CELAN WP2 DELIVERABLE 2.5

FINAL REPORT OF WP2, INCLUDING A LIST OF PROVISIONAL RECOMMENDATIONS

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Abbreviations

AAC	augmentative and alternative communication
BI	business intelligence
BRO	business representative organizations
CAT	computer-assisted translation
CL	corporate language
CMS	content management systems
CNL	controlled natural language
CSR	social corporate responsibility
DTP	desktop publishing
GILT	globalization, internationalization, localization and translation
HEI	higher education institutions
IMT	interactive machine translation
ICT	information and communication technology
LCR	language and other content resources
LI	language industry
LMS	learning management system
LS	language services
LSP	language service providers
LT	language technology
LTT	language technology tools/systems
LT&T	language teaching and training
MT	machine translation
OA	office automation
OPI	over the phone interpreting
PwD	persons with disabilities
ST	speech technology
STT	speech technology tools
SME	small and medium enterprises
TD	technical documentation
TMS	terminology management systems
T&T	teaching and training
WP	work package

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CELAN D2.5
Final Report of WP2, including a list of provisional recommendations

1   Purpose and methodology

D2.5 is the Final Report of WP2, including a list of provisional recommendations. It is representing the outcome of Tasks T2.1, T2.2 and T2.4 with the following aim:

> *The WP2 Final Report will aggregate all results and findings of T2.1-T2.4 of WP2 and come up with a list of provisional recommendations derived from WP2.*

Although WP1 provided some indications, T2.1 investigated and analysed in-depth the language industry (LI) and its products and services. The comprehensive results were compiled in D2.1 (see 1.1) and its annexes. Then in T2.2 the findings of T2.1 were validated through interviews with a selected group of companies supplementing them by identifying best practices or success stories through these interviews or additional desk research. The results of T2.2 were laid down in D2.2 (see 1.2). Based on D2.1 and D2.2 a comprehensive list of language- and LI-related needs as expressed by industry&business was prepared. T2.4 matched these needs against existing language industry services, tools, and resources. In this way the resulting D2.4 (see 1.3) provides a comprehensive list of matches between expressed business needs and LI products and services available on the market.

The following parts of chapter 1 present the aggregated results of tasks T2.1, T2.2 and T2.4 laid down in the respective deliverables namely:

- D2.1 Annotated catalogue of business-relevant services, tools, resources, policies and strategies and their current uptake in the business community
- D2.2 Report of the outcomes of the interviews carried out in Task 2.2 including case studies of whole-company success stories
- D2.4 Comprehensive list of matches and gaps between industry&business needs and existing language industry services, tools and resources.

1.1   D2.1: LI products and services and their uptake in industry

T2.1 with the aim to come up with an "Annotated catalogue of business-relevant services, tools, resources, policies and strategies and their current uptake in the business community" proved to be challenging in view of the fast development of the LI over the last 5-10 years. Starting off from the requirement that "WP2 and especially T2.1 are about highlighting language services, tools, and resources that are used by and useful for enterprises – in particular SMEs", industry was analysed from a LI perspective followed by an investigation of the products and services of the LI in the form of an evaluation of existing

- Language technologies (LT) and language technology tools/systems (LTT),
- Language and other content resources (LCR),
- Language services (LS) and language service providers (LSP),
- LI sector-internal services,
- LI-relevant standards, guidelines and certification,
- LI-related policies/strategies.

T2.1 was carried out in close coordination with T2.2 from the very beginning. Desk research supported by preliminary consultations of LI experts in academia and industry resulted in a comprehensive overview (see: CELAN D2.1 Annex 1) of LI products and services which were evaluated in D2.1. As the number and variations of LTT and LCR as well as LS is increasing virtually by the day, the "CELAN Typology of Language Industry Products and Services" (see: CELAN D2.1 Annex 3) was developed as a comprehensive meta-catalogue providing guidance through the jungle of fast increasing LI products and services.

CELAN D2.1 collects ample indications for the current uptake of respective LI resources within the industry&business community, bearing in mind the increasing language- and LI-

related needs (and demands stemming from the needs) of industry&business triggered by accelerated globalization and the development of the Internet (and other global networks) as technological driving forces of globalization. In general, one can say that the LI in all its facets can meet customers' language-related needs and demands. The resources offered by the LI are at different levels of complexity and sophistication and in fact address an array of customer needs/demands also at different levels of complexity and sophistication depending on – among others – the size of the enterprise, its degree of specialization, the industry sector it belongs to and the customer demands of the target markets it aims at.

However, it also became evident that the success of an SME on global markets was often attributed to the use of LT (or LSP) rather than to language competences/skills, or it was directly attributed to the application of ICT, although LT deserved the merits. This shows that both language experts and LI in general have an image problem. This is one of the reasons why the visibility of the LI among SME is still comparatively low.

1.2   D2.2: Selected interviews and case studies

D.2.2 reports on the outcomes of the interviews carried out in T2.2 including case studies of whole-company success stories. The purpose of this task was also to validate the findings of T2.1. The preparations for the deliverable, therefore, started already while working on the overview of all language industry (LI) relevant aspects, also covering horizontal issues, such as language policy/strategies as well as language- and LI-related standardization and certification.

In order to carry out T2.2, the task was divided into three phases:

Phase 1: Designing a mind map (CELAN D2.1 Appendix 2) based on a rough categorization of LI products and services and a format to conduct consultations with LI experts.

Phase 2: Developing the "Language industry supply-side online questionnaire" (D2.2 Appendix 3) to collect information and identify enterprises for in-depth interviews.

Phase 3: Conceiving the "Format for in-depth interviews" (D2.2 Appendix 4) for carrying out interviews with representatives of selected enterprises and analysing the results. Parallel to this, desk research to identify best practice or success stories was carried out.

As a meta-catalogue, the CELAN Typology served as a guidance for the interviews to be carried out in the framework of T2.2. The results of T2.2 are presented in D2.2 as follows:

- Survey through the "Language industry supply-side online questionnaire",
- Case studies about best practices or success stories of SME in industry,
- Case studies about best practices or success stories of SME in the LI,
- Best practices/success stories identified through desk research.

