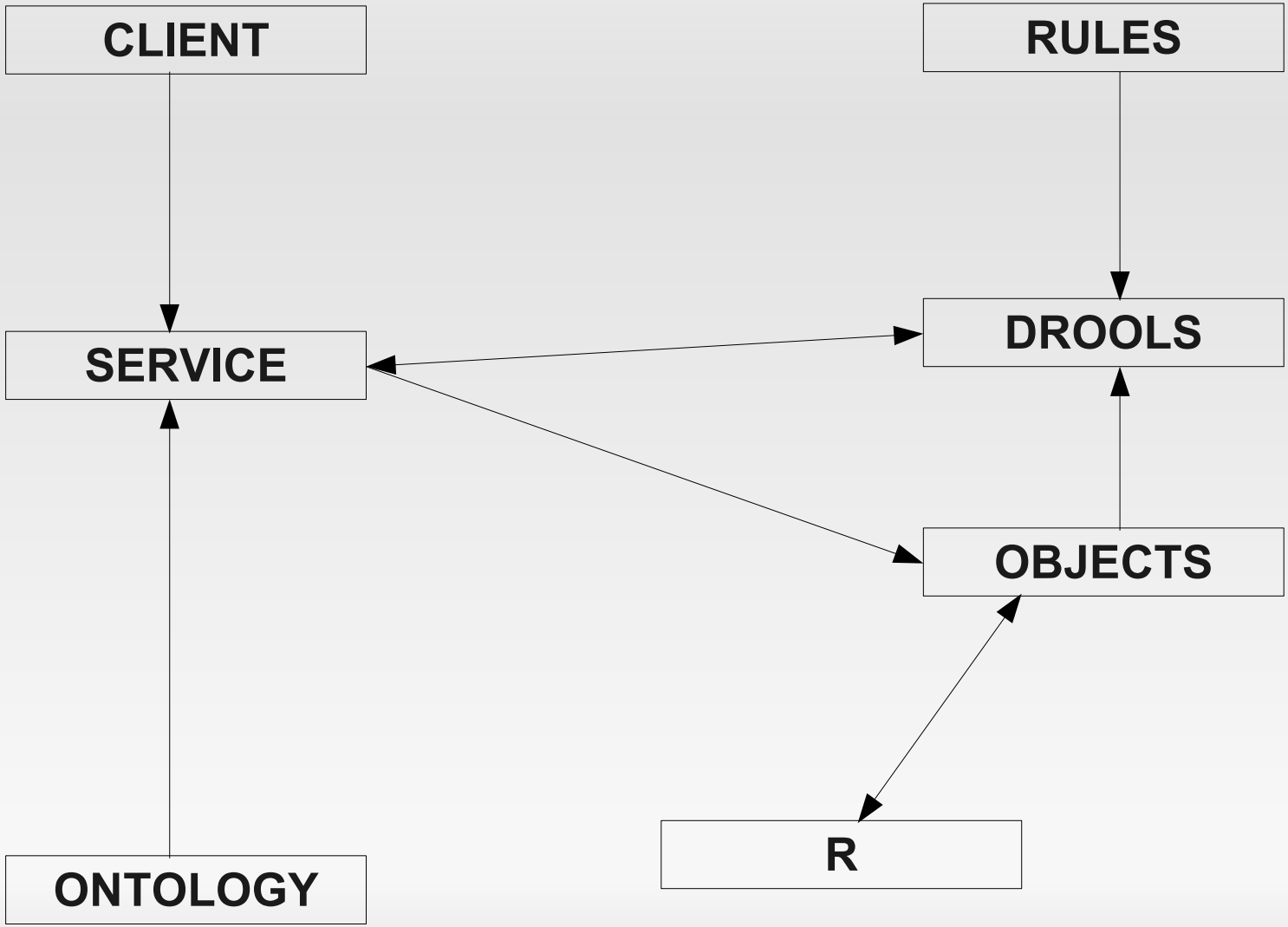
Pilot project focus

- year from/to of events,
- type of events (e.g. fire where were injured fireman),
- **statistical method for generating class intervals (Jenks, Equal interval, etc.),**
- number of classes,
- type of frequency (square km, population)
- start colour, end colour for classes visualization

