

**Agent-Oriented Software Engineering TFG
AL3 Rome Event (30 June - 2 July 2004)**

Methods Integration Approaches

Alfredo Garro

Dipartimento di Elettronica, Informatica e Sistemistica (DEIS)
Università della Calabria, ITALY

garro@deis.unical.it

Outline

- ① The FIPA Methodology Technical Committee:
main goals and activities
- ② Methods Integration Approaches

The FIPA Methodology Technical Committee: aim and referring paradigm

- The FIPA Methodology Technical Committee (TC) has been constituted with the aim of identifying a design methodology for Multi Agent Systems (MAS) that could fit the greatest number of needs
- Existing development methodologies have different advantages when applied to specific problems.
 - ◆ It is therefore possible to think that the developer of a MAS would like to use phases or models or elements coming from different methodologies in order to build up a personalized approach for his own problem.

The FIPA Methodology Technical Committee: aim and referring paradigm

- In order to reuse contributions coming from existing methodologies the TC adopts the method engineering as the referring paradigm
 - ◆ In this context the development methodology is constructed by the developer assembling pieces of the process (method fragments) from a repository of methods (method base)
 - ◆ The method base can be built up by taking pieces coming from existing methodologies (ADELFE, Gaia, MESSAGE, PASSI, Tropos, etc.) or ad hoc defined.

The FIPA Methodology Technical Committee: main (ambitious) goals and activities

■ **Formal definition and representation of the *method fragments***

It is necessary to formally represent method fragments in order to facilitate their integration and store them in the ***method base***;

■ **Identification of the *method base* architecture.**

The method base needs of a technological infrastructure for the instantiation of the method meta-model previously defined;

■ **Collection of *method fragments*.**

They can origin from the most diffused methodologies and other specific contributions. After the formalization they can be introduced in the *method base*;

The FIPA Methodology Technical Committee: main goals and activities

■ Description of techniques for methods integration.

It is necessary to define guidelines for methods integration in order to both construct the methodology (retrieving the method fragments from the method base and integrating them) and apply it in the real design work.



Enabling the use of:

- **CAME (Computer Aided Method Engineering)** tools that offer specific support for the composition of a methodology from existing fragments;
- **CASE (Computer Aided Software Engineering)** tools that assist the designer in performing the development process based on the composed methodology.

The FIPA Methodology Technical Committee: what we have done up till now

- **Formal definition and representation of the *method fragments***
 - ◆ Defined a [method fragment metamodel](#) and an [XML based method fragment representation](#);
- **Identification of the *method base architecture*:**
 - ◆ Proposed a method base architecture based on XML;
- **Collection of *method fragments*:**
 - ◆ Represented some Methodology (in particular [ADELFE](#), [GAIA](#) and [PASSI](#)) using the OMG SPEM (Software Process Engineering Metamodel) notation;
 - ◆ Extracted some method fragments from the represented Methodology according to the defined method fragment metamodel ([ADELFE fragments](#), [GAIA Fragments](#), [PASSI fragments](#));

The FIPA Methodology Technical Committee: what we have done up till now

■ **Description of techniques for methods integration:**

- ◆ Started to discuss some approaches and guidelines for methods integration...

... what we are going to do in the second part of my talk

Methods Integration Approaches

Two approaches to obtain methods integration:

- (i) guided by a Multi Agent System (meta) model;**
- (ii) guided by a development process.**

