

# Language Technology Resource Center

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## Abstract

This paper describes the Language Technology Resource Center (LTRC), a U.S. Government website for providing information and tools for users of languages (e.g., translators, analysts, etc.) The LTRC provides information on a broad range of products and tools, and provides a means for product developers and researchers to provide the U.S. Government and the public with information about their work. The LTRC is part of the Foreign Language Resource Center (FLRC) program, which provides support to Government and professional organizations regarding language tools.

## 1 Background

The Language Technology Resource Center (LTRC) is a U.S. Government-sponsored website<sup>1</sup> that provides information on a broad range of products and tools. It also includes an online survey for product developers and researchers to provide the U.S. Government and the public with information about their work. The LTRC is part of the Foreign Language Resource Center program, which provides support to Government and professional organizations regarding language tools.

The LTRC is developed and run by MITRE. As described on MITRE's home page, "The MITRE Corporation is a not-for-profit organization chartered to work in the public interest. As a national resource, we apply our expertise in systems engineering, information technology, operational concepts, and enterprise mod-

ernization" to address U.S. Government needs.<sup>2</sup>

## 2 History

In 2000, in response to the crisis in Albania, MITRE began posting and distributing information about available tools to support the relief effort. In 2002, the effort received a small amount of funding from the Office of the Secretary of Defense. In 2004, it became one of the first projects of the Language and Speech Exploitation Resources (LASER) Advanced Concept Technology Demonstration (ACTD).

The program was transitioned to the U.S. Army Foreign Language Program Office in the Army G2. The United States Army Intelligence and Security Command (USAINSCOM) is the Executive Agent.



In 2007, the name of the website was changed from the "Foreign Language Resource Center" to the "Language Technology Resource Center" in

<sup>1</sup> Language Technology Resource Center: <http://ltrc.mitre.org>.

<sup>2</sup> MITRE: <http://www.mitre.org>.

order to better reflect the content and in order to distinguish the website support from the many other functions of the Foreign Language Resource Center program.

### **3 Mission**

The mission of the LTRC and the FLRC, as defined in the website, is to obtain and share information about language-related software and hardware that is or soon will be available from academia, industry, government, or other sources.<sup>3</sup>

### **4 Requirements**

The requirements of the LTRC and FLRC, as described in the 2005 Management Plan,<sup>4</sup> are to:

#### **4.1 Identify Language Tools**

Requirements for information on language tools are collected from U.S. government translators, translation managers, researchers, language teachers, users of searches and translations, and systems administrators. Information needs have been from four Government technology surveys and from early stages of the Framework for Evaluation of Machine Translation in ISLE (FEMTI). ISLE was a European Community program for International Standards for Language Engineering.<sup>5</sup>

Prior surveys had shown that sufficient information was not included in many product websites and/or that such information was buried in the site where it could not be extracted easily with automated methods.

#### **4.2 Facilitate Acquisition of Tools**

Requirements are also collected from acquisitions officers, whose needs included a listing of competitive products, information on compliance with Section 508 on accessibility, and availability of the product on the Government Services Administration (GSA) Schedule.

### **4.3 Plan**

In addition, planners needed to assess language readiness, which was challenging considering the number of languages and dialects, the number of types of technology, and frequently the number of products per language/dialect per type.

## **5 Implementation**

The website is implemented with the following:

### **5.1 Tool Survey**

The site includes an online tools survey based on information needs from government planners, acquisitions officers, systems administrators, programmers, and users. The only required information is the name of the company and product, a short description of the product, and the name and contact information for further information. However, people are welcome to complete as much of the form as they wish, as well as to send electronic information such as white papers and evaluations.

People completing the survey are contacted each six months with reminders to update information. The FLRC team also keeps track of new product announcement and solicits updates of the survey.

Information can be entered display on the public internet and/or for display on government networks.

### **5.2 Tool Database and Reports**

Reports can be generated from the tools database. The most common report is a particular language crossed with a particular type of technology (e.g., Arabic x Optical Character Recognition [OCR]). A user can also select a language and see all technologies, or select a technology and see all languages.

