

## **03/5101 Natural Language Techniques in Support of Spacecraft Design**

**Type of activity: Medium Study (4 months, 25 KEUR)**

### **Rationale**

In June 2001 ActiveBuddy Inc. released SmarterChild [1], an on-line “chatterbot” designed to enable internet users to access real-time news and information via IM or AIM or MSM Messenger. SmarterChild is just one of a wide family of Artificial Intelligence software thought to interact with humans in a friendly way as if they were chatting with a real person. The innovation of SmarterChild is the ability to find information relevant to the conversation browsing the internet (in background) or sorting information out of a database.

Two major features of such a system, namely its ability to interpret human language and the ability to infer the information needed by the user, could be extremely useful for preliminary space system design. Often while assessing a spacecraft concept, designers need information, new ideas or data relevant to the project. Some of this information can be found on the internet or in specialised databases but looking through all the available data is often complex and time consuming. The idea is to have a smart advisor that runs in background while a design is being discussed, collects inputs from the designers just following the process and on the base of all these inputs starts an extensive query looking for all relevant information. From time to time, prompted or not, it can provide some advice on the subject, suggesting the existence of studies already carried out and highlighting the most important results, for example. A natural application for such a system would be its utilisation in the Concurrent Design Facility in ESA [2] or in any other facility that makes use of the concurrent design approach.

### **Description**

It is proposed in the frame of this preliminary activity study the best approach to bridge the gap between traditional computational linguistics research and the implementation of practical applications with potential use in the spacecraft engineering domain.

In particular, the activity should assess suitable machine translation, information retrieval and speech analysis in a highly technical, domain-specific and multinational environment in which the all speakers use English language to exchange information.

The final objective is to define a suitable architecture for a prototype of a system performing translation of technical discussions, and which will be interfacing with an adequate autonomous search engine, which for this first stage will be assumed to be internet based. An assessment of the requirements of an operational system will also be part of the study. Only the human-machine interface module will be addressed in the scope of this activity while a specialised search engine and data mining tool will be subject of later studies

### **References**

- [1] <http://www.smarterchild.com/>
- [2] [http://www.estec.esa.nl/outreach/download/cdf\\_paper.pdf](http://www.estec.esa.nl/outreach/download/cdf_paper.pdf)
- [3] J. Turmo, H. Rodriguez, Learning Rules For Information Extraction, *J. Natural Language Eng.*, Volume 8, Issue 3, pp 167 - 191
- [4] L. Hirschman, R. Gaizauskas, Natural Language Question Answering, The View From Here, *J. Natural Language Eng.*, Volume 7, Issue 4, pp 275 - 300