Pilot project focus



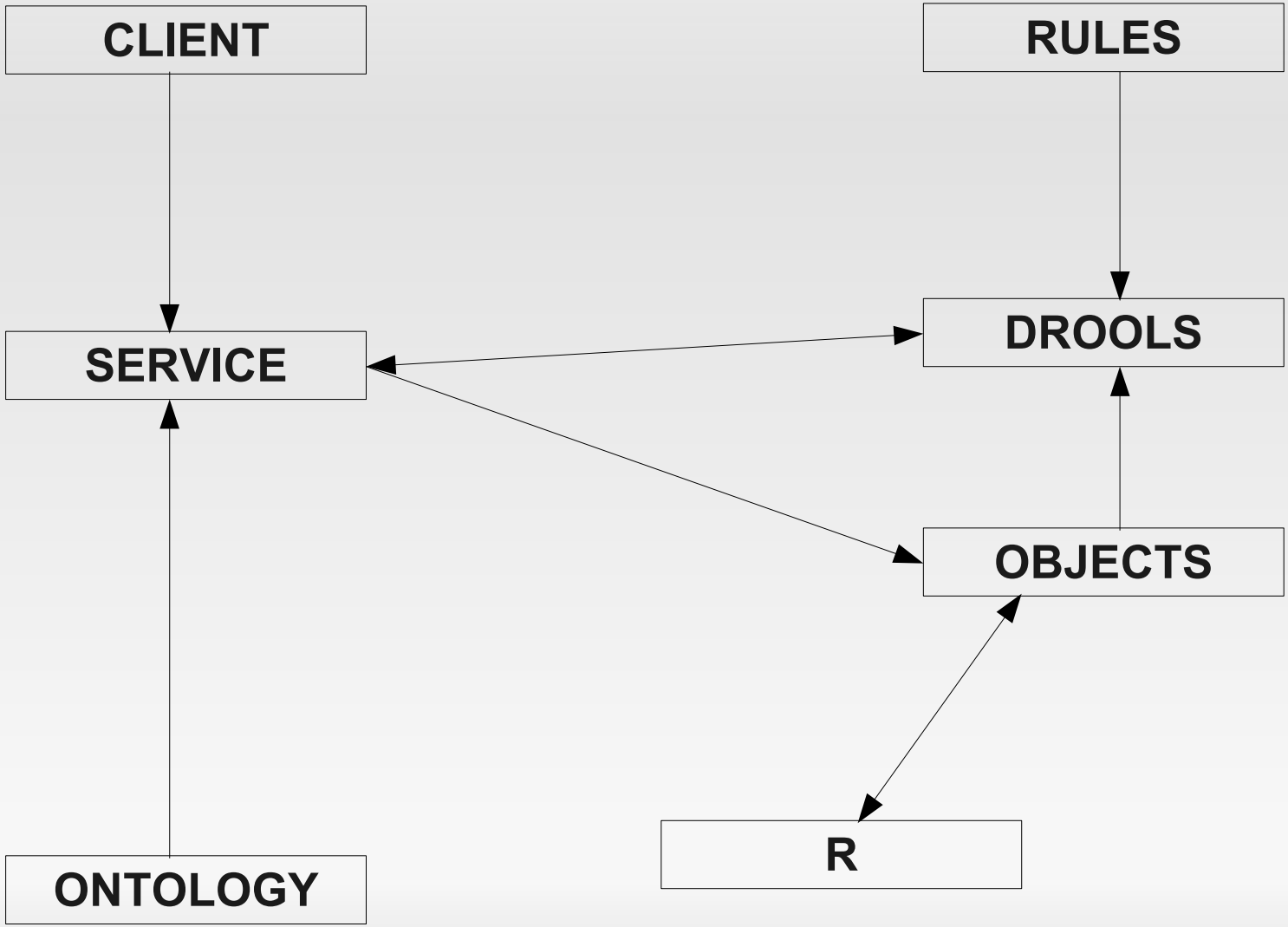
Schema of the system



Client

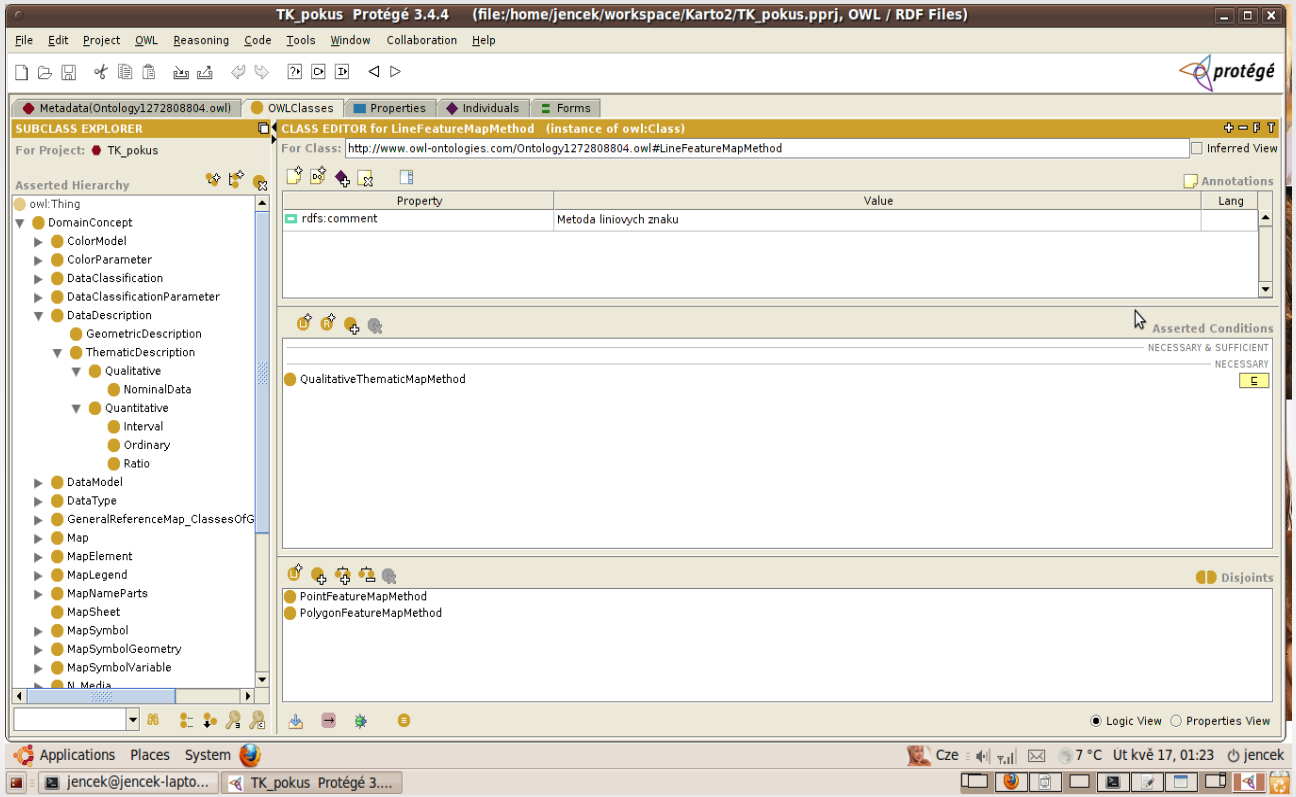
- Any SOAP/REST capable
- Pilot - Atlas
- Decision which method of classification to use
- Sends data for classification to SERVICE

Schema of the system



Ontology

- OWL
- Protége OWL-API (limits - ontology is simple)