Method Fragment Definition

Methods Integration guided by a Multi Agent System (meta) model

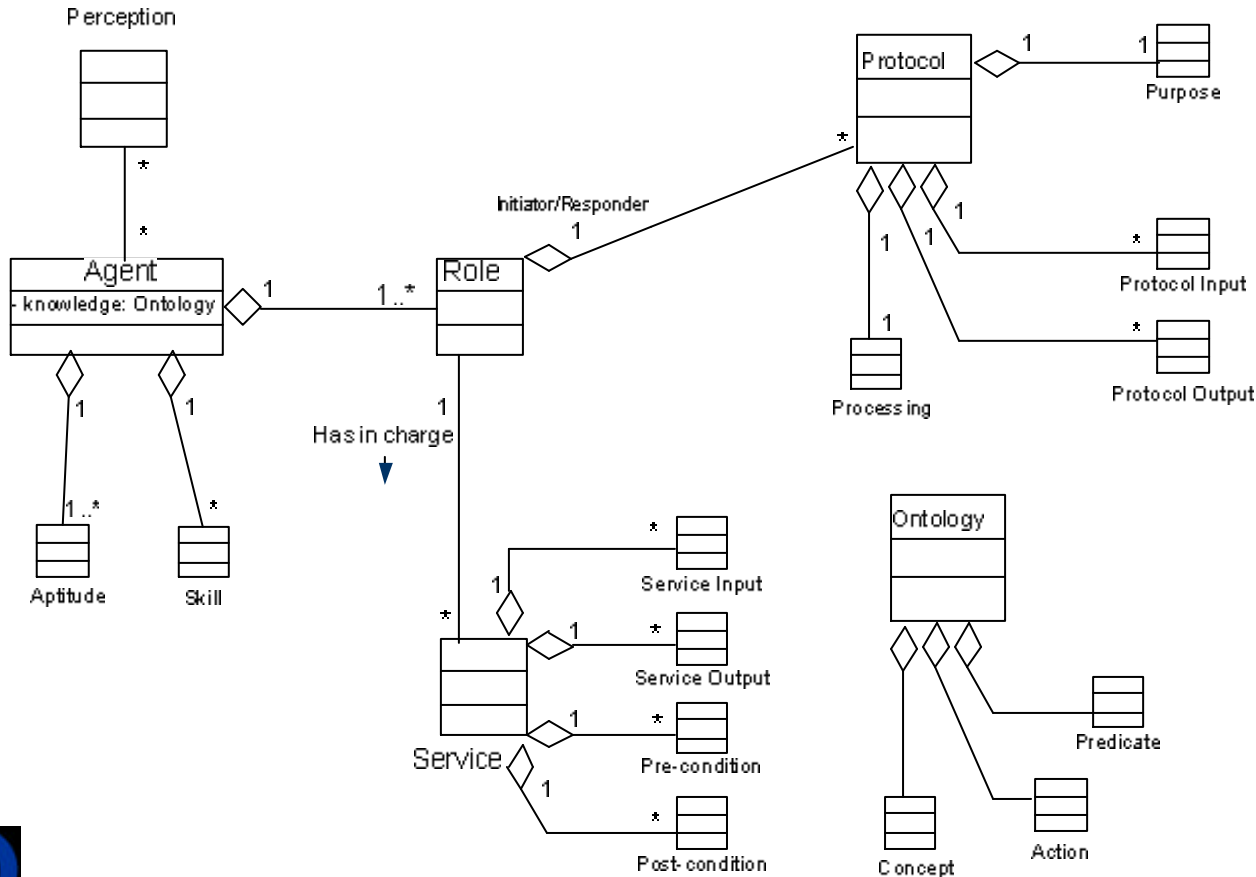
While building his own methodology, the designer must:

- identify the elements that compose the meta-model of the MAS he will build;
- choose the method fragments that are able to produce the identified meta model elements.

