

# **From ALPS to Alpnet (and beyond)**

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## Prologue

Nestled in the Wasatch range of the Rocky Mountains in northern Utah lies scenic Utah Valley. Home to Brigham Young University (BYU) and a host of foreign-speaking residents, the setting also served as a hotbed throughout the 1980's for the machine translation (MT) industry. To fully appreciate this narrative the chronologically prior story of BYU's Translation Sciences Institute (TSI)—which has not yet been written—would need to be consulted. When the Church<sup>1</sup> withdrew funding for the project, the TSI team disbanded. Some former participants remained at BYU, others left the university to work for industrial corporations, and the majority remained to create three commercial MT spin-offs. Though separate papers could undoubtedly (and should) be written about the other two, this chapter will only focus on the largest and longest-lived of the MT companies headquartered in Utah Valley: Automated Language Processing Systems (ALPS), later Alpnet.

Deep pockets provided financial backing to continue the TSI project off-campus; funds came particularly from a Salt Lake City entrepreneur who had a successful car dealership and an interest in high-tech ventures. This chapter sketches the significant contributions ALPS made to the MT world, and how, even though it no longer exists, it served as a valuable incubator for researchers in subsequent language-based enterprises. This sketch is first-hand, as experienced by one of the earliest and longest-term employees.

## Two boot camps

In 1976 I began undergraduate computing science studies at the University of Alberta in Edmonton. One key decision I made was to enroll in Collège Saint-Jean, a newly-affiliated French-speaking campus. Particularly valuable that first year was the intensive instruction I received in French grammar.

Like many Mormons, I served a two-year mission, in my case interrupting my college studies after the first year. My mission service was in France, a formative experience in several respects. Like many missionaries I first attended the Missionary Training Center in Provo, UT, a kind of linguistic boot camp for those departing on foreign-speaking missions. My companion for those two months, assigned alphabetically, happened to have the surname Lytle. On one of our once-a-week half-days of discretionary time, he suggested that we go visit his uncle on the adjoining BYU campus. We spent a couple of hours at the Translation Sciences Institute, where his uncle Eldon Lytle showed us around. I was completely smitten by the work they were doing, and

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<sup>1</sup> The Church of Jesus Christ of Latter-day Saints, often referred to as the Mormon Church.

hoped to become a part of it after my mission. This chance encounter helped plot my future MT career.

After my mission I returned to Edmonton, adjusting the focus of my studies slightly to include more linguistics course. In 1981 I graduated with a bilingual B.Sc. with emphases in computer science, math, and linguistics, and with a healthy background in translation theory and practice.

During my last year of studies an Edmonton acquaintance of mine was making frequent trips to Utah Valley due to his interest in tar sands development, a lively industry in northern Alberta at the time and one pursued by a Provo engineering company. His contacts were also aware of a new Provo company, Automated Language Processing Systems, which was incorporated early in 1980. My friend became interested in their line of work as well. In December 1980 he somehow managed to gain admission to a demo that the ALPS people were doing for Church officials at their world headquarters building in Salt Lake City. He offered to fly me to that meeting in order to assess what I thought about their work. My first consulting job!

Accordingly, I flew down to Utah on Christmas Day (no less!) and sat in, fly-on-the-wall style, while the ALPS people demonstrated their latest technology to Church translation department and management personnel a couple of days later. I was impressed by what I saw and dazzled by the hardware and software (by current standards primitive). I also took the time to go to Provo and have informal interviews with ALPS and Weidner (the second local MT company) to gauge possible employment possibilities. My positive assessment of ALPS to my friend reinforced his desire to open a Canadian office as soon as possible to handle on-site several projects that ALPS was working on in Canada. He committed to join ALPS and to open an office in Ottawa, and I was to join him in that effort.

In the summer of 1981, then, I spent several weeks back in Provo—this time for a kind of MT boot camp—where I underwent intensive training with ALPS, interacting with development, marketing, and support personnel to prepare for my job in Ottawa. This included a trip to Detroit, Chicago, and Boston where we demonstrated and/or installed our systems for several large American rust belt multinationals. The first project I remember working on while training in Provo involved cooperation with a Los Angeles-area translation firm. I provided technical support for the translators, who were doing a French-Spanish translation project for the Argentine government. The Argentines had just bought French Exocet missiles and needed Spanish documentation. It was sobering, a year later, to see that weaponry used against the British navy in the Falklands War.

In late summer 1981 my friend and I moved to Ottawa, where we opened a comfortable ALPS office downtown. Our work at first consisted mainly in cooperating with the Canadian government's Bureau of Translations in a comprehensive test of the system. The task was to translate job announcements and other semi-templatic material from English to French. Canadians, of course, are no strangers to issues of translation, and working there brought me (and ALPS) into contact with well-known translators, MT developers (including the TAUM team), and government functionaries. In what must have been one of the most extensive evaluations ever—from linguistics to ergonomics to psychology—the system's performance was shown in the final report in 1983 to be "disappointing", "uneconomical", and even "mesmerizing" to highly experienced

translators. Several recommendations were formulated for carrying out even more thorough and careful evaluations in the future, including document workflow processes.

After year at the Ottawa office I was offered a choice to join the research and development group in the Provo office. The Canadian office continued to work with (mostly corporate) customers including some translation service bureaus.

### Pioneering a product

From the onset, ALPS intended to derive revenue from three sources: (1) the sale of turnkey MT systems; (2) translation services; (3) maintenance revenue from software support in areas related to operating systems, translation tools, and dictionary maintenance. As it would turn out, the sales of turnkey systems (i.e. sales consisting of bundled hardware/software configurations) met with some success from 1983-1986. By 1986, though, hardware sales were less interesting so focus shifted to software sales. The emphasis on translation services started strong but declined in 1985-1986 to avoid possible conflicts of interest with software customers and due to unprofitability. As we will see, however, services took a dramatic upswing after 1986.