Another report is a matrix of languages and types of tools. Each cell includes the number of products of a particular type of technology in the database that work with that language (e.g., the number of Chinese OCR products). The original plan had been to develop metrics and measures whereby a cell could be colored red, yellow, or green to show language readiness. However, agreement has not been reached on these measures.

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<sup>3</sup> LTRC: <http://lrtc.mitre.org>

<sup>4</sup> LASER Management Plan 2005.

<sup>5</sup> FEMTI: <http://www.isi.edu/natural-language/mteval/>

A separate search capability is provided for dictionaries in order to capture the many types of tools available. A standard dictionary search includes dictionary type, source language, target language, domain, register, and year of publication. An advanced search includes the ability to further define these parameters.

A software comparison capability is also provided (in prototype), where users can select the type of technology and the language or dialect. They could then select from a list of requirements which are hard (non-negotiable), soft (desired), or null (no requirement). The system then ranks the products in the database according to users' selections.

Information on cost and accuracy is provided separately, as this information is relative. For instance, an additional \$200 may be well worth two percentage points in accuracy. One possibility that has been considered is to enable users to select cost and accuracy on a sliding scale.

The issue of accuracy, of course, is still in debate and in development for many types of language technology tools. A possibility in the future may be to list test scores along with the tasks that the system may be able to do. Additional research is needed for such measures.

A further report is provided on future products in a particular language and technology type. This information is important for many organizations, as it may influence decisions to acquire software or to wait for the new products. However, due to the company sensitivity of the information, there are few entries in this area and none open to the general public.

### **5.3 Other Software Tools**

The tools section of the LTRC includes links to online MT. It also includes downloadable virtual keyboards for Chechen, Dari, Dinka, Iraqi Arabic, Kurdish, Pashtu, Tajik, Turkmen, Uighur, Urdu and other languages. The keyboards work with Microsoft Windows 2000 and higher.

### **5.4 FAQs**

FAQs are provided for Arabic-script languages. There is potential for linking to many other FAQs available from Microsoft and from other sources on the internet.

## **5.5 Information**

Information is provided on the following:

### **5.5.1 Conferences and Meetings**

Information is provided on conferences and meetings. Information can be provided by anyone with a password throughout the government community.

### **5.5.2 Announcements**

Information is provided on announcements. Information can be provided by anyone with a password throughout the government community.

### **5.5.3 Standards**

Information is provided on standards from ISO, the Institute of Electrical and Electronics Engineers (IEEE), the Localization Standards Association (LISA), the American Translators Association (ATA), the World Wide Web Consortium (W3C), the Object Management Group (OMG), the International Standards for Language Engineering (ISLE), and other organizations related to language. Where permitted by copyright, the standards or links to downloadable standards are included. Standards in development are also included.

### **5.5.4 Organizations**

Information is provided on professional organizations and on U.S. government organizations. Information can be updated by any person with a password via an internet form.

### **5.5.6 Resources**

Information is provided on a wide range of resources, including&. Information can be updated by any person with a password via an internet form.

## **6 Related Efforts**

There are several related efforts to catalog tools and resources. Some of the major ones are listed below.

## 6.1 *Compendium for Translation Software*

John Hutchins maintains the *Compendium for Translation Software*<sup>6</sup> for the European Association for Machine Translation (EAMT) and the International Association for Machine Translation (IAMT). The *Compendium* catalogs the following:

- “MT systems: for home use (e.g. for personal use by the general public); for Internet/Web (i.e. for translating electronic documents on the Internet, electronic mail, Web pages, chat discussions, etc.); for professional use (e.g. for use by professional translators); for company intranets.
- Translation support tools: Electronic dictionaries; Localization support tools; Translation memory systems; Alignment tools; Terminology management systems; Foreign language authoring systems; Translator workstations
- Online systems: MT services (i.e. translation service via Internet (or mobile telephone), with or without human post-editing); MT portals (i.e. services on Internet providing access to a number of MT services and/or to information about MT systems).”<sup>7</sup>

Language pairs and contact information are provided. The *Compendium* is available in PDF form from the EAMT website.