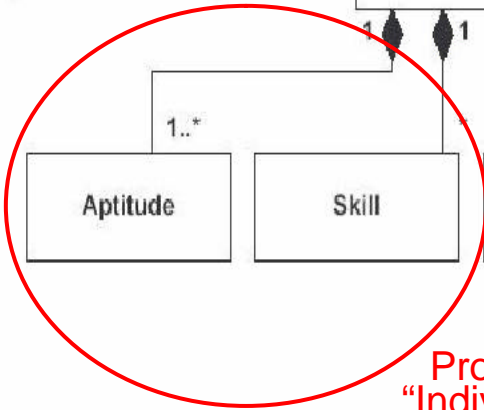
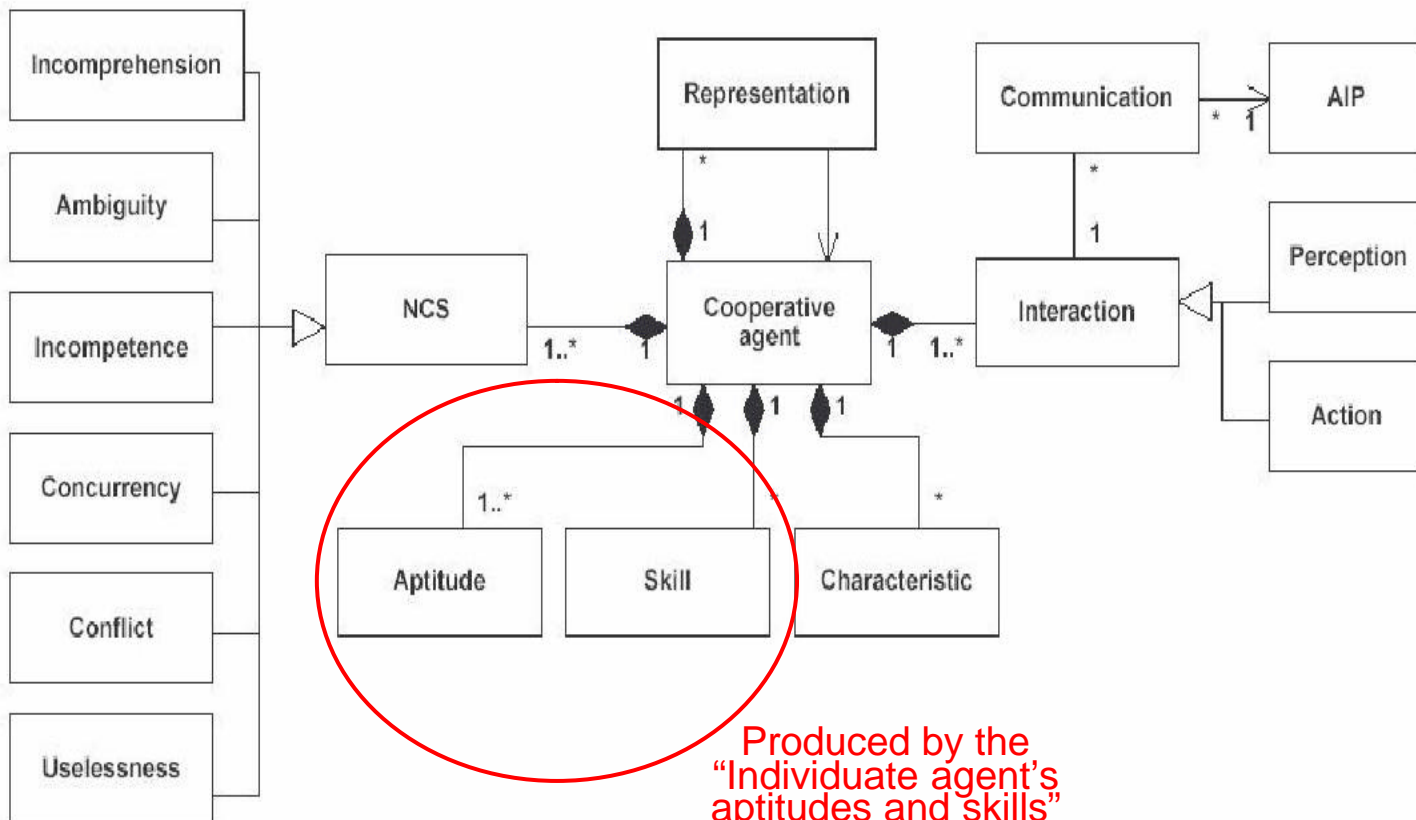
Hence, the designer obtains a specific methodology that is able to completely “cover” the MAS meta-model he will exploit in his specific application domain or problem.

