EUROPEAN COMMISSION

Community Research

SEVENTH FRAMEWORK PROGRAMME

REVIEW REPORT

FP7-ICT-247914 MOLTO Project

Project period M13 to M24

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1. Overall Assessment

1.1. Executive Summary

The main objective of the MOLTO project is to develop a set of tools for translating texts between multiple languages in real time with high quality. As its main technique, MOLTO uses domain-specific semantic grammars and ontology-based interlinguas. These components are implemented in GF (Grammatical Framework), a grammar formalism where multiple languages are related by a common abstract syntax. GF has been applied in several small-to-medium size domains, typically targeting up to ten languages but MOLTO aims to scale this up in terms of productivity and applicability. A substantial part in this effort is to make the technology accessible for domain experts without GF expertise and minimize the effort needed for building a translator. The most research-intensive parts of MOLTO are the two-way interoperability between ontology standards (OWL) and GF grammars, and the extension of rule-based translation by statistical methods. The OWL-GF interoperability will enable multilingual natural-language-based interaction with machine-readable knowledge. The statistical methods will add robustness to the system when desired. New methods will be developed for combining GF grammars with statistical translation, to the benefit of both.

The MOLTO Enlarged project adds two work packages. In the Semantic Wiki WP a system is built that integrates the functionalities of MOLTO tools in a collaborative environment, where users can create content in different languages and all edits become immediately visible in all languages via automatic semantic-based translation. In the Interactive Knowledge-based System WP the MOLTO technology will be used in an enterprise environment for the localization of end-user oriented systems to new languages and the generation of high-quality explanations in natural language. Translation grammars are constructed within the participating company by non-expert staff without the intervention of grammar specialists.

The expected final product of MOLTO is a software toolkit that will be made available via the MOLTO website. It will consist of the following tools and libraries:

- a grammar development tool, available as an IDE and an API, to enable the use as a plugin to web browsers and translation tools, to facilitate construction and improvement of translation systems and the integration of ontologies with grammars,
- a translator's tool which is robust towards open text, available as an API and some interfaces in web browsers and translation tools,
- a grammar library for linguistic resources,
- a grammar library for the domains of the three case studies: mathematics, patents, and cultural heritage.

MOLTO tools will be portable to different platforms as well as generally portable to new domains and languages. By the end of the project, MOLTO expects to have grammar resource libraries for 18 languages (7 at the start of the project), whereas MOLTO use cases will target between 3 and 15 languages.

The second reporting period of the project has been dedicated to work on the set goals for each of the subtasks separately.

At the review meeting time, the project presented its achievements according to the goals set for the period. In particular, the project has:

- received an extension of 3 months and an additional funding of 600,000 EUR (total of 2,975,000 EUR);
- added two new consortium partners and two new WPs;
- developed two grammar IDE's for GF;
- built and researched hybrid architectures for MT;
- published a book and organised tutorials and a workshop about GF;
- ported the ACE-Wiki to GF, allowing multilingual collaborative document editing, allowing reasoning based on abstract syntax.

In addition, in the context of the case studies Work packages, the project has:

- compiled OpenMath exercise grammar library in 12 languages, and built a dialogue system for computer algebra (Sage);
- improved MT by combining SMT with GF-MT;
- built a NL query system for patent search;
- built a prototype for NLG for the Gothenburg City Museum database.

These achievements represent valuable work so far. The consortium is well aware of the state of the art in the different domains and the main products/applications and services being developed within and outside Europe. Integration and cooperation between the consortium partners seems to be sub-optimal in some cases, and needs to be improved in the final project year.

1.2. Review Result

☒ **Acceptable progress** (The project has achieved most of its objectives and technical goals for the period with relatively minor deviations).

1.3. Main Conclusions

The project progresses well, addressing very interesting topics. In general, progress follows the project work plan. Most of due deliverables have been completed. However, some of them are not accepted by the reviewers. A thorough revision of these deliverables has to be performed in a way that complies with the reviewers requests.