## 6.2 Association for Computational Linguistics Natural Language Software Registry

The Association for Computational Linguistics (ACL) Natural Language Software Registry (NLSR) is “a concise summary of the capabilities and sources of a large amount of natural language processing (NLP) software available to the NLP community. It comprises academic, commercial and proprietary software with specifications and terms on which it can be acquired clearly indicated.”<sup>8</sup> It is oriented towards research.

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<sup>6</sup> John Hutchins, *Compendium of Translation Software* directory of commercial machine translation systems and computer-aided translation support tools, developed on behalf of EAMT and IAMT, latest edition online Jan 2008: <http://www.hutchinsweb.me.uk/Compendium.htm>

<sup>7</sup> Ibid.

<sup>8</sup> Natural Language Software Registry website: <http://registry.dfki.de/>

## 6.3 European Community’s Common Language Resources and Technology Infrastructure

The European Commission’s Common Language Resources and Technology Infrastructure (CLARIN) is a new program as of 2008 “aiming at uniting existing digital archives in Europe that contain language-based material into a federation that will allow the social sciences and humanities research communities unified access to the content.” It will make speech and text tools “available to interested researchers with a view to opening up new research avenues.” It will also “provide web based services that will allow non-expert users (especially humanities and social sciences researchers without a technological background) to perform complex tasks on the materials contained in the archives.”<sup>9</sup> CLARIN is oriented towards European languages and towards research.

## 6.4 MEDAR

The European Commission’s Mediterranean Arabic Resources (MEDAR) also began in 2008. It has the objectives of:

- “Consolidating a network of players in all areas of HLT
- Developing the Cooperation Roadmap based on a clear picture of the foreseeable technological trends, market potentials, and cooperation possibilities
- Updating the Basic Language Resource Kit: the minimum set of resources and tools necessary for carrying out research and training on LRs [Language Resources] and HLT [Human Language Technology], with a focus on MT and MLIR [Multilingual Information Retrieval]
- Supporting the development of tools and resources, in particular MT and MLIR on the basis of partners’ technologies and open source code (e.g. Statistical MT, MLIR, and speech recognition) and the framework for their benchmarking.”

## 6.5 Other

The European Language Resources Association (ELRA) maintains a catalog of language resources,

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<sup>9</sup> CLARIN Newsletter #1, May 2008.

which are primarily corpora and lexicons.<sup>10</sup> The Linguistic Data Consortium (LDC) is similarly focused on corpora.<sup>11</sup> There are also various lists of tools on the internet, usually arranged by language and/or by type of tool (e.g. <http://www.yourdictionary.com>).

## 7 Issues

Issues include:

### 7.1 Terminology

One problem in developing a survey was the disagreement of what constitute some technology. For instance, several machine translation companies (including rule-based MT companies) that at the time had no tools for translators checked the box for “Translation Management System”. While MT can be thought of as a system for managing translation, the type of tool known as a “Translation Management System” is one directed towards human translators, providing Translation Memory and support tools.

There are currently several efforts to standardize terminology, including work in the International Organization for Standardization (ISO) Technical Committee (TC) 37, Subcommittee (SC) 4 on Language Resources Management.<sup>12</sup>

### 7.2 Separation and Aggregation

During the last few years, there have been the dual trends of separation and aggregation. Tools such as morphological analyzers were being marketed by themselves to be incorporated into a wide range of products. At the same time, many tools were being aggregated, particularly with MT. For instance, the Army Research Laboratory integrated OCR and MT for several language pairs. The combination then was used in many larger systems.

### 7.3 Wide Range of Requirement Sets

One of the difficulties in providing information is that the U.S. Government has a wide range of requirement sets. One tool or one configuration

may be recommended for one application but not for another. See Section 5.2 on comparison reports.

### 7.4 Sensitivity of Information

Information is often sensitive—particularly concerning companies’ plans and product evaluations. Some companies enter data only to be displayed on government networks and not on the public internet. In some cases, contact information for such data. In other cases, the information is just sent to government parties as approved by the data owner.

### 7.5 Completeness

The usefulness of the LTRC depends on information that covers at least the top several products in each technology type and language. Coverage has been an issue, with some companies eager to provide data and some not. In some cases, MITRE has provided the information, with a notation in the description field that the information was provided by MITRE and not by the owner of the information (i.e., the developer, company, or researcher). Reviews for completeness are conducted by Subject Matter Experts in MITRE and other organizations. In addition, users of the LTRC provide suggestions.