Methods Integration guided by a Multi Agent System (meta) model: an example

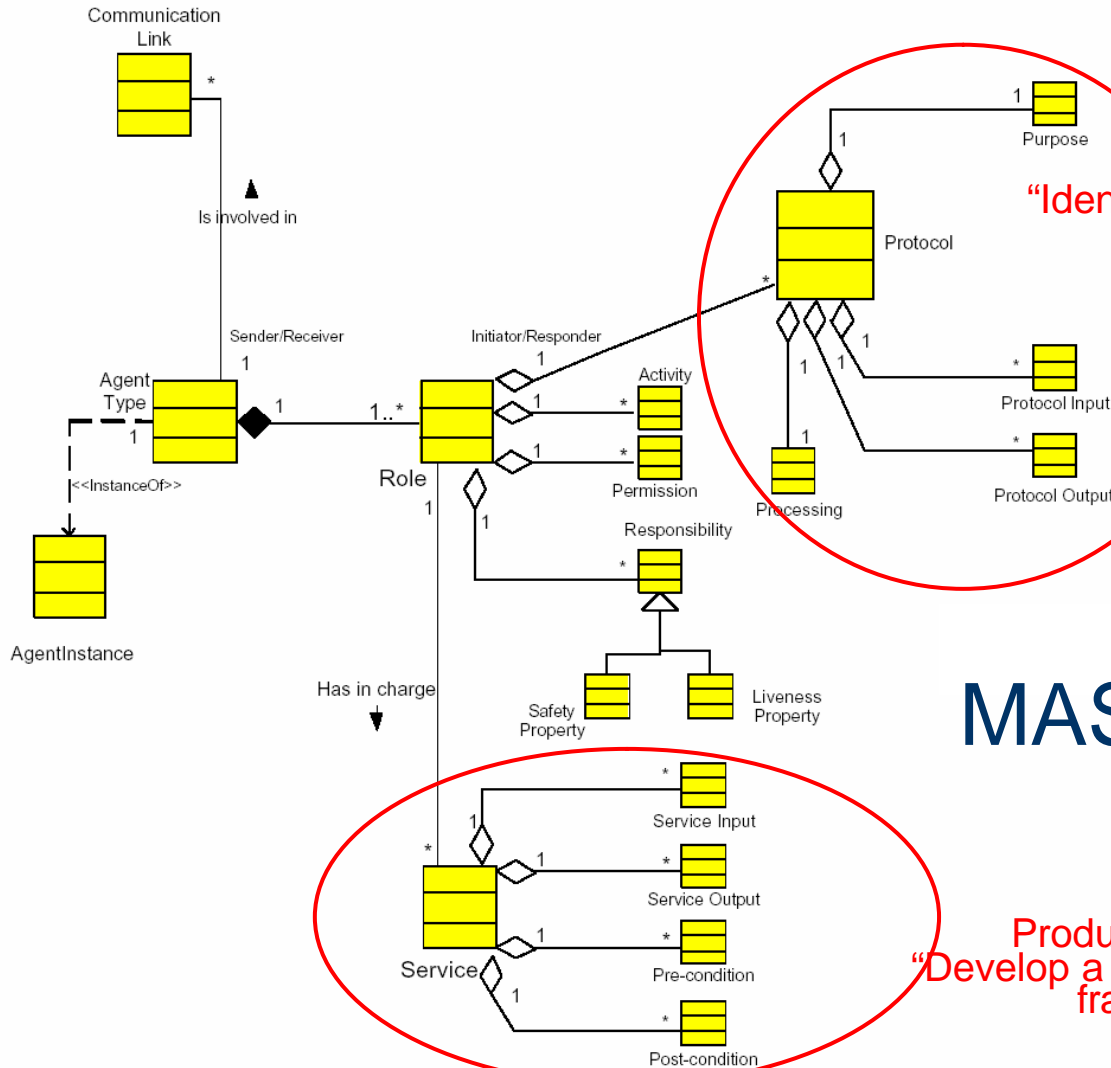
Let us consider the following MAS (meta) model:



ADELFE MAS (meta)model



Produced by the
"Individuate agent's
aptitudes and skills"
fragment



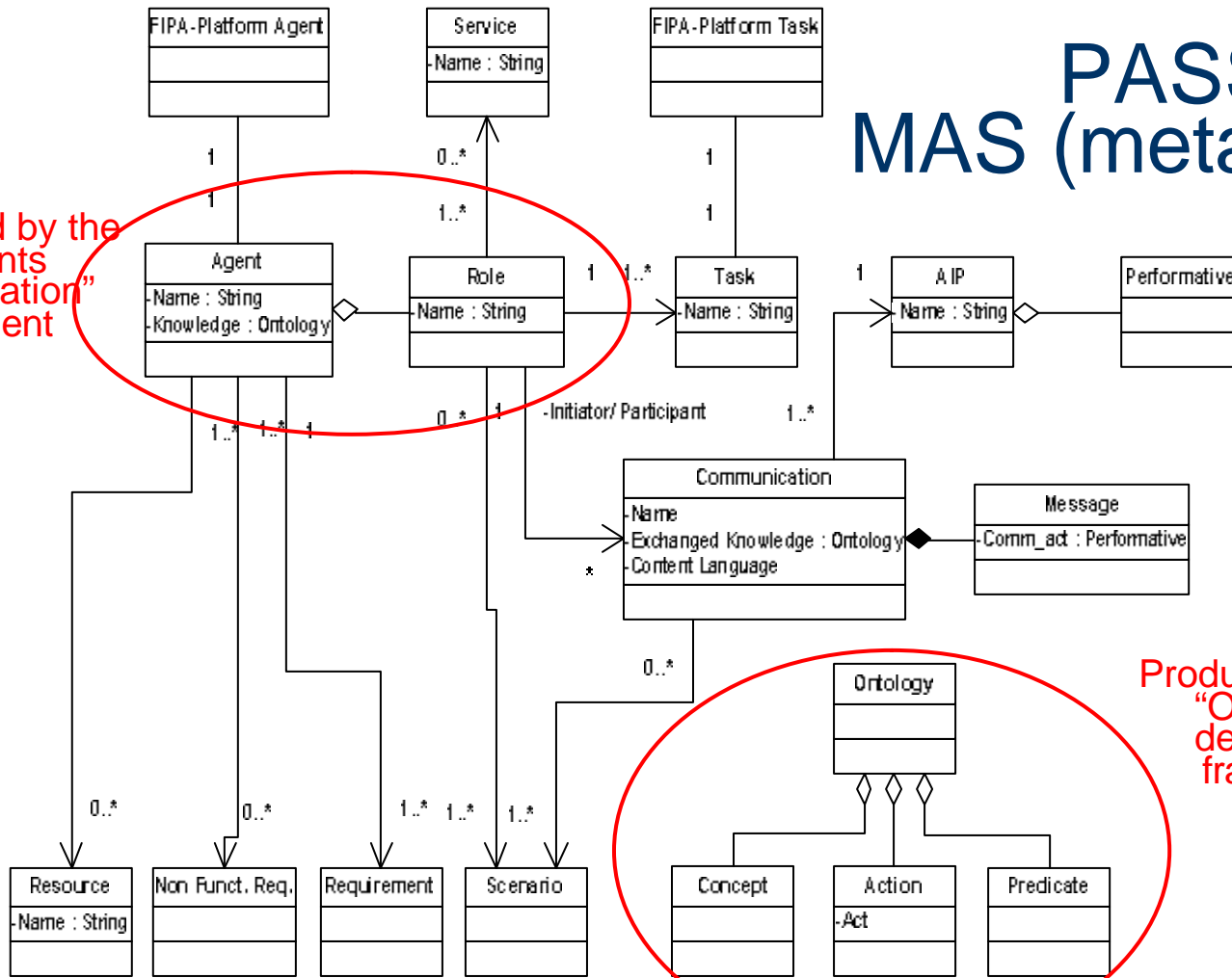
Produced by the "Identify and document the interactive protocols" fragment