The consortium is very strong and appropriately balanced. Partners are highly competent in their respective areas of expertise. The addition of the new partners seems to even strengthen the consortium. With respect to the integration of the different areas of expertise, cooperation between the project partners should improve.

The project represents the state of the art in the different areas. Technical work is very good and there is evidence that very interesting scientific results will be generated. The demonstrations of already available results at the components level, given at the review meeting, are well appreciated.

The recommendations from last year's review report have not all been properly addressed, such as the required updating of certain deliverables. Some observations, comments and remarks, raised and discussed at the review meeting or in last year's review report, follow. These should be addressed in the respective deliverable(s) as well as in the planning for the next period.

1. Technical coordination should be strengthened. Continuous and strict monitoring should be applied. Reviewers made several recommendations in the 1st review but most of them have not been implemented or it was unclear what was done with respect to these recommendations. As it is shown in the remarks per WP, the adoption of several of these recommendations would support monitoring of the 2nd year's work progress towards the project's objectives.

2. The recommendation from the 1st review "How g*rammar rules are extracted (from lexical databases, ontologies, text examples) needs to be specified in detail and a concrete schedule should be included in the updated workplan (D1.1)"* has not been included in D1.1. This should be included in D2.3 *"Grammar tool manual and best practices"*, due in M27. This is a **crucial deliverable** since the best practices with respect to the other work packages should also be included here

3. The recommendation from the 1st review "*Details on the integration steps (the integration of the vocabulary editor with the translation editor, the integration of the vocabulary editor with TermFactory (TF), and the integration of TF with the Knowledge Representation Infrastructure (KRI) of WP4) need to be provided in the updated workplan (D1.1). Concerning the integration of TF and KRI, it seems that there are overlaps between these tools. The partners must clarify which functions of these tools will be used in the case studies in order to exploit complementarities of the tools and avoid overlaps."* has not been addressed properly. Since this is presented as "*less understood"* by the WP leader, this is a major area of concern. The problems of the integration of WP3 tools remain. This should be solved in an updated D1.1.

4. The translator's tools that should be developed in WP3 should not be given up. Although the WP's leader's impression is that the MT quality is too low for the tools to ever be used, the developed tools can be useful for those subdomains/language pairs where MT quality is better.

5. The recommendation from the 1st review "*Critical issues with respect to the semi-automatic creation of abstract grammars from ontologies, as well as deriving ontologies from grammars, are still to be clarified. Concrete steps to handle these issues need to be specified in detail and a schedule should be included in the updated work plan (D1.1). In addition, as noted with respect to WP3, complementarities between KRI and TF should be exploited avoiding possible overlaps. Terminology should be added and abbreviations explained in Deliverable D4.1 in order to facilitate reading by non-experts in the field"* should still be addressed. The issue of the two-way interoperability between ontologies and GF grammars still remains unclear, although as noted in the DoW this represents one of the two most research-intensive parts of MOLTO. This should be solved in the new versions of D4.2 and D4.3. The current version of deliverables D4.2 "Data Models, Alignment Methodology, Tools and Documentation", and D4.3 "Grammar-Ontology Interoperability" are not approved. D4.2 is too general. A lot is said about LOD and the museum case and not on the alignment methodology. What is the added value of the proposed methodology? D4.3, on the other hand, does not give a clear picture of the interoperability issues and the degree of automation that can be expected. What is required for porting this to a new application? Concrete steps should be provided making clear what can be automated and what cannot with the provided infrastructure.

6. The current description of work in WP6 lacks details on the prototype multilingual dialogue system to be developed. In addition no update of D9.1. was provided, as

recommended in the 1st review. Therefore, it is necessary to include in D9.1E an example dialogue and specifications of this prototype .