### 7.6 Accuracy

Accuracy is also critical to the LTRC. Currently, entries for tools are reviewed by the LTRC team. Once approved, the entry displays on the website. When a tool is evaluated and all items in the product entry are validated, a green “V” (for Validated) appears next to the product name wherever it appears in an LTRC report.

The approval review was needed in the earlier years of the LTRC, as there were frequent entries from companies announcing “99% accuracy” in machine translation and other difficult-to-substantiate claims. Due to the increasing maturity of the language technology field, such entries are now scarce. The approval stage may soon be eliminated so that entries appear as soon as the person completing the survey hits the “submit” button.

Users of the LTRC almost always want to know levels of accuracy and usefulness. Where possible, the LTRC provides government users with existing

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<sup>10</sup> ELRA Catalog of Language Resources:  
<http://catalog.elra.info/>

<sup>11</sup> Linguistic Data Consortium:  
<http://www ldc.upenn.edu/Catalog/>

<sup>12</sup> ISO TC37 SC4 homepage: <http://www.tc37sc4.org/>

evaluations. The LTRC also runs evaluations of systems using the target data.

In the product survey, there is a section for data owners to add measures and metrics, along with relevant data such as the date and conductors of the evaluation and a link (if possible) to the evaluation. However, due to the sensitivity of many of these evaluations, few data owners have provided this information in the web survey.

## **7.7 Currency**

Currency of data is also critical. Some companies are prompt in providing data on any product updates. Some are not. In some cases, as described previously, MITRE defaults to writing the entry themselves (with the entry so designated), with an offer to replace the entry with data provided from the company or developer.

Administrative tools track the status of product entries, including the dates when the entries were last updated. Reminders are sent to data Points of Contact (i.e., those people who filled out the surveys) every six months to remind them to update their information.

## **7.8 Preparedness**

A key concern is to be prepared for U.S. Government language requirements, particularly since there is often little or no lead time between a crisis and the requirement for available, tailored, integrated products. A particular challenge is the area of disaster relief, where there is a high need for language interaction (e.g., medical questions, refugee registration, etc.) but little or no notice.

## **7.9 Context**

Another concern is to provide context for the product information sheets. LTRC users not familiar with language technology need not just a list of tools (e.g., Arabic<->English MT) but also information on when they will also need OCR, OCR clean-up tools, search, or other tools and which of these additional tools have already been integrated with the MT. This concern is now being addressed with reports and guides which link to the product information sheets.

## **7.7 Leveraging Other Resources**

With the rapidly increasing amount of information and the small amount of funding for language technology knowledge management, there is a need to leverage national and international resources. Links are helpful but often not sufficient. Guides (as described above) may lay out a search strategy with links. Additional means of leveraging these other resources are being explored.

## **8 Plans**

Plans include the following:

### **8.1 Input**

The LTRC team continues to solicit companies, developers, and researchers to add information via the survey tool. In some cases, the team has provided information themselves, then emailing the link to the information to the company. That information is marked as having been entered by MITRE rather than by the owner of the information. The LTRC team is also soliciting input on the structure of the website, as changes are being made to the infrastructure and the content.

### **8.2 Review**

The team also continues to solicit review of completeness and accuracy of information. There are plans to make better use of professional organizations for this review.

### **8.3 Update of Survey**

The survey is being updated to reflect changing requirements and tools such as FEMTI.

### **8.4 Wikis**

Wikis are planned to enable comments on products and guides.

### **8.5 Push Technology**

There are plans for providing push technology, in order to enable users to automatically receive information about announcements, conferences, meetings, and new or updated products of interest (e.g., all products supporting Hindi).

## 8.6 Newsletter

The LTRC has provided articles for other newsletters. Plans include continuing this practice and also providing an LTRC newsletter.

## 8.7 Coordination

Most important is continued coordination with other efforts (e.g., CLARIN, MEDAR) in order to leverage work that is already done or that may be planned. In addition, there is a need to identify and develop means of providing users with the easiest and most complete possible access to information about language technology.

## Acknowledgments

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