In the course of the investigations and interviews it was recognized that

- Large-scale enterprises either use or develop or can afford to use/develop all kinds of LI products and services on the market;
- SME as a rule only use a small selection of the broad bandwidth of solutions provided by the LI, because they do not have
  - the information or
  - the proper means to investigate these offers or
  - the right consultants to inform and advise them.

This means that virtually all large-scale enterprises which are successful on the global market, have effectively integrated LI-related aspects in their globalization strategies. SME successful on the global market in most cases have found and taken up – not necessarily in a systematic way, but more often than not, rather by trial and error or following the example of others – a limited selection of offers of the LI, which contributed to their success.

In connection with the preliminary consultations and interviews to select the case studies, the concepts of whole-company "best practice" or "success story" were found fuzzy. It is mostly used for self-promotion by LI-enterprises and ICT companies at large. In addition, best

practice does not necessarily result in a success story and a success story is not necessarily based on best practice. Furthermore, it is often not the company or organization as such which earns the reputation of best practice or of a success story, but rather a part of or group within an organization, or (one or a set of) actions or activities taken to improve for instance the company's productivity. It could also refer to a particular product or group of products, to documents like a particular guideline or methodological approaches (which may or may not result in products or services), or to management strategies, such as corporate social responsibility (CSR), marketing activities etc.

It was confirmed that the success of an SME on global markets is often attributed to the use of LT (or LSP) rather than to language competences/skills, or is directly attributed to the application of ICT.

1. 3   D2.4: Existing needs matched by LI products/services

D2.4 provides a comprehensive list of matches and gaps between industry&business needs and existing language industry services, tools and resources – including also language policy/strategies as well as language- and LI-related standardization and certification aspects. From T2.2 it became clear that the language- or LI-related needs in industry&business differ depending among others on:

- Size of the enterprise and its degree of specialization,
- Its degree of globalization and the customer demands of the target markets,
- The nature of the industrial sector of the enterprise (e.g. manufacturing, trade),
- The degree of value-added of the enterprise's business.

How is this variation of different needs matched by different levels of complexity and sophistication under each type of the CELAN Typology? In reality, it is possible that a small, but highly globalized enterprise with high value-added business may need and use even highly sophisticated (and thus possibly expensive) LI products and services, while a large-scale highly globalized enterprise – e.g. in the raw material sector – may have only limited language-related needs and accordingly may use only few and low-sophistication LI products and services. D2.4 elaborates the main patterns in this multidimensional picture while not neglecting exceptions.

Based on the findings of WP1, T2.1 and T2.2 a refined table of needs in industry&business emerged, comprehensively covering basic language- and LI-related needs under the aspects of:

- Interpersonal communication,
- Technical documentation/communication,
- Marketing, promotion, publicity, advertising etc.,
- Information gathering,
- Language and LI-related policies/strategies, standardization and certification.

Industry&business can find solutions addressing these needs by developing the necessary resources in-house, or by outsourcing, or by looking for the "right" mix for in-house and outsourcing solutions.

On the one hand, all LI enterprises existing for more than a few years on the market can be considered as having found their customers proving the successful uptake of their products or services on the market. On the other hand, the still comparatively low market penetration of the LI products and services, particularly among SME, requires considering:

What are the reasons for the discrepancy between the high degree of meeting the needs of and the good uptake of LI products and services by industry&business in general on the one side and the comparatively low degree of market penetration among SME on the other side?

Posing the question in such a way leads to a number of "major gaps":

- The overwhelming presence of ICT in media, R&D, management methodologies, policies, etc. is dwarfing the visibility of the LI;
- Therefore, the LI is often not regarded as an industry sector of its own;
- The needs of LT experts with enough linguistic expertise and language experts with enough LT-expertise is not sufficiently met by the existing training opportunities;
- LI-related topics/developments of recent years do not appear in formal education;
- Business representative organizations (BRO) are not sufficiently aware of the LI;
- Decision makers in politics and business management – following their internal and external advisors – consider LI aspects (and even more so language-related aspects) as trivial;
- Large business consultancy enterprises just follow common perception and undervalue the LI;
- A certain aversion against standardization and certification by LSP and LTT providers – not to mention LCR developers – is typical for SME (and ICT) in general, but leads to a comparative reluctance to engage in standardization and skepticism against certification in the LI;
- There is a hidden need for vendor-independent LI consultants which is not met by the market.

Deliverables D2.1, D2.2 and D2.4 confirm the fact that the success of an SME on global markets is often attributed to the use of LT (or LSP) rather than to language competences/skills on the one hand or directly attributed to the application of ICT on the other hand, which shows that both language experts and LI in general have an image problem. This is paralleled by the lack of awareness of the existence of LI products and services in industry&business.

2   Provisional recommendations concerning language-related needs and LI

The investigations/evaluations in WP2 show that the LI has become quite complex over the last ten years. There are numerous and many different kinds of LI products (comprising LTT and LCR) as well as services (LS) and LSP on the market. Therefore, the demand for qualified language experts with a high level of LT competences/skills has definitely risen, on the one hand, while in the ICT fields LT experts with a sufficient knowledge of language-related requirements are in – often unrecognized – demand. LTT and LCR are indispensable for enterprises with large language-related needs and LSP to achieve good results. This role of the LI – with its products and services – is grossly undervalued in the public eye.

This situation leads to recommendations referring to the whole of the LI and others to individual aspects of the LI and its users' needs.

Rationale: Concerning the LI as a whole it became evident that both language experts and LI have an image problem.
➔ (to LI in general) LI stakeholders could take several approaches to remedy this situation:
(1) They should get organized to jointly work on developing general argumentation strategies and promotion activities so that the merit for the success of industry&business – and especially of SME – on global markets is directly attributed to them, not to the application of ICT in general. This would largely improve the visibility of the LI among SME and foster the uptake of LI products and services in industry&business. LSP keenly using state-of-the-art language technology in particular improved the speed and quality of their services.
(2) They should develop specific argumentation strategies geared towards guiding customers towards solutions to their real needs – not necessarily developing for them sub-standard solutions which are already outdated at the conception phase (because the customer is not aware of the own needs or has strong preconceptions).
(3) They should promote and assist the education/training of vendor-independent consultants in their own interest. This would in fact be a true win-win situation for LI stakeholders, LI customers and the vendor-independent consultants.
(4) Cooperation with HEI should be intensified.