7. WP7 work should focus on the major issues examined in MOLTO, especially in relation to the grammar – ontology interoperability automation. Specific scenarios are needed for the exploitation of MOLTO tools in this case study. It is recommended to include such scenarios in a new version of deliverable D9.1E.
8. The recommendation from the 1st review "*Preparation of a new version of D9.1 is recommended including prototype specifications and scenarios for the three case studies (WP6, WP7, WP8)"* should still be addressed. A concrete evaluation methodology is needed focusing on MOLTO's major goals: How will the consortium prove that its objectives were fully/partially met? We expect to see this in D9.1E "Addendum to the MOLTO test criteria, methods and schedule" hoping that the recommendations suggested above as well as in the 1st review, in relation to D9.1, will be included there.
9. The way the project's web site is structured, although it contains the necessary content, affects its readability in some cases.
10. The deliverables on the work plan (D1.1) and the dissemination plan (D10.1) should be updated at the beginning of the 3rd year.

2. Objectives and Work plan

The project progresses well, addressing very interesting topics. In general, progress follows the project work plan. During the 2nd year, the consortium has been expanded with two new partners, which strengthen it with new expertise and a new business case. In several cases, details of the work plan and evaluation plan are still missing. Information describing the achievements of each work package follows below.

WP2: Grammar Developer's Tools

The purpose of this work package is to develop a tool for building domain-specific grammar-based multilingual translators. This tool will be accessible to users who have expertise in the domain of translation but only limited knowledge of the GF formalism or linguistics. The tool will integrate ontologies with GF grammars to help in building an abstract syntax. For the concrete syntax, the tool will enable simultaneous work on an unlimited number of languages and the addition of new languages to a system. It will also provide linguistic resources for at least 15 languages, among which at least 12 are official languages of the EU.

The main achievements in the 2nd reporting period consist in the development of two types of IDE's: one in Eclipse and another cloud-based, which support on the fly extension of the GF grammar. Also, grammar compilation is now faster. It is also reported that new resource grammars for new languages have been added, but this happened outside of the scope of the MOLTO project and is hence not evaluated in this review. The end date of this work package is extended to M27 instead of M24, to include the experience from the new kind of users from Be Informed, and because the start of the MOLTO enlargement was delayed.

In general, WP2 has adhered to the work plan and has shown a very good quality of work. Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

Critical issues in the development of the GF compiler API, like project management, testing and maintenance, are taken care of.

For the next year, a lot is expected from the last deliverable in this WP: D2.3: User Manual and Best Practices. Since the recommendation from the 1st review "How g*rammar rules are extracted (from lexical databases, ontologies, text examples) needs to be specified in detail and a concrete schedule should be included in the updated workplan (D1.1)"* has not been included in D1.1., it should be included in D2.3. This is a **crucial deliverable** since the best practices with respect to the other work packages will also have to be included here

WP3: Translator's Tools

The purpose of this work package is (a) to build an API for practical translation and production of multilingual documents; and (b) to develop a web-based front-end to the multilingual translators allowing translation, example-based grammar authoring, syntax edition, context-sensitive word completion, and multilingual ontology-based lexicon building. UHEL's ContentFactory will be used as distributed repository system and for a collaborative work flow for multilingual terminology.

The main achievements in the 2nd reporting period include a translation editor, the integration of this editor into the GlobalSight translation environment, and a TermFactory ontology editor.

Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

In general, it was concluded that the MOLTO engine suffers from the following bottlenecks:

(i) it has too small language coverage for translators,

(ii) it is too laborious to build a domain model,

(iii) translation tools cannot solve this low coverage; and

(iv) the engine needs a robust parser to go beyond the fridge magnets.

From these bottlenecks the conclusion was drawn to concentrate on ontology and terminology acquisition tools until more robust parsing becomes available.

Since the recommendation from the 1st review "*Details on the integration steps (the integration of the vocabulary editor with the translation editor, the integration of the vocabulary editor with TermFactory (TF), and the integration of TF with the Knowledge Representation Infrastructure (KRI) of WP4) need to be provided in the updated workplan (D1.1). Concerning the integration of TF and KRI, it seems that there are overlaps between these tools. The partners must clarify which functions of these tools will be used in the case studies in order to exploit complementarities of the tools and avoid overlaps."* has not been addressed properly and is presented as still "*less understood"* by the WP leader this is a major area of concern. The problems of the integration of WP3 tools remain. Integration details should be provided in an updated D1.1.