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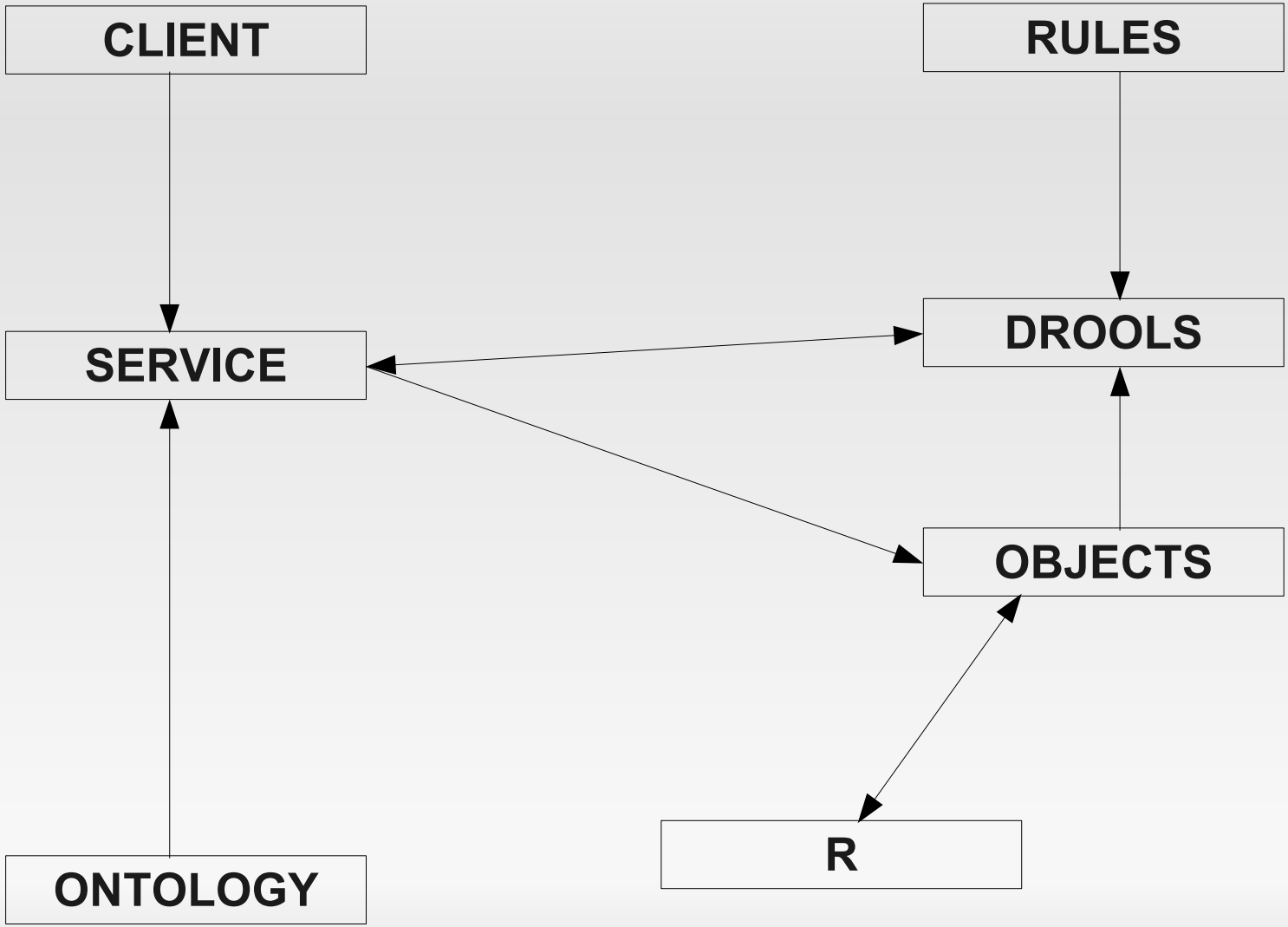


Class StatisticalValuesGeo

- Uses R via rJava (JRI - http://rosuda.org/rJava/)
- rJava - Java native interface to R
- Run tests of data distribution
  - Normal distribution
  - Uniform distribution