Rationale: Competition on the market for LI products and services is fierce and entices LI stakeholders to overlook common goals and the need to cooperate e.g. in the field of standardization, the growing demand for quality and reliability of content, the requirements for content integration and interoperability.
➔ (to LI in general) Cooperation with respect to standardization efforts, building of commonly available reliable content resources, developing methods and system approaches for content interoperability etc. would be beneficial for all LI stakeholders.
Globalization is heading towards overcoming the next language barrier represented by the next 10 languages beyond today's most commonly used 10 languages in the Internet. For being successful in foreign markets, such as China, Russia, Brazil, etc. it is crucial to get website, product description, manuals, marketing and promotion material localized into the target markets' languages.

Rationale: There is an increasing need in industry&business towards the integratability and interoperability of systems and content in general, on the one hand and more services to be contracted to LI enterprises, on the other hand.
➔ (to LSP and LTT developers) The awareness for the fact that industry&business needs more LSP, and especially those properly using state-of-the-art as well as standards-conformant LT and LCR should be raised in economic politics and by BRO.

In the following parts the recommendations highlighted in the WP 2 documents were condensed under
- LTT and their users (para 2.1),
- Language and other kinds of content resources (LCR) (para 2.2),

- Language services (LS) and language service providers (LSP) (para 2.3),
- Evaluation of standards and guidelines in the LI (chapter 3),
- Language policy/strategies (chapter 4),
- Job opportunities (chapter 5).

2.1   LTT and their users

LTT are of growing importance in industry&business at large and even for the ICT industry itself, but there are complaints about the cost, quality, capability for integration and interoperability, problems of content interchange, restrictions with respect to language and script use, lack/proliferation of standards, etc.

The following are recommendations referring to LT and LTT as well as their users in general.

Rationale: Users (incl. LSP) demand that LTT should be usable immediately (with as many languages as possible) and be easy to adapt to and integrate into other system environments and at the same time be less expensive.

➔ As LTT users suffer from problems with exchange (and conversion) of content, gaps in standards, content locked into tools/systems, insufficient system integratability and interoperability etc., LTT developers should cooperate towards better solutions in the direction of enhanced integratability and interoperability of systems and content.

➔ (to economic and educational policy as well as industry&business in general) As there is a lack of vendor-independent consultants who can advise users of LTT in a neutral objective way, activities should be developed/promoted to train LI consultants.

➔ (to HEI) LTT should be better represented in the education and training of higher education institutions (HEI) with respect to several fields/aspects of education:

- Computer science and especially software engineering,
- LT-related requirements on ICT in domain-related education and training,
- LT-related competences/skills of LSP,
- More language- and LI-related aspects in learning technologies

2.1.1   Translation technology and its users

Machine translation (MT) is applied to many sorts of text and even websites' content as well as transcribed dialogues in mobile communication. It is not at the same level of maturity in all its applications. Although MT has improved tremendously for certain text sorts in TD and is increasingly applied to ever larger volumes of texts, it will still require for quite a while:

- Human intervention before submission to MT
- Human intervention after submission to MT
- Various methods/tools of computer-assisted translation (CAT), interactive machine translation (IMT) etc.

Rationale: Language experts well trained in keenly using translation technology are more efficient and yield higher translation quality.

➔ (to potential translation technology users and HEI as well as other training organizations) In particular LSP enterprises interested in hiring or sub-contracting language service experts should be aware to which extent human intervention is necessary (before or after MT) for which sorts of text in which domain or application so that they can look for the experts or sub-contractors having the right competences/skills for using MT most efficiently.

➔ (to potential translation technology users) When analyzing their translation needs, enterprises should consider controlled natural language (CNL) approaches which largely facilitate the translation of texts, the efficient use of translation technology, the harmonization of language use throughout the enterprise (with a view to corporate language – CL) etc.

2.1.2 Text technologies and their users

There are text technologies for different purposes at various levels of sophistication. Text technologies comprise in particular authoring tools for scientific and technical writing, TD systems for technical documentation and desktop publishing (DTP) and the respective tools/systems. The first two of them – being at the text creation and editing end – may include features of text lay-outing and graphics functionalities to an extent which exceed those of office automation software. DTP – being at the finalizing/finishing end – concentrates on high-end products and often covers the functionalities of professional pre-print software.

Rationale: Text technologies are under the pressure of integration into larger software architectures and interoperability with different kinds of content.

➔ (to text technology developers and users) Especially for high volumes of text creation or editing the suitable use of CNL approaches (and tools) and/or terminology management systems (TMS) or language-oriented CMS is recommended.

➔ (to text technology developers and users) Text mark-up should be done in such a way that it does not necessitate big reformatting efforts when taking it over into other systems, such as DTP or Web CMS.

➔ (to text technology developers) Text technologies should be conceived based on standards in such a way that they are interoperable with office automation systems and other LTT.

2.1.3 Terminology management systems (TMS) and their users

Appropriate terminological data can render more effective: advanced search engines, translation technology and other applications. Quality management and multilingualism has contributed to the growing demand for terminology tools in industry&business. Compared to the positive effects of an appropriate terminology management in view of an enterprise-wide corporate language (CL) or in non-linguistic applications (such as in parts administration) clearly makes up for the cost of TMS and terminology work in an enterprise.

Rationale: There are TMS for different purposes at various levels of sophistication. Many TMS are insular systems which only deal with terminological data (not taking into account the need for other kinds of structured content) and cannot – or only with great difficulties – be integrated or made interoperable with other LTT or ICT in general.

➔ (to TMS developers) TMS should be conceived in such a way that they can support any language-related activity where harmonization of language use is an issue, such as to support:
   - A consistent and coherent language use in general (with a view to a clear CL
   - Translation, interpretation, TD and localization,
   - Information gathering activities,
   - Marketing, advertising, promotion etc.

