THE FORUM FOR EUROPE'S LANGUAGE TECHNOLOGY INDUSTRY

LT INDUSTRY DEFINITION / TAXONOMY

SPEECH TECHNOLOGY

Speech technology relies on underlying signal and language processing tools that are configured in different ways for various purposes. In addition, combining speech input and output in usable systems requires higher level processing of the dialogue features of human language and communication.

Speech Input: machines recognise and react to human speech
Speech input is an alternative to keyboard, keypad, or other physical input devices, an input "mode" that can be integrated into almost any digital system (multi-modal systems accept a variety of input methods); also used for "command and control" functions to operate software or equipment; commonly used in "picking" applications in warehousing, in interfaces for digital devices, and for dictation and transcription, particularly in the medical and legal fields.

Speech Output: machines turn digitised information into simulated human speech
Synthetic speech creates the impression that a machine can "converse" with a human and often replaces recorded speech in older systems; because it is generated using language technology, synthesised speech can be used in many environments, and can be customised to virtually any type of application, language, accent, or even to the speaking voice of an individual human; now widely deployed in mobile environments (e.g. in phones and cars).

Speech Dialogue: systems model human interaction with machines, integrating speech input and output
Speech Dialogue was pioneered in Interactive Voice Response (IVR) systems for telephone customer support and is a staple of the Call Centre market; now more widely used, especially in mobile device interfaces; frequently implemented in Voice Portals or voice platforms by integrators. [Full dialogue systems are multi-modal, employing speech, touch, gesture plus text, audio and graphics as input/output.]

Speaker Recognition: machines recognise who is speaking (rather than what is being said)
Speaker recognition systems require users to "enrol" in the system by giving examples of their speech, from which the system learns their voice patterns; individual voice prints can be stored and re-used, potentially for different applications. Speaker recognition applications are generally classified as either identification or verification systems.

- **Speaker Verification**: machines verify the identity of a speaker
Speaker Verification is one of a set of biometric alternatives to traditional security methods (such as passwords); an individual's voice print can be stored and referenced just like a finger print, a scan of the iris, and other unique biological identifiers; verifies that the speaker is who he/she claims to be.

- **Speaker Identification**: machines identify who is speaking, from a group of speakers
Speaker Identification systems can pick out and identify an individual's voice, e.g. to aid in the automatic transcription of an audio or video conference.

INTELLIGENT CONTENT TECHNOLOGY

Intelligent Content technology relies on underlying tools such as natural language processing (NLP), categorisation and clustering engines, and associated statistical techniques for processing human language. In addition, many Intelligent Content applications require (or derive) linguistic resources such as word lists, terminologies, dictionaries, thesauri, taxonomies, or ontologies.

Text Input & Digital Scanning: systems "read" existing text or support the physical input of text through keyboards, keypads, etc.
Optical Character Recognition (OCR) was one of the earliest commercial applications of LT and remains an important market; keyboards (including Virtual Keyboards) provide LT-enabled features such as predictive typing, continuous touch/swipe or even gesture input.

Content Creation & Management: systems support the initial creation of text content, or the creation of new content out of existing text elements
Authoring/Creation tools include checking tools (for spelling or grammar), controlled authoring environments, author memory systems, summarisation engines, and management environments that control these processes

Search & Navigation: systems provide access to text or unstructured data
Search & Navigation systems include: search engines, platforms, and applications with browsing and navigation, applied to enterprise or Web content; unified information access platforms; search-based applications & tools; natural language question & answering systems

Text Mining & Analytics: systems derive high quality information from text or unstructured data
Text Mining & Analytics systems use LT to "learn" about the semantics or meaning of a text source. Typical text mining tasks include categorising text, clustering related text elements, extracting concepts or entities ("things"), modelling the relationships between entities or concepts, producing taxonomies, and applying the derived knowledge to activities such as sentiment analysis or business intelligence.

Rich Media Search & Analytics: systems provide access to or derive information from rich media
Mining multimedia digital resources such as graphics, audio, and video, to find content elements and/or to derive information for further processing; includes but goes beyond tracking tags associated with rich media. Rich Media Search & Analytics can be applied to text that is related to or derived from the media resource (e.g. speech-to-text transcription of an audio stream), or to the stream itself (e.g. searching or analysing the phonetics of an audio stream, rather than a text transcription of that stream).

TRANSLATION TECHNOLOGY

Translation technology uses a range of tools and functions to support the creation and maintenance of multilingual information, from simple utilities on the desktops of individual translators, to sophisticated automatic translation engines. Compiling and maintaining large-scale linguistic resources is a key aspect of Translation & Multilingual Management, which can also employ the full range of natural language processing, algorithmic, and machine-learning techniques.

Translator Tools: utilities and tools that support the manual translation process
Includes bilingual dictionaries, multilingual terminology management, termbases (TB), multilingual text tools, and localisation tools for translation of software products; largely comprises niche markets based on language pairs, increasingly offered as online utilities or plugins, and/or highly customised tools for software environments.

Translation Leveraging Tools: systems that store bilingual pairs of text elements that can be reused by translators (or "leveraged")
Leveraging tools, traditionally called Translation Memory (TM), store translated segments of text (phrases, sentences, paragraphs, blocks, documents) that can be "recalled" if the same (or similar) text needs to be translated again; they are widely used where repeated updates are the norm (e.g. in product documentation, technical manuals, etc.), and incorporate many language handling features that automate the process of translation. "Advanced" leveraging tools add more functionality to TMs; by indexing matched documents, rather than creating a database of small matched segments of the documents, the translator has more flexibility in identifying matches, and better access to linguistic context, to show meaning, style, and tone. Even more advanced leveraging approaches borrow methods from Example-Based Machine Translation

Machine Translation: systems that automatically translate text
Machine Translation (MT) systems give automatic translations of text without human intervention in the process itself (though translators may be used to "post-edit" MT output for quality control). The three main approaches to MT are: the classical rule-based systems based on linguistic information (such as the rules of grammar) combined with bilingual dictionaries; example-based systems that translate by analogy, using sets of previously translated documents (a bilingual corpus), similar to advanced leveraging but employing machine learning techniques (rather than human translators) to choose correct matches; and statistical systems that also use a bilingual corpus but choose correct translation matches using statistical probability models.
Hybrid systems leverage the strengths of different approaches by combining them.

Translation Management Systems: systems that manage the end-to-end process for translating and localising information
There are three management functions available with TMS products: business (e.g. financial accounting, analytics), process (workflow management, integration with CMS), and language (integrating Translator Tools, Leveraging Tools and Machine Translation). TMS features are either in-built, or provided through integration with third-party products; Web-based applications with cloud sharing of translation resources are increasingly common.

Language Learning: systems that use LT to support the language-learning process, promoting multilinguality
Error correction, pronunciation aids, drills, etc.

UNIFIED LANGUAGE TECHNOLOGY

Speech and Translation: combining speech input (converting speech to text), machine translation (automatically translating text), and speech output (converting translated text back into speech)

Spoken translation systems, being developed for many platforms and channels; products particularly prolific in mobile apps space.

Speech and Intelligent Content: combining speech input, search and analytics, and speech output
Speaking avatars, conversational digital personal assistants

Translation and Intelligent Content: combining search and analytics with translation technology
Multilingual sentiment analysis, cross-lingual search, image translation