GAIA MAS (meta)model

Produced by the "Develop a Services Model" fragment

PASSI MAS (meta)model

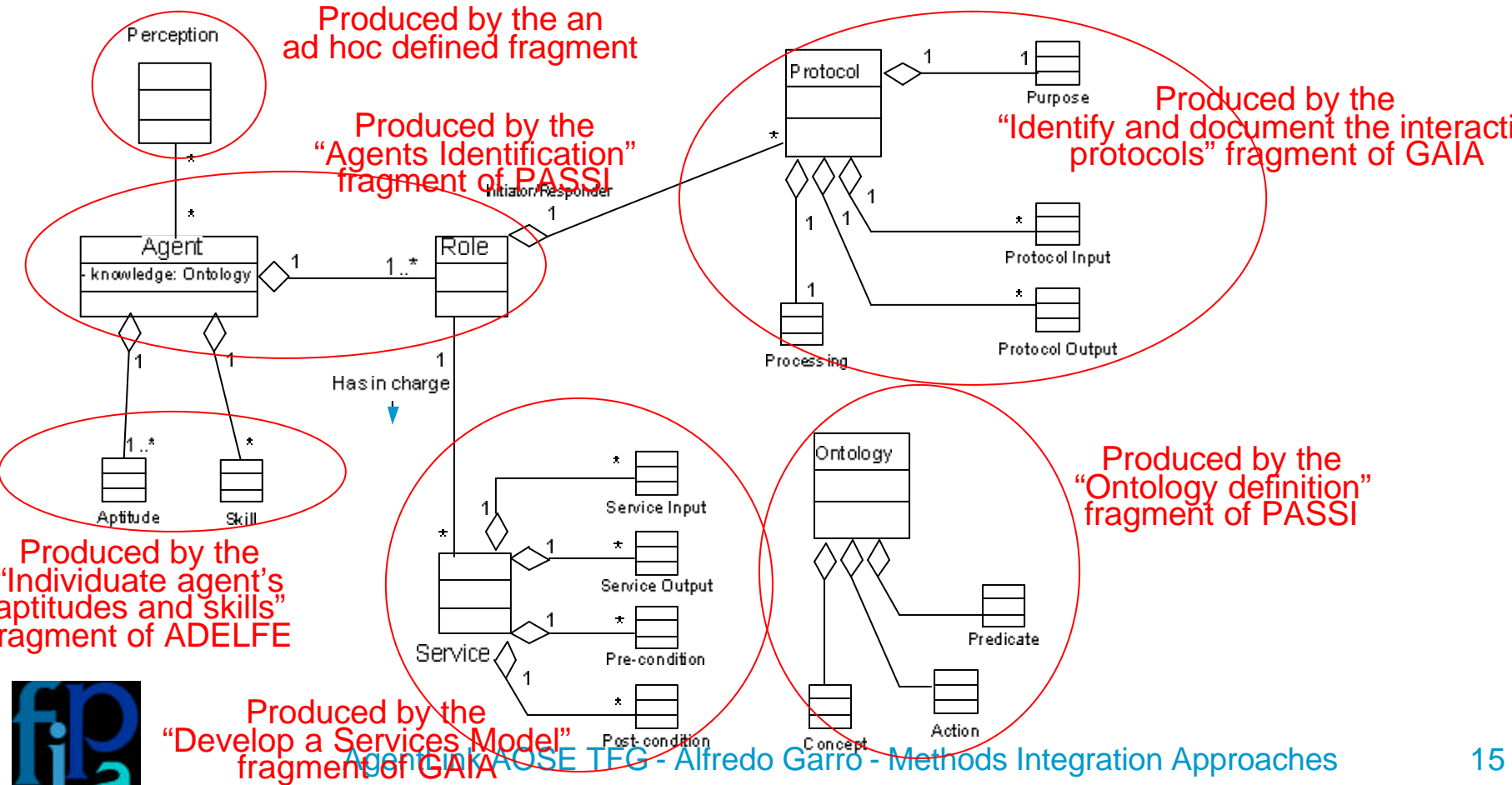
Produced by the
"Agents
Identification"
fragment