➔ (to TMS developers) TMS design should include work flow management and increasingly also web-based, distributed cooperative work methods (incl. the use of mobile devices)

2.1.4 Speech technology (ST) and its users

STT were designed to respond to or duplicate the human voice. They comprise speech recognition and speech synthesis tools, high-speed speech transcription and dictation tools, speech compression and manipulation, voice access to information, up to innovative systems, such as video rewrite and other dubbing systems. Some features of ST are already widely used in consumer electronics and other low-end devices.

Situation: Industry and governments are heavily investing in readily applicable speech technology for an array of purposes. For many specific applications, such as reading texts, dictating texts, operating a computer with speech commands, communicating with and among persons with disabilities (PwD), supporting simple dialogues, STT already show a

high degree of maturity. While human interpretation – especially in sensitive situations and in critical communication – cannot be replaced by ST for a while to come, it can be expected that ST will make progress in this direction.

➔ (to LTT users and LSP) LTT users in general and LSP in particular should watch the development of ST and select those STT that help to improve the efficiency and quality of language-related activities.

2.1.5 Content management systems (CMS) and their users

For the purpose of CELAN only those CMS which are primarily processing language data and LCR, such as web CMS, are considered as LTT. However, language technologies play a critical role in many CMS systems – e.g. for authoring assistance, document indexing, search, version control, summary generation or the automatic translation of the content into multilingual versions. Other CMS represent a business world of its own with its own approaches and business models.

Rationale: Language-related CMS are indispensable for many enterprises and in particular for larger or specialized LSP. But they are still costly in terms of system maintenance and upgrading, training the persons using or operating the system.

➔ Users (whether industry&business or LSP) need to carefully check the "hidden cost" of buying or renting a CMS and analyse well their needs and the range of purposes (incl. languages and scripts), for which certain CMS can be applied.

➔ Users should particularly consider that a CMS fits into (or can be adapted to) their overall system environment, so that their content is not locked into the system and can be recovered when they have to change to a different system, and that as many features as possible are standards-compliant.

2.1.6 Language teaching/learning systems/tools

eLearning is essentially the computer-assisted and increasingly network-enabled transfer of skills and knowledge. It comprises all forms of electronically supported learning and teaching. In general a language-independent approach to the creation and maintenance of content in eLearning systems/tools is used so that any kind of subject can be taught in any language. Content is delivered via the Internet, intranet/extranet, audio or video tape/CD, satellite TV, etc. There are many eLearning systems/tools which are also used for language teaching/earning and quite some which are only used for language teaching/learning.

Rationale: There is a proliferation of language teaching/learning systems/tools having many benefits, but also many draw-backs.

➔ eLearning systems/tools geared towards language teaching/learning should be designed to optimally empower the learners.

➔ eLearning systems/tools should be designed to enable learning content developers and learners to use them in a collaborative way.

➔ eLearning systems/tools geared towards language teaching/learning in industry&business should not be used isolated from teaching/learning technologies for other purposes and provided with interfaces for the reuse and re-purposing of content in other systems.

2.2   Language and other kinds of content resources (LCR)

LCR in the LI are collections of structured or unstructured content published or accessible in electronic form: in databases, on CD-ROM or dedicated devices (e.g. electronic dictionaries), or on the Internet through online access. It is estimated that only 1% of today's content is conventionally published on paper. The major kinds of online content resources comprise:

- Different kinds of structured content, such as terminological data online, lexicographical data online and other kinds of structured content online,
- Different kinds of unstructured content.

Rationale: There are many variations of either structured content or unstructured content at different levels of sophistication – but few bridges between. No need to mention that there are many systems for processing and deploying content. However, in the Internet:

- *Mass markets are emerging for all kinds of content resources of different degrees of reliability (more and more replacing traditional publications) on the one side,*
- *The demand for integration and interoperability – not to mention for quality and reliability – of LCR is growing, on the other side.*

There are no standards and tools yet available to check the reliability of content contained in LCR, which – in rare cases – may lead to liability issues.

➔ (to industry&business and LSP) Users need to carefully check the emerging LCR and decide, which ones are reliable or not. It is useful – and sometimes necessary – to provide individual users with guidelines about how to use which LCR for which purpose.

➔ (to industry&business and LSP) Users need to check whether freely available LCR providing obligatory advertisement in order to finance themselves can pose a security problem.

➔ (to economic and educational policy) New business models should be promoted for LCR developers to offer LCR automatic updating, reuse in various LTT and ICT systems as well as other services to certain users or user groups.

➔ (to industry&business) Users should particularly consider that their (structured or unstructured) content is not locked into the system and can be recovered when they have to change to a different system, and that as many features as possible are standards-compliant.

➔ (to LCR developers) The formats of unstructured content should be standard compliant and modular – not to mention the capability to handle different languages and scripts.

➔ (to LCR developers) If required, the formats of unstructured content as well as the respective systems must be compatible or at least interoperable with controlled natural language (CNL) approaches/systems and LCR resources as well as translation, text and other GILT approaches/systems.

➔ (to LCR developers and eLearning designers) A good content authoring system (or content development platform) should be used when creating content for instance in eLearning systems; it is important that the content is modular, allowing students to learn a manageable amount of information while giving them the opportunity to create links between bundles of information.

2.3 Language services (LS) and language service providers (LSP)

Globalization has led to more contacts at any level and in any domain or field of application, which has triggered an exponentially growing demand for:

- Technical documentation/communication services,
- Translation services,
- Interpreting services,
- Localization services,
- Desktop publishing services (complementary to text-related, translation and localization services),
- Language teaching and training,
- Language industry consultancy services,
- Communication services for persons with disabilities (PWD).

Rationale: LSP belong to the most extensive users of LT and LCR – and concerning the LTT and LCR they use, they are the most intensive users.

➔ (to LSP) LSP should consider as much as possible the GILT conception, which responds to the demands and requirements of industry&business customers and their language service providers (LSP) to integrate the most pertinent systems and services – and increasingly also content. GILT originally comprised globalization, internationalization, localization and translation, to which text technologies and desktop publishing (DTP) systems/tools and services have to be added.

➔ (to LSP) LSP should engage in the respective standardization efforts for their own benefit – and also in certification which is increasingly required by industry&business customers.

➔ (to industry&business customers) Whether done in-house or being outsourced, industry&business customers should know well the different requirements of LS and the LT used for carrying out the services.