The translator's tools that should be developed in WP3 should not be given up. Although the WP's leader's impression is that the MT quality is too low for the tools to ever be used, the developed tools can be useful for those sub-domains/language pairs where MT quality is better.

WP4: Knowledge Engineering

The purpose of this work package is (a) research and development of two-way grammar-ontology interoperability bridging the gap between natural language and formal knowledge; (b) infrastructure for knowledge modeling, semantic indexing, and retrieval; (c) modeling and alignment of structured data sources; and (d) alignment of ontologies with the grammar derived models. WP4 aims to deliver an engine that will allow semi-automatic creation of abstract grammars from ontologies, as well as deriving ontologies from grammars, and instance level knowledge from natural language (NL). In terms of retrieval, NL queries will be transformed to semantic queries and the resulting knowledge will be transformed back in NL.

Concerning the resources deployed in the 2nd period, UHEL and UGOT do not claim any resources although, according to the updated DoW, they are involved in the preparation of deliverables (D4.2 by Ontotext and UHEL, D4.3 by Ontotext and UGOT).

The recommendation from the 1st review "*Critical issues with respect to the semi-automatic creation of abstract grammars from ontologies, as well as deriving ontologies from grammars, are still to be clarified. Concrete steps to handle these issues need to be specified in detail and a schedule should be included in the updated workplan (D1.1). In addition, as noted with respect to WP3, complementarities between KRI and TF should be exploited avoiding possible overlaps. Terminology should be added and abbreviations explained in Deliverable D4.1 in order to facilitate reading by non-experts in the field*" should still be addressed.

The issue of the two-way interoperability between ontologies and GF grammars still remains unclear, although as noted in the DoW this represents one of the two most research-intensive parts of MOLTO. This should be solved in the new versions of D4.2 and D4.3

The current versions of deliverables D4.2 "Data Models, Alignment Methodology, Tools and Documentation", and D4.3 "Grammar-Ontology Interoperability" are **not approved**. It is unclear why UHEL and UGOT were not involved in the preparation of these deliverables, although this is clearly written in the DoW (see also previous remark concerning the deployment of resources).

D4.2 is too general. A lot is said about LOD and the museum case but nearly nothing is said about the alignment methodology. The deliverable should contain information about what the added value is of the proposed methodology. D4.3, on the other hand, does not give a clear picture of the interoperability issues and the degree of automation that can be expected. What is required for porting this to a new application? Concrete steps should be provided making clear what can and what cannot be automated with the provided infrastructure.

WP5: Statistical and Robust Translation

The purpose of this work package is to develop translation methods that exploit the grammar-based methods of WP3 to extend their coverage, robustness, and quality in unconstrained text translation. The focus will be placed on techniques for combining GF based and statistical machine translation. The WP7 case study on translating patents will be used to test the techniques developed in WP5.

The main achievements in the 2nd reporting period consist in reaching Milestones 5 (Baseline prototypes) and 7 (Hybrid combination models) and in clearing the final collection of corpora.

In general, WP5 has adhered to the work plan and has shown a good quality of the work. Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

Critical issues related to the baselines (SMT baseline, naïve combination of GF and SMT as hybrid baseline) and the hybrid approaches (hard and soft integration, probabilistic estimations for GF phrases) are taken care of. The details of the hybridization approaches have been described in D.5.2. and the details about the data have been described in D.5.1. Concerning the hybridization, for the soft integration approach, linguistic features could also be included, such as parts-of-speech into the factors of the factor-based SMT model.

WP6: Case Study: Mathematics

The purpose of this work package is to develop a multilingual dialog system able to help the math student in solving word problems (a type of textbook problem designed to help students apply abstract mathematical concepts to 'real-world' situations).

A prototype was built and made available at http://molto.ontotext.com.

In general, WP6 has adhered to the work plan and has shown a good quality of the work. Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

The current description of work in WP6 lacks details on the prototype multilingual dialogue system to be developed. In addition, no update of D9.1 was provided, as recommended in the 1st review, including an example dialogue and specifications of this prototype. These should be present in D9.1E.