Produced by the
"Ontology
definition"
fragment

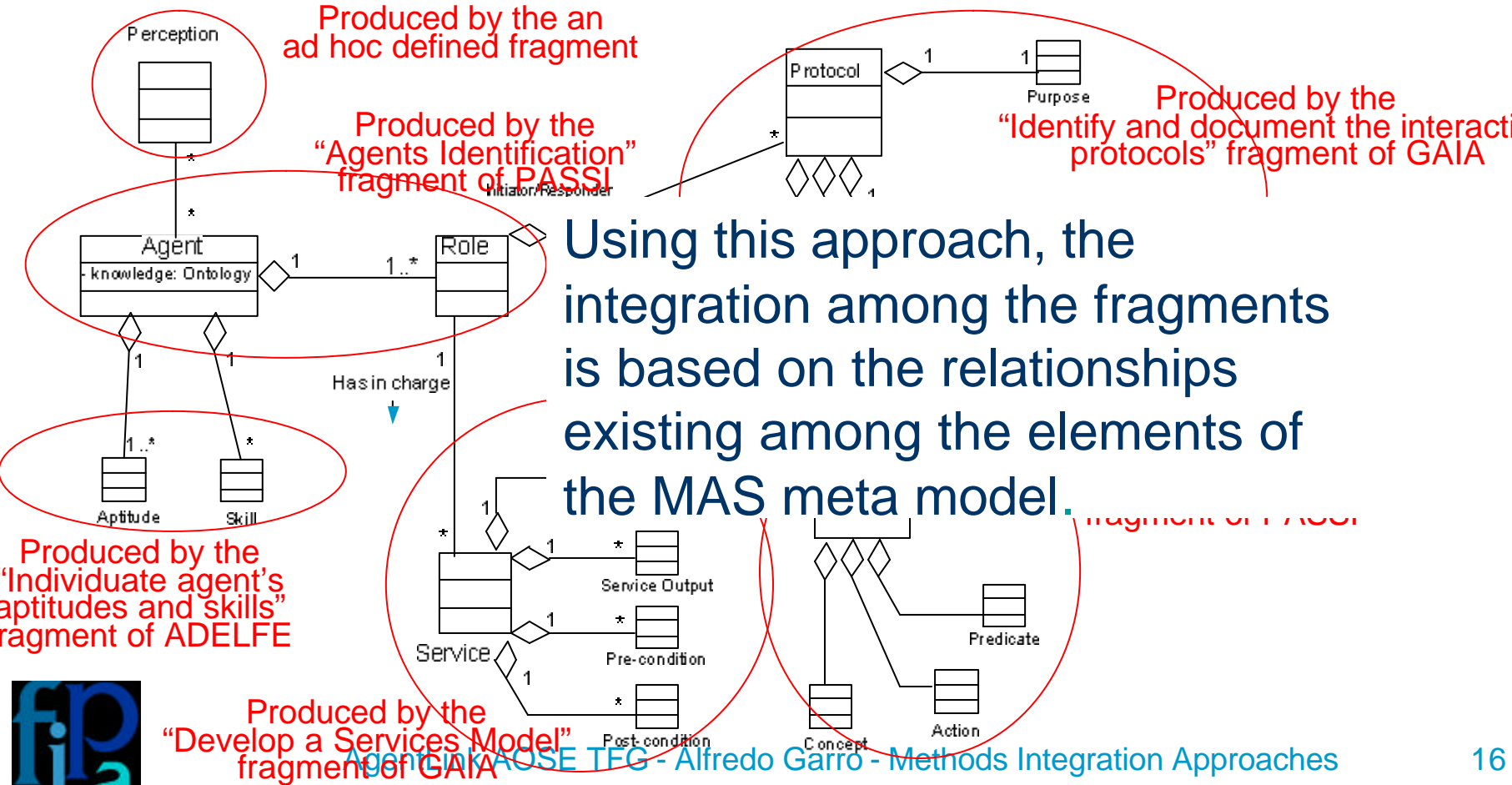
Methods Integration guided by a Multi Agent System (meta) model: an example

Let us consider the following MAS (meta) model:



Methods Integration guided by a Multi Agent System (meta) model: an example

Let us consider the following MAS (meta) model:



Produced by the "Develop a Services Model" fragment of GAIA

Methods Integration guided by a development process

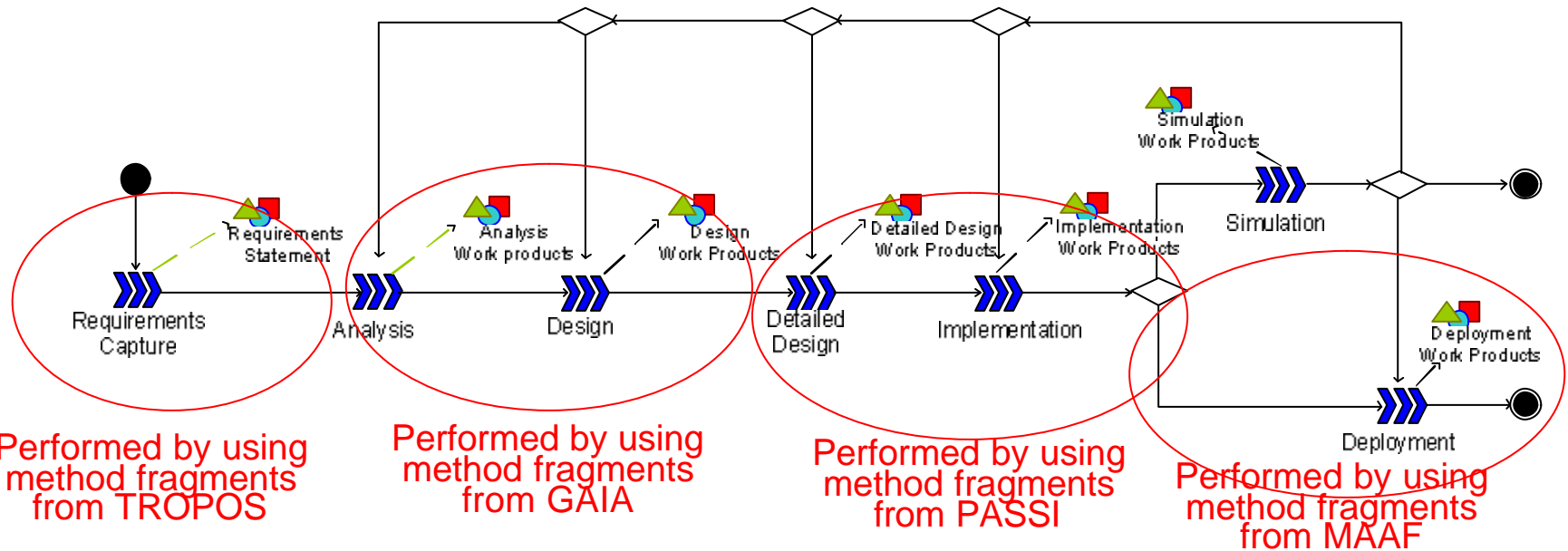
This approach focus on the instantiation of some ***software development process*** that completely covers the development of MAS.