2.3.1 Technical documentation (TD) / technical communication

Under the aspect of LS text technologies comprise in particular technical documentation (TD), Scientific and technical writing, and desktop publishing (DTP). TD today goes beyond writing or supplying information – it is all about apprehending the right data according to the audience, then getting it in a format that best suits its needs. Effective TD increments customer satisfaction and decreases support costs. TD leads to tangible benefits since it can make business processes more reliable. Well-written content can make intellectual capital even more valuable.

Rationale: For the time being technical documentation/communication covers probably the most thriving professions. Given the fact that TD is part of the product, TD is important in connection with product quality and product safety. Legal provisions triggered the first standards on technical documentation. Today, TD is heavily governed by standards – localization and translation are following this direction. Nowadays, standards – and standards-based certification systems – are not only accepted, but increasingly also demanded by customers and LSP.

➔ (to users of TD and TD services) All processes should be designed in such a way that they can be mirrored in the enterprise. This means: All TD processes should be documented.

➔ (to industry&business customers) When charging an external documentation service with creating your documents, it is important that you reserve all rights regarding templates, style sheets, texts, and source code (especially in the case of online help / online documentation).

➔ (to industry&business customers) Using external TD services:
  - Can increase the company's flexibility and reduce time to market,
  - Gives people back the time to focus on their core tasks,
  - Ensures that TD which requires special skills can be performed efficiently by a specialized TD service provider.

2.3.2 Translation services

Although the demand for ***literary translation*** has increased over the years and is a substantial part of the publishing business, the demand for ***specialized translations*** has grown and is still growing exponentially. The latter have diversified tremendously over the last decades into many different kinds including:
  - Domain-specific translation, like legal, technical, scientific, medical, etc.
  - application field specific translation, such as patent translation;
  - Media translation;
  - Subtitling and dubbing, etc.

This growth and diversification has enhanced the development of translation technologies to improve the performance and quality of translation.

Rationale: Managed correctly, translation can enable key growth and competitive advantage. Managed poorly, it is a fragmented, unstructured expense that is hidden from the glare of executive review, and ripe for optimization.

➔ (to business&industry) When translation volumes increase, enterprises should not think of translation as just compliance, but a tool to reach new markets. Then they see that quality translations are not just necessary – they are part of an investment strategy that will eventually has a major payoff.

➔ (to business&industry) Management is advised to ask people knowing about the key aspects of translation to be engaged in the planning, to ask informed questions, to conduct quarterly performance reviews, and to ensure that maximum value is being generated for the

translation spend. About 40 associations of professional translators in Europe can be contacted for information on translation tasks and services.

➔ (to business&industry and translation service providers) Consider that special requirements, such as different writing systems (e.g. Cyrillic, Chinese, Arabic, etc.), may necessitate more time for individual translation jobs, or need extra language technology tools (LTT) or specialized language and other content resources (LCR).

➔ (to business&industry) There may be translations, where it is advisable to look only for the best translator for the task.

➔ (to business&industry) Management may consider GILT (globalization, internationalization, localization and translation – often comprising also translation and DTP) services for more generic solutions to their growing language-related needs.

2.3.3   Interpreting services

An *interpreter* is a person who converts a thought or expression in a source language into an expression with a comparable meaning in a target language. From original simultaneous and consecutive interpreting, the several modes of interpreting developed, such as conference interpreting, consecutive interpreting, community interpreting, telephone interpreting (OPI), signing (sign interpreting), some kinds of dubbing. Conference interpreting is closely linked to conference organization (and the respective facilities necessary). Large interpreting service companies usually also offer a broad range of conference organization services.

Rationale: *More and more combinations of these modes and new modes are required and emerging in practice. Demand in society (e.g. community interpreting) and business on the one hand and LT development are driving diversification and change in the field of interpreting.*

➔ (to industry&business) Analyse and evaluate your needs for interpreting and then chose the most suitable solution or mix of solutions concerning interpreting modes and using (in-house or external) interpreters. Many associations of professional interpreters in Europe can be contacted for information on interpreting tasks and services.

➔ (to business&industry) There may be interpreting needs, where it is advisable to look only for the best interpreter for the task.

➔ (to business&industry) Management is advised to ask people knowing about the key aspects of translation to be engaged in the planning, to ask informed questions, to conduct quarterly performance reviews, and to ensure that maximum value is being generated for the translation spend.

2.3.4   Localization services

In general, localization is the adaptation of a product or communication to a community of speakers with respect to cultural, linguistic, legal, political and other aspects. More specifically, it means to adapt computer software (software localization) to different languages, regional differences and technical requirements of a target market. Often referred to as part of GILT, localization services developed out of TD rather than translation. Globalization, internationalization and localization have developed multilingual approaches from the outset as well as sophisticated methods and tools. Today desk-top publishing (DTP) systems and services are more and more included in the GILT framework. GILT services are extensively using any of the language technology tools/systems necessary for their services and belong to the most intensive users of LTT and LCR.

Rationale: Localization, globalization and internationalization services have been conceived to adapt products (and the technical documentation pertaining to products) intended to be marketed cross-border or at international level accompanied by high volume texts. GILT refers to a broad range of processes necessary to prepare and launch products (or services) and company activities internationally. GILT has a deep impact among others on business processes, management procedures and even the adaptation of marketing tools.

➔ (to industry&business) The more texts are necessary to be translated/localized and the higher the text volumes the more it is advisable to investigate and implement the approaches and tools developed by today's GILT approach and services which more and more comprise text technologies, DTP and supportive LTT such as TMS, CMS etc.

➔ (to industry&business customers) Using external GILT services:

- Can increase the company's flexibility and reduce time to market,
- Gives people back the time to focus on their core tasks,
- Ensures that GILT tasks which require special skills can be performed efficiently by a specialized GILT service provider.

2.3.5 Desktop publishing (DTP) services

Word processing and other office automation (OA) software today include some, though by no means all, capabilities previously available only with professional printing or DTP systems. As a consequence of the demand for integration and interoperability, there is a trend among DTP services to venture into the field of the GILT services. Vice versa, GILT services frequently also include professional DTP in their services.