There is a request by the consortium for changing the objective of D6.3 "Assistant for solving word problems" focusing instead to the implementation of a math wiki in relation also to the work in the new WP11. Although there was a new DoW a few months ago this was not foreseen there. Such a change affects the main objective of WP6 which is "*to have a multilingual dialog system able to help the math student in solving word problems*". The reviewers do not agree with such a change. In the 1st review we stressed the need to provide details towards the implementation of this objective. This may be a complex objective but the consortium still needs to examine it in detail and work for its implementation.

In addition since there is now the new WP11, the partners could also work there on the implementation of a math Wiki.

WP7: Case Study: Patents

This work package aims at (a) creating a commercially viable prototype of a system for MT and retrieval of patents in the bio-medical and pharmaceutical domains; (b) allowing translation of patent abstracts and claims in at least 3 languages; and (c) exposing several cross-language retrieval paradigms on top of them.

The main achievements in the 2nd reporting period consist in the final collection of the patent corpus from EPO, the building a GF grammar for Patent translation and a GF grammar for controlled language queries. There is also the development of a patent query prototype in English and French.

In general, WP7 has adhered to the work plan and has shown a good quality of the work. Resources deployed in comparison with those forecast in Annex I to the contract are adequate. It was already announced at the previous review that Ontotext would be working on this WP as well. However, this is not indicated in the updated DoW.

Concerning corpora alignment, the consortium could ask for support from the relevant project PLUTO. With respect to semantic annotation there may be problems with the use of different resources (overlaps, need for coordination). Such issues have not been discussed so far. The goal of transferring semantic annotations to the target language is unclear. The semantic annotations could also be exploited by MT and not only for retrieval. The evaluation of the query engine is an important issue which should be clarified (in D9.1.E). There is no need to include speech recognition. These issues should be addressed in D7.2 (due M27).

WP7 work should focus on the major issues examined in MOLTO, especially in relation to the grammar – ontology interoperability automation. Specific scenarios are needed for the exploitation of MOLTO tools in this case study. It is recommended to include such scenarios in deliverable D9.1E.

WP8: Case Study: Cultural Heritage

The purpose of this work package is to build an ontology-based multilingual grammar for museum information starting from a CRM ontology for artifacts at Gothenburg City Museum using tools from WP4 and WP2. The grammar will enable descriptions of museum objects and answering to queries over them, covering 15 languages for baseline functionality and 5 languages with a more complete coverage. A prototype of a cross-language retrieval and representation system will also be built to be tested with objects in the museum, and automatically generate Wikipedia articles for museum artifacts in the 5 languages with extensive coverage.

The main achievements in the 2nd reporting period involve the data collection of the Gothenburg Museum and the CIDOC-CRM ontology. Grammars have been built for translation and multilingual natural language generation for five languages.

In general, WP8 has adhered to the work plan and has shown a good quality of the work. Resources deployed in comparison with those forecast in Annex I to the contract are underused and an extension is requested to end the WP at M36, moving D8.3 to M36. The partners should provide arguments for the requested extension of the WP, from M30 to M36.

As noted in WP7, specific scenarios are needed for the exploitation of MOLTO tools in this case study. It is recommended to include such scenarios in deliverable D9.1E.

The degree of automation needs to be clarified for the mapping CIDOC CRM -> Ontology -> GF translation grammar.

WP9: User Requirements and Evaluation

The purpose of this work package is to (a) collect user requirements for the use cases, grammar development IDE and translation tools; (b) define criteria for evaluating the translation and the tools; (c) define diagnostic and evaluation corpora; (d) perform continuous quality control and monitor progress through iterative evaluation.

The main achievements in the 2nd reporting period consist in setting up a bug tracking system.

In general, we expected an update of D9.1 as recommended in the first year review. We expect to see this in D9.1E “Addendum to the MOLTO test criteria, methods and schedule” hoping that the recommendations suggested above as well as in the 1st review, in relation to D9.1, will be included there.