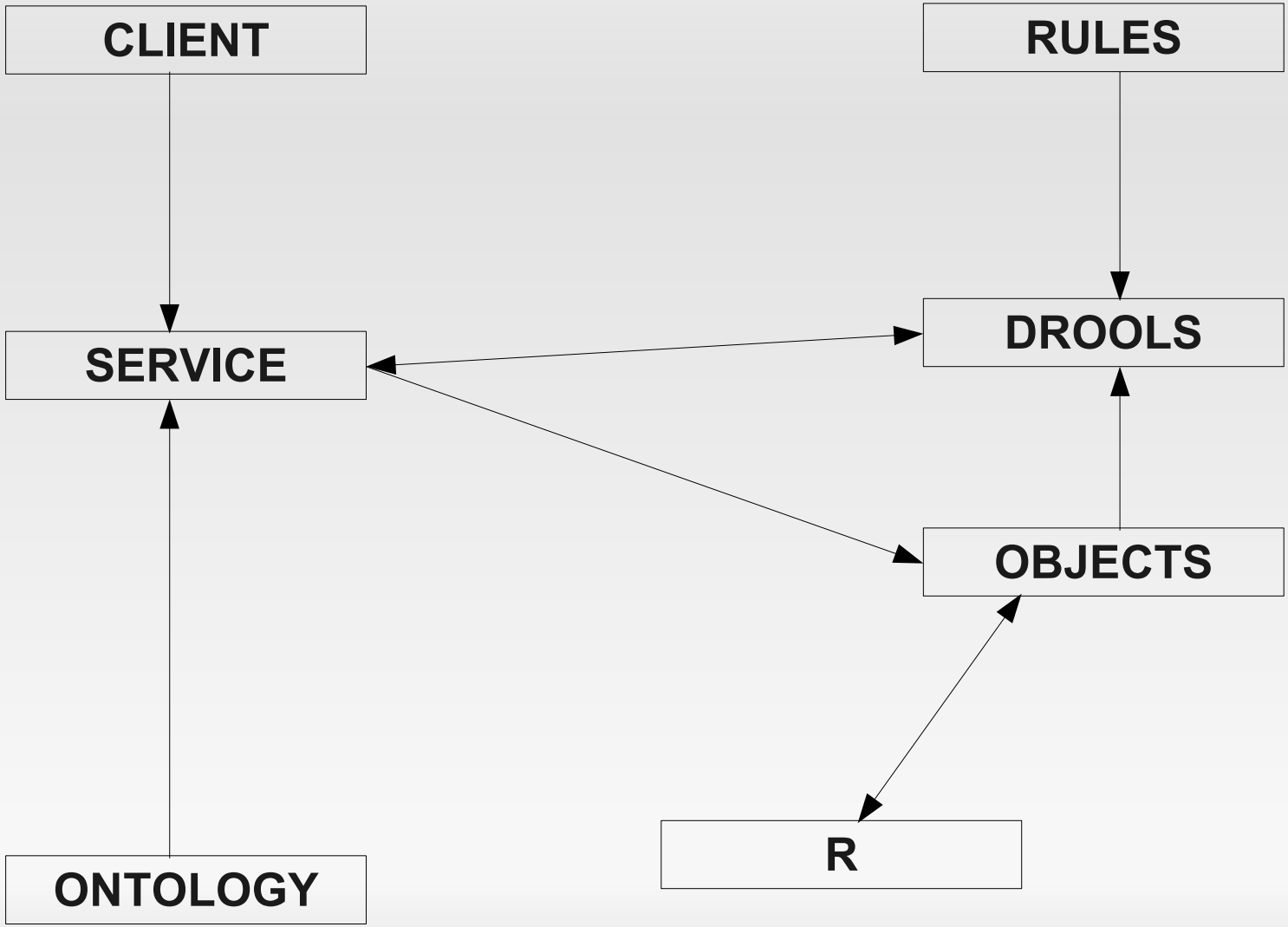
Normal distribution

- Shapiro test (shapiro.test)
- W > 0.95
- pvalue > 0.05

Uniform distribution

- Kolmogorov - Smirnov test (ks.test)
- Comparison with uniform distribution (y=c(min(p):max(p))) - limits to integer values
- D < 0.1
- pvalue > 0.05

Schema of the system



DROOLS

- Rule based expert system
- Rules in DRL language

```
rule "UniformDistribution"
 when
   StatisticalValuesGeo ( distribution == "Uniform" )
  then
   InfoContainer.method = "Quantile";
end
```

Problems

- Integration to JBOSS
  - R engine instance does not end in the correct way
  - Workaround - solution based on stateless CGI interface called from JBOSS engine
  - Possible solution - not tested yet - experimental package RWebServices
- Where to implement call of R
  - To each class from ontology, that needs it
  - To separate class (like some factory) for all classes

Problems

- Server with old version of R
  - Does not support function assign (need to convert array to vector)
  - Need to run with --vanilla parameter

Conclusion

- The integration is possible, but at the moment not with a good performance
- It allows in the future use another functions from R
- R engine can be replaced with another tool (the solution is not directly dependent on the R engine)

Thank you for your attention

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