Rationale: Today, virtually any business use desktop publishing for some purpose. Desktop publishers prepare graphic materials such as: brochures, flyers, full-page advertisements, business forms, Web pages, logos, CDs covers, catalogs, newsletters, books, proposals, and much more. While some desktop publishers prepare almost any kind of graphic material, many specialize in one or a few, such as on newsletters.

➔ (to business&industry) Be aware of the fact that high-quality DTP requires well-trained DTP experts. Although certain features of DTP are gradually introduced into general OA systems, still more features specific to DTP are developed.

➔ (to business&industry and DTP service providers) Consider that special requirements, such as different writing systems (e.g. Cyrillic, Chinese, Arabic, etc.), may necessitate more time for individual DTP jobs, or need extra language technology tools (LTT).

➔ (to business&industry) Be aware of the gaps in standardization concerning interoperability of DTP systems and other LTT and OA systems.

2.3.6 Language teaching and training (LT&T) services

LT&T outside of the official educational system have become a thriving business over the last three decades and differentiated among others according to:

- Enterprise-oriented language training,
- Target groups of language teaching,
- Different types of language courses,
- Skills/competences of teachers/trainers,
- Skills/competences of learners,
- Teaching of languages for special purposes,
- Computer-based language learning.

There is an array of different kinds of organizations carrying out such LT&T, from traditional non-profit vocational education organizations, via official cultural institutions to clubs and associations – not to mention individual teachers/trainers (increasingly working from abroad through the Internet) and dedicated language learning platforms.

Rationale: There is a proliferation of LT&T services/platforms on the market offering different solutions for specific purposes. Parallel to this development, there is also a proliferation of teaching/learning technologies. These technologies and tools in many cases are inefficiently used neither in LT&T agencies nor in HEI.

➔ (to industry&business) Larger enterprise should consider investing in the most suitable language teaching/learning technologies under a general T&T policy/strategy (which would comprise general guidelines, technology and various qualification as well as incentive aspects).

➔ (to industry&business) Enterprises with a comprehensive T&T policy/strategy (comprising LT&T) could offer their cooperation partners and suppliers to use some of the T&T opportunities offered. Other enterprises could use LT&T opportunities suitable for their purposes offered by other enterprises, business representative organizations (BRO), HEI or others.

➔ (to LT&T service providers and HEI) From a teaching and learning theory perspective it is important to separate the content creation process from the specific tool being used to deploy the content, not only to focus attention on the process of creating truly compelling and interactive learning objects, but also to ensure that the content can be easily shared and reused without being locked into a specific authoring tool or learning management systems (LMS).

2.3.7 Language-related consultancy services

LI-related consultancy services can refer to all or any of:
- Overall language policy of an enterprise,
- Introduction or improved use of language technology tools,
- Most efficient use of language services and LSP,
- Most effective use of terminology and other LCR,
- Introduction or outsourcing of language learning/teaching, or to the
- Pertinent standards and certification schemes.

However, LI products and services (as well as assistive technologies) being considered as "niche" markets:
- Are not part of mainstream ICT (also in education and training),
- Standardization is spread over many technical committees at international level,
- Are not known or not accepted or refused to be taken as essential (especially by the SME and micro-enterprises in the LI).

Rationale: General business consultancy services normally do not know enough about the LI to provide proper language- and LI-related consultancy. However, the consultancy services offered by experts and enterprises of the LI rarely offer neutral/objective consultancy independent from specific LT vendors or LSP. On the other hand the demand for neutral/objective consultancy services is growing.

➔ (to industry&business) Be aware that the LI – although often subsumed under general ICT – is characterized by many specifics, from methods via dedicated technologies to specific standards and certification schemes. It may, therefore, be necessary to ask more than one consultant for advice.

➔ (to industry&business) Make sure that consultants specializing on language- and LI-related aspects have a broad knowledge of language-aspects, LT and LS, as well as organizational and operational experience in industry&business.

2.3.8 Communication services related to persons with disabilities (PwD)

Not least due to the emergence of the assistive technologies and different forms of augmented and alternative communication (AAC), new types of communication services for PwD are appearing. They refer to:
- The development of LTT (or the adaptation of existing LTT) for use by PwD,
- The development of LCR (or the adaptation of existing LCR) for use by PwD,
- The development of LS (or the adaptation of existing LS) for use by PwD.

Beside sign interpreting, there are new developments on the market, such as instant subtitling of PowerPoint presentations at conferences, dubbing of movies etc. Under a broad perspective of "interoperability" and "localization", mobility and accessibility require many same or similar requirements for software and content development. No wonder that many tools stemming from assistive technologies have become common use for everybody especially in mobile devices.

Rationale: There are assistive technologies for, special LCR supporting communication with and LS – or better communication services – facilitating communication with PwD thus reducing the material and psychological barriers against employing PwD.

➔ (to LTT, ICT and LCR developers) As LI-related standards and assistive technology standards – in particular those related to communication – often address similar issues (and are both useful in eLearning), all ICT developers in general and LTT developers in particular should respect the requirements of the "Recommendation on software and content development principles 2010".

➔ (to industry&business) There are several good reasons, why it is beneficial for enterprises to employ PwD; there exist support schemes for enterprises to employ PwD in many European countries which facilitates communication with PwD on the one hand, while helping enterprises to comply with societal and legal requirements, on the other hand.

2.3.9 LI sector-internal services

As a sign of maturing the sector-internal services comprise a big share of the LI market. They are rendered by and for LTT developers, LCR developers and LSP – in addition to some large-scale enterprises individually. They can be roughly subdivided into:

- LTT development, and installation and maintenance services (e.g. by LTT companies for LSP or LCR developers, or by LSP localizing LTT),
- Training services (e.g. by LTT developers to LTT users, LSP, LCR developers, students of LS),
- Advice and consultancy services (e.g. by LTT developers and LSP to LTT users, LSP, LCR developers).

Rationale: Often LTT development is not oriented at international standards and therefore it results in deficits with respect to integratability and interoperability of systems and content. The focus of many LT companies on concentrating training and consultancy services on their own products/services is short-sighted in the long run, because users will look for solutions to free them out of the limitations of vendor-dominant systems.