Concerning the resources claimed, without reading D9.1E the reviewers cannot assess them in comparison with those forecast in Annex I.

WP10: Dissemination and Exploitation

The purpose of this work package is to (a) create a MOLTO community of researchers and commercial partners; (b) make the technology popular and easy to understand through light-weight online demos; (c) apply the results commercially and ensure their sustainability over time through synergetic partnerships with the industry.

The dissemination effort in the 2nd reporting period is of a high quality. The addition of partner Be Informed enforces the potential for project exploitation, addressing recommendation 9 *"Taking into account the numerous endeavours undertaken in the translation domain, both research and commercial, the market segment addressed by MOLTO should be identified with maximum precision. The specific case studies should also be taken into account in this effort. It is suggested that careful planning is initiated as early as possible and not later than the next reporting period."* from the first review.

In general, WP10 has adhered to the work plan and has shown a very good quality of the work. Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

Concerning exploitation, the market segment addressed by MOLTO should be carefully identified. The specific case studies should be taken into account in this effort. It is suggested that careful planning is initiated as early as possible.

About the project's web site, although it contains the necessary content, the way it is structured affects its readability in some cases. For instance, publications are presented per year, title or author but not per work package making it difficult to find a publication (presentation, paper, deliverable, other). Also, with respect to demos, the latest versions should be appearing at the site.

WP11: Multilingual Semantic Wiki

The main goal of this work package is to build an engine for a multilingual semantic wiki, where the involved languages are precisely defined subsets of the 15 languages of the MOLTO project.

This work package has just begun and seems a good environment for developing one of the project's main goals: to develop a set of tools for translating texts between multiple languages in real time with high quality.

Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

WP12: Interactive knowledge-based systems

The main goal of this work package is to develop a production grade explanation service in Be Informed's product suite that generates natural language explanations that are acceptable to broad audiences across languages. It aims to demonstrate that the MOLTO tools are usable and effective to non-linguistic professionals for the day-to-day tasks of writing explanation grammars.

This work package has just begun and seems to address recommendation 9 from the first annual review *"Taking into account the numerous endeavours undertaken in the translation domain, both research and commercial, the market segment addressed by MOLTO should be identified with maximum precision. The specific case studies should also be taken into account in this effort. It is suggested that careful planning is initiated as early as possible and not later than the next reporting period."*

Resources deployed in comparison with those forecast in Annex I to the contract are adequate.

3. Resources

Judging from the data made available, the reviewers estimate that the personnel resources have been utilised for achieving project progress in a manner consistent with the principle of economy, efficiency and effectiveness.

The effort spent seems to be commensurate to the work carried out and the results achieved so far. No major deviations between resources spent and those planned for the period are observed.

4. Implementation of the Project

Technical coordination should be strengthened. Continuous and strict monitoring should be applied. The partners seem well committed to generating high-quality project results with strong impact in their respective fields and overall. In general, the reviewers feel some individuation in project execution, esp. in work packages WP3, WP4 and WP7 (possible overlaps between TF and KRI, GF-ontology interoperability issues). More effort should be made for integration of all partners under a common unifying vision.

The project progresses according to the updated work plan of Annex I of the extended project.

Individual work packages are well managed. Potential overlaps between WP3 and WP4 urgently need to be resolved and decisions on critical issues related to GF-ontology interoperability should be taken a.s.a.p. Scenarios for the case studies work packages should still be specified.

A Risk assessment and contingency plan exists in Annex I. The reviewers would, however, welcome a more instantiated plan, close to the actual risks the project might be facing.

5. Use and Dissemination of Foreground

Taking into account the project objectives, the importance of translating between multiple languages in real time with high quality, as well as the high quality of the consortium and the results achieved so far, the project is indeed expected to produce significant scientific and technical results with high exploitation potential.

The extension of the project consortium with Be Informed addresses our concern from the previous review, where we remarked that "*no adequately specific plan for use of the foreground has been presented.*"

Taking into account the numerous different endeavours undertaken in the translation domain, both at the research and the commercial fronts, the reviewers believe that a clear plan for the commercialisation of results beyond the end of the project is necessary, even in draft form at this stage. Additionally, the necessary IPR arrangements should be in place in the next reporting period.