Given a specific problem and/or an application domain, the designer must:

- ◆ Instantiate the process by selecting, for each phase, suitable method fragments.

Methods Integration guided by a development process: an example

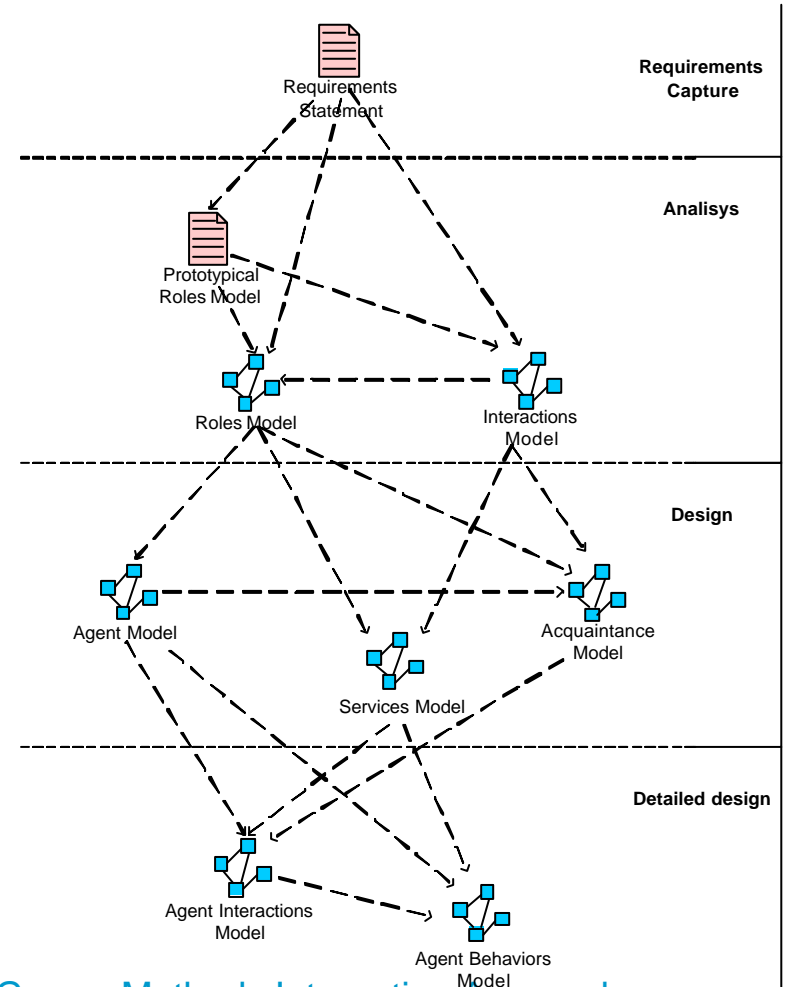
Let us consider the following software development process:



A complete case study is reported in: “From Modeling to Simulation of Multi-Agent Systems: an integrated approach and a case study” (by myself, G. Fortino and W. Russo) and will be presented at MATES 2004 conference.

Methods Integration guided by a development process: an example

Using this approach, the integration among the fragments is achieved by individuating and/or defining dependencies among work products belonging to “consecutive” fragments of the instantiated process



The presented approaches are not mutually exclusive; rather, hybrid approaches containing features of both the two proposals might be defined as well.

I will be happy if you would send yours comments about these proposals (and in general about the methods integrations problem) to the FIPA Methodology TC mailing list:

Methodology@fipa.org

<http://www.fipa.org/mailman/listinfo/methodology>

THANK YOU