➔ (to LTT developers) The maturing LI needs to step up efforts to improve the professionalization of the LI product and service providers – not least with a view to gaining more standing "against" general ICT. A greater participation in pertinent standardization activities would certainly help to overcome deficits in the recognition of the LI as an industry sector of its own.

➔ (to economic policy and LTT developers) In their own interest with respect to credibility there is a need for activities to train and qualify vendor independent LI consultants, which would largely improve "trust" in the field of the LI.

3   Recommendations from the evaluation of standards and guidelines in the LI

Annex 2 Investigation of business-relevant standards and guidelines in the fields of the language industry of D2.1 (Annotated catalogue of business-relevant services, tools, resources, policies and strategies and their current uptake in the business community) shows that there exist many standards of relevance to the language industry. The situation resembles to some extent that in the field of eBusiness-related standards, where there is an affluence of industry (de facto) standards compared to a minority of international (de jure) standards of official standards organizations. This explains why there is a need for international standards to fill certain gaps, on the one hand and for the harmonization of competing standards, which often create barriers to integration and interoperability instead of overcoming them, on the other hand.

Standards – especially international standards – in the field of the LI are important to ensure integration and interoperability of systems and content and thus the efficiency of processing and communicating the necessary information in terms of structured and unstructured content. This efficiency would let industry&business enjoy the full range of benefits of using LI products and services – and make them affordable to SMEs. As LI-related standards and assistive technology standards – in particular those related to communication – often address similar issues (and are both useful in eLearning), there should be more coordination efforts among the respective standardization activities going on. The respective standards should enjoy more attention in the education and training of computer scientists and software engineers.

> Unfortunately, only few LI experts – whether from academia or industry – know the full range not only of LI products and services in general, but also of existing standards in particular. There is definitely a lack of education and training for vendor-neutral, objective and LI standards-knowledgeable consultants, which should be taken up for action by politics and industry associations.

Looking at the 2010-2013 ICT Standardisation Work Programme
> *"ICT standardisation is part of the general standardisation activities and contributes to the policy objective of improving European competitiveness while balancing industry expectations with societal needs"*

language industry (LI) related standardization – given the stupendous rise of the LI over the last 5-10 years – is clearly undervalued. Standardization efforts related to the LI may even become a major driver towards overcoming the fragmentation and deficits in the interoperability of ICT standards at large.

The investigation of business-relevant standards and guidelines in the fields of the language industry in D2.1 resulted in 9 major recommendations:

Recommendation 1 *(to policy and decision makers confronted with LI-related issues):*
In the age of globalization policy and decision makers should pay due attention to LI-related standards, which facilitate localization, i.e. the adaptation of products and services (including the respective documentation as well as communication processes) to the languages and cultures of target markets. In this connection, the comparatively new aspect of content quality is becoming a major issue in overall quality management of the organization.

Efficient localization is indispensable for successful globalization which explains the astounding growth of the language industry (LI) with its products (i.e. language technology tools/systems [LTT], language and other content resources [LCR]) and services over the last years. Parallel to the development of LI products and services industry requires more and more the capability of ICT to be integratable or at least be interoperable – a requirement increasingly extended also to content. In this connection it is necessary to identify existing standards which need harmonization and gaps to be filled in standardization.

Recommendation 2 *(to all stakeholders in the field of LI-related standardization):*
LI products and services and their integration and interoperability with ICT in general and with various content management systems (CMS) in particular – duly taking into account the rising needs for the integration of assistive technologies – makes the enhanced coordination of LI-related standardization and implementation efforts imperative at several levels such as:
- Character coding, fonts development etc.,
- Metadata and metadata registries, repositories of codings etc.,
- Formats, schemas, protocols, markup languages etc.,
- Data modelling approaches (incl. meta-models and a ontology meta-language),
- Document and content management (incl. sustainable archiving requirements),
- Overall policies and management practices.

Recommendation 3 *(to standards developers in the field of LI-related standardization):*
The field of LI-related standardization activities has become – in line with ICT standardization at large – quite complex and fragmented, which calls for an increase of coordination efforts. This coordination could take place through the standardizing experts involved, improved communication and information channels among related standardization activities, more detailed cross-referencing of related standards (incl. those of industry SDO) and other means. As a side-effect this coordination – also including the harmonization of language used in standards – would improve the general quality level of standards.

Recommendation 4 *(to developers and users of LI products and services):*
Whether using or developing LI products and services in-house or outsourcing the use of these products and services to language service providers (LSP), due attention should be paid to pertinent standards which not only helps to save costs (and gain efficiency at the same time), but also to avoid misunderstandings (causing conflicts, risks and possible liabilities) as well as to benefit from improved quality of the resulting LI products and services.

Recommendation 5 *(to users of LI products and services):*
An efficient use of LI products and services needs thorough preparation and a systematic approach (e.g. on the basis of an explicit language policy/strategy) – including also a good overview of existing standards. Using – whenever possible – standards-compliant LI products and services helps to improve the efficiency of all localization activities and of content management at large. Looking for a vendor-neutral and objective consultant familiar with LI-related standards is a good way to implement the respective know-how fast and to help users take the most appropriate decision for their – often unaware – language problems.

Recommendation 6 *(to developers of LI products and services):*
Given the increased requirements for ICT system and content to be integratable and interoperable – extended towards the quality and interoperability of content – the developers of LI products and services should endeavor to be compliant with international standards and further develop them in order to overcome the fragmentation (resulting in barriers to interoperability) in this field. Especially SMEs should not be advised to invest into tools/systems which – if the necessary capability for integration and interoperability is not given – could prevent the upgrading of their systems in the future, not to mention the costly conversion or re-input of their content, if systems have to be upgraded or replaced.

Recommendation 7 *(to developers of language and other content resources):*
Standards-compliant or even standardized high-quality structured content is becoming more and more a crucial issue in the use of LI products and services. Quality structured content is invariably connected to the application of pertinent standards-based or standardized metadata. In particular, resources of structured content should be developed with content integration and interoperability in mind, where the re-purposability in assistive technologies is becoming a new requirement which is not so amazing given the complementarity or even similarities of data and information used through assistive technologies to content in the language industry.