On the dissemination front, the consortium has performed very well so far, as it is shown by the GF tutorials and book, and the various MOLTO related publications. The reviewers believe that project participants will be able to generate more high-quality publications as research work and its evaluation is progressing.

6. Other Issues (if applicable)

7. Recommendations

Based on the comments made above, the reviewers want to emphasize the following points that should be considered for the planning of the next project phase.

Recommendation 1. Technical coordination should be strengthened. Continuous and strict monitoring should be applied. Reviewers made several recommendations in the 1st review but most of them have not been implemented or it was unclear what was done with respect to them. As it is shown in the remarks per WP, the adoption of most of these recommendations would support monitoring of the work progress towards the project's objectives.

Recommendation 2. The recommendation from the 1st review "How g*rammar rules are extracted (from lexical databases, ontologies, text examples) needs to be specified in detail and a concrete schedule should be included in the updated workplan (D1.1)"* has not been included in D1.1.It should be included in D2.3 *"Grammar tool manual and best practices"*, due in M27. This is a **crucial deliverable** since the best practices with respect to the other work packages should be included here

Recommendation 3. The recommendation from the 1st review "*Details on the integration steps (the integration of the vocabulary editor with the translation editor, the integration of the vocabulary editor with TermFactory (TF), and the integration of TF with the Knowledge Representation Infrastructure (KRI) of WP4) need to be provided in the updated workplan (D1.1). Concerning the integration of TF and KRI, it seems that there are overlaps between these tools. The partners must clarify which functions of these tools will be used in the case studies in order to exploit complementarities of the tools and avoid overlaps."* has not been addressed properly and is presented as still "*less understood"* by the WP leader. This is a major issue of concern. The problems of the integration of WP3 tools remain. These should be discussed in an updated D1.1.

Recommendation 4. The translator's tool s that should be developed in WP3 should not be given up. Although the WP's leader's impression is that the MT quality is too low for the tools to ever be used, the developed tools can be useful for those subdomains/language pairs where MT quality is better.

Recommendation 5. The recommendation from the 1st review "*Critical issues with respect to the semi-automatic creation of abstract grammars from ontologies, as well as deriving ontologies from grammars, are still to be clarified. Concrete steps to handle these issues need to be specified in detail and a schedule should be included in the updated work plan (D1.1). In addition, as noted with respect to WP3, complementarities between KRI and TF should be exploited avoiding possible overlaps. Terminology should be added and abbreviations explained in Deliverable D4.1 in order to facilitate reading by non-experts in the field"* should still be addressed. The issue of the two-way interoperability between ontologies and GF grammars still remains unclear, although as noted in the DoW this represents one of the two most research-intensive parts of MOLTO. This should be solved in the new versions of D4.2 and D4.3 The current version of deliverables D4.2 "Data Models, Alignment Methodology, Tools and Documentation", and D4.3 "Grammar-Ontology Interoperability" are not approved. D4.2 is too general. For instance, a lot is said about LOD and the museum case and not on the alignment methodology. D4.3, on the other hand, does not give a clear picture of the interoperability issues and the degree of automation that can be expected. What is required for porting this to a new application? Concrete steps should be provided making clear what can be automated and what cannot with the provided infrastructure.

Recommendation 6. The current description of work in WP6 lacks details on the prototype multilingual dialogue system to be developed. As recommended in the 1st review, an example dialogue and specifications of this prototype should be provided. These can be included in D9.1E.

Recommendation 7. WP7 work should focus on the major issues examined in MOLTO, especially in relation to the grammar – ontology interoperability automation. Specific scenarios are needed for the exploitation of MOLTO tools in this case study. It is recommended to include such scenarios in deliverable D9.1E.

Recommendation 8. The recommendation from the 1st review "*Preparation of a new version of D9.1 is recommended including prototype specifications and scenarios for the three case studies (WP6, WP7, WP8)"* should still be addressed. A concrete evaluation methodology is needed focusing on MOLTO's major goals: How will the consortium prove that its objectives were fully/partially met? We expect to see this in D9.1E "Addendum to the MOLTO test criteria, methods and schedule" hoping that the recommendations suggested above as well as in the 1st review, in relation to D9.1, will be included there.

Recommendation 9. The way the project's web site is structured, although it contains the necessary content, affects its readability in some cases. It should contain a structure according to the work packages, including all documentation related to a specific work package.

Recommendation 10. The deliverables on the work plan (D1.1) and the dissemination plan (D10.1) should be updated at the beginning of the 3rd year.

8. Annexes

I Deliverables

DELIVERABLES LIST STATUS			
No.	**Title**	**Status***	**Remark**
1.4	**Periodic Management Report M18**	**Approved in full**	
1.5.	**Periodic Management Report M24**	**Approved in full**	
2.2	**Grammar IDE**	**Approved in full**	
2.3	**Grammar tool manual and best practices**	**Delayed till M27**	This is a crucial deliverable, since the best practices with respect to the other work packages will also have to be included here
3.1	**MOLTO translation tools API**	**Approved in full**	
3.2	**MOLTO translation tools prototype**	**Approved in part**	The translator's tools that should be developed in WP3 should not be given up. Cf. RECOMMENDATION 4
4.2	**Data models, alignment methodology, tools and documentation**	**Rejected**	Too general, cf. RECOMMENDATION 5
4.3	**Grammar-Ontology Interoperability**	**Rejected**	It does not give a clear picture of the interoperability issues and the degree of automation that can be expected. What is required for porting this to a new application? Concrete steps should be provided making clear what can be automated and what cannot with the provided infrastructure.
5.1	**Description of the final collection of corpora**	**Approved in full**	
5.2	**Description and evaluation of the combination prototypes**	**Approved in full**	
6.1	**Simple drill grammar library**	**Approved in full**	
6.2	**Prototype of commanding CAS**	**Approved in full**	RECOMMENDATION 6
7.1	**Patent MT and Retrieval Prototype Beta**	**Approved in full**	
8.1	**Ontology and corpus study of the cultural heritage domain**	**Approved in full**	
8.2	**Multilingual grammar for museum object descriptions**	**Approved in full**	
9E.1	**Addendum to the MOLTO test criteria, methods and schedule**	**Delayed**	
10E.1	**Addendum to the MOLTO dissemination plan, with monitoring and assessment**	**Delayed**	

* Status: Approved in full

Approved in part
Approved subject to the conditions listed under remarks
Rejected.

II Review Agenda

Tuesday, March 20, 2012

Introduction Aarne Ranta

WP1 Olga Caprotti

WP2 Aarne Ranta

WP3 Lauri Carlson

WP4 Milen Chechev

WP5 Cristina España

WP7 Meritxell Gonzales, Cristina España

WP6 Jordi Saludes

WP8 Aarne Ranta

WP9 Lauri Carlson

WP10 Olga Caprotti

WP11 Kaarel Kaljiurand

WP12 Jeroen van Grondelle

III Summary of review Organisation and Logistics

The review process took place at Sal de Llac, UPC, Barcelona, Spain. The review meeting started at 09:00 and concluded at 18:00. The list of attendees can be found in Annex IV. All deliverables were submitted before the review meeting. The new technical annex of the extended project was not available before the review meeting.

IV List of participants contributing to the review

Organisation	Name	Email
PO	Michel Brochard	Michel.Brochard@ec.europa.eu
Reviewers	Vangelis Karkaletsis Vincent Vandeghinste	vangelis@iit.demokritos.gr vincent@ccl.kuleuven.be
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Ontotext	Milen Chechev	
BI	Jeroen van Grondelle	
UZH	Kaarel Kaljiurand	

All partners were represented.

V Report(s) from previous review or pre-review

Karkaletsis & Vandeghinste (2011). Review Report of FP7-ICT-247914 MOLTO Project. Period M1 to M12.