***Recommendation 8** (to language service providers):*
Language service providers (LSP) need personnel having a broad range of technical competences and skills for carrying out the services – not to mention the necessary insight in the market, business experience, understanding of legal and other non-technical aspects. In rendering their services they have to deal with non-linguistic types of content, for which they need the right language technology tools (LTT). They also have to cope with a number of formats, schemas and markup languages constantly causing problems in their daily work. Therefore, it needs a high level of ICT literacy – including the familiarity with pertinent standards – on the LSP's side in order to master this complexity, which they often have to share with their customers. Since LSP are growing in terms of numbers and size they are also major employers for graduates of LI-related fields, which should be considered particularly by higher education institutions (HEI).

***Recommendation 9** (to educational and training institutions/organizations):*
Given the fact that many of the aspects covered by LI-related standards and the complementarity standards related to assistive technologies are not sufficiently taught during the education of computer scientists and software engineers at higher education institutions (HEI), the intensification of cooperation also with respect to standardization activities is desirable. In addition, extra-HEI training schemes as well as an accredited – preferably standards-based – certification of the thus acquired skills/competences are definitely a need on the market.

4   Recommendations concerning language policy/strategies

Enterprise language policy or language strategies from the point of view of language- or LI-related needs may cover one/some or all of the following individual aspects:

- Interpersonal communication,
- Professional interpreting, translation, localization,
- Training and learning technologies,
- Text activities and technologies,
- Digital marketing and LI solutions,
- Information gathering and business intelligence (BI).

In addition, there are generic LI approaches, tools and other products, or services to support virtually all aspects of language-related activities, thus rendering language policies/strategies more effective, such as:

- Terminology and other language and content resources,
- Controlled natural language,
- An enterprise style guide.

Rationale: The Canadian example shows that a national language- and LI-related policy concerning the status of languages, LI and the respective standardization efforts are resulting in concrete economic advantages (indirectly creating also new jobs). Large-scale industry and in particular ICT enterprises nearly all have a language- and LI-related policy with obvious positive effects.

➜ (to policy makers in the public domain) Particularly in Europe where mobility is considered an important policy issue not only bi-, tri- or multilingual countries but also largely (perceiving themselves as) monolingual countries should develop a language policy – considering the impact on education, innovation, migration, export promotion, etc.

➜ (to decision makers in industry&business) The more your enterprise is targeting customers (sometimes even suppliers) in different language communities, the more it will be faced with language issues of growing complexity. Therefore, in order to avoid serious inconsistencies in TD or flaws in CL, it is advisable to formulate a formal language policy as early as possible.

➜ (to lower and middle management in industry&business) It is advisable to consider that:

- Language issues are not "trivial" – therefore, try to get hold of experts with sufficient experience,
- Language issues are not so complex that there is no solution to them – there are plenty of successful examples to learn from,
- Solutions to language issues are not too expensive – endeavour to find consultants having a broad range of experiences with feasible, economical and quality improving solutions.

➜ (to LI sector and assistive technologies enterprises) LI and assistive technologies enterprises have several aspects and problems in common:

- Multi-category (no single category "language industry"),
- Difficult to explain (strongly academic driven),
- Fragmentation,
- Under-organized (in terms of associations, partnering etc.).

5   Recommendations with respect to job opportunities

In the course of the investigations in CELAN T2.1 and T2.2 certain trends with respect to job opportunities for experts with language-related competences/skills surfaced:

- Smaller SME in industry&business tend to hire language professionals for taking care of the communication needs extended to more and more languages (and scripts) in the course of globalization;
- Larger SME and large enterprises tend to reduce language professionals and make more use of LTT and LSP, while the language-related competences/skills are either taken care of by language professionals with a different mix of language-related competences/skills or by LT or other experts;
- LSP enterprises are employing many language professionals, but not as many – especially young graduates – as are available in the market;
- Since a couple of years there is a striking increase of translation marketplaces, which – similar to flight booking platforms – offer customers in industry/business or public administration translations into more or less any language and in any subject at "competitive" conditions, while trying to lure individual translators into their systems. This puts existing LSP under pressure, on the one hand and makes individual translators lose bargaining power on the other hand, as they have to succumb to the translation marketplaces' conditions;
- For the development of LTT, experts of ICT with more knowledge of languages or language experts with high-level ICT competence are required;
- Many language-related job profiles needed in the LI are also needed in (especially large SME or large) enterprises.

Rationale: The job market for language professionals is subject to high dynamics in terms of
- *Change in (and increase of) the mix of competences/skills required by customers or employers;*
- *New types of "customers" (mostly not employers in the traditional sense) in the form of LSP or intermediary platforms;*
- *New forms of competition from non-language professionals;*
- *Increased demand for automation and for cost reduction brought about by automation.*

➔ (to HEI and other pertinent education/training organizations) Education and training organizations should survey the market demands regularly and show higher flexibility in adapting their curricula and training schemes.

6   Summary

After aggregating all results and findings of T2.1, T2.2 and T2.4 of WP2, D2.5 comes up with a list of provisional recommendations derived from WP 2 investigations and activities concerning:

- Language-related needs and LI (chapter 2)
- Standards and guidelines in the LI (chapter 3)
- Language policy/strategies (chapter 4)
- Job opportunities (chapter 5)

The provisional recommendations under "language-related needs and LI" were further differentiated into:

- LTT and their users
  - Translation technology and its users
  - Text technologies and their users
  - Terminology management systems (TMS) and their users
  - Speech technology (ST) and its users
  - Content management systems (CMS) and their users
  - Language teaching/learning systems/tools
- Language and other kinds of content resources (LCR)
- Language services (LS) and language service providers (LSP)
  - Technical documentation (TD) / technical communication
  - Translation services
  - Interpreting services
  - Localization services
  - Desktop publishing (DTP) services
  - Language teaching and training (LT&T) services
  - Language-related consultancy services
  - Communication services related to persons with disabilities (PwD)
  - LI sector-internal services

The provisional recommendations concerning standards and guidelines in the LI were taken over from CELAN D2.1 Annex 2.

Given the fragmented situation of the LI and the large number of little coordinated developments some of the provisional recommendations may not fit to each individual situation.

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