The unique aspect that ALPS folded into its core MT products from the very beginning was a commitment to involve the translator in the processing loop: interactivity was indispensable. In 1973 the BYU TSI group decided that interaction was one way to compromise on the unrealistic goal of fully-automatic, high-quality domain-independent MT. That commitment carried over to ALPS product development.

In general, ALPS offered three levels of assistance to translators: multilingual editing; dictionary lookup (on-demand or automatic); and interactive sentence-by-sentence translation. Batch (i.e. non-interactive) processing for translating an entire document at once was not an option for ALPS. Martin Kay's (1980) description of current automatic MT was to be avoided at all costs: "Passages of innocent prose...were subjected to a process of vivisection at the hands of an uncomprehending electronic monster that transformed them into stammering streams of verbal wreckage."

The advantages of human involvement were (to us) obvious: allowing a translator to collaborate in the process would allow for more consistent terminological control, as well as real-time human resolution of ambiguity at all levels. Thus the two-edged sword of human interaction involving the translator became our unique area of emphasis: our forte and our biggest sales pitch, but also our biggest untested hypothesis and greatest challenge.

The first commercial product was developed on a Data General Eclipse series minicomputer. Programs were written in Data General Language (DGL), a close derivative of Algol 68, although optimizations were also implemented in assembly language. There were essentially three levels of assistance available to translators. Selective Dictionary Lookup (SDL) was a multilingual word processor with on-demand lexical lookup. Automatic Dictionary Lookup (ADL) was a translation item-oriented editor that automatically matched online source text against dictionaries. The Computerized Translation System (CTS) was a sentence-by-sentence full translation system that interacted with the translator to resolve ambiguities in source language analysis, source-target language transfer, or target-language generation. Some minimal dictionary support was implemented at the time, as well as the automatic creation of

keyword-in-context (KWIC) and words-not-found (WNF) lists. By mid-1981 the first version of the system was ready for preliminary installations. Serious marketing of the system began late in 1981, and for the most part the company and its offerings were completely unheard-of at the time.

One insightful and important technology that ALPS developed at the start was called ISAM. It was our own indexed sequential access method for storing information in database-like style. The code was well designed and ran quite efficiently. This gave us the ability to build modular low-level linguistic code to perform necessary language processing: language-specific collation (i.e. alphabetic sorting) of words and terms for dictionaries; specifying a language's character inventory for file input/output and text representation/manipulation (e.g. word processing, editing, formatting, printing, hyphenation); and enabling principled mappings to terminal displays and keyboard layout routines. The substantial dictionary utilities and translation memory modules described below also relied on this foundation.

Linguistically the system followed the direct transfer model; information and structures were mapped quite directly between source and target languages at the phrasal and syntactic levels. There was very little analysis done in the area of semantics or pragmatics. The processing was very loosely based on Junction Grammar (JG), but left largely to the individual programmer's discretion. Those who had worked at TSI tended to use more JG insights than the rest, but nobody could claim that the system was principally based on the theory.<sup>2</sup> However, some knowledge sources were acquired from the BYU project. The same analysis module served for all products involving a given source language; modules for mapping to target-language structures and target-language generation modules were developed in target-dependent fashion.

Though Lytle's linguistic theory was the catalyst for the TSI project and his original concept was the starting point for ALPS, over the years Lytle's personal influence waned somewhat in the company, a source of some friction. Lytle was involved in prototyping, proposing, and designing products and meeting with potential investors when necessary. The rest of the R&D team's task was to redesign, optimize, enhance, refine, and adapt the system to an end-user context.

In 1982 the second version of the system was released with incremental enhancements based on feedback from the first customers. Fairly substantial obstacles were being felt by marketing personnel: it was hard to justify costs or return on investment within this new interactive paradigm. The credibility of ALPS was untested since MT was still relatively unknown, and marketers were unsure of whether to focus on the translation process proper or in the overall question of document management and production.

While the Canadian government test was taking place, other comprehensive evaluations were also being run elsewhere. A major American document production company found the ALPS system performance "acceptable" in a competition with their in-house MT system. Their December 1982 report's dizzying array of statistics led to the conclusion that ALPS output enjoyed mixed results between (un)intelligibility and (un)naturalness depending on the type of text (in-house vs. controlled input vs. externally produced, etc.). A French computer company, in its own evaluation early in 1983, found

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<sup>2</sup> A bibliography of Junction Grammar information including a list of relevant publications can be found at [www.junction-grammar.com](http://www.junction-grammar.com).

that the most problematic areas of linguistic treatment involved (not surprisingly) coordination and nominal compounding. Their conclusion was that the system, in its current state of development, would probably not constitute an effective solution to their needs.

### Launching the flagship

By 1983 we had received extensive user feedback from customers, outside evaluations, and our own in-house personnel. It was becoming clear that interaction alone would not sell or provide a competitive advantage, but in addition that the linguistic performance of the system was not as important as the cost-benefit potential of involving translation in an integrated, seamless, overall document control process.

Accordingly, from 1983-1985 a complete reimplementaion of the system was carried out. This involved, first of all, porting all of the code to a more workable programming language than DGL. There was some pressure towards adopting Ada, but in the end the C programming language was chosen instead (in retrospect a wise decision for all involved). The principal motivation for the rewrite, though, was to integrate into the system and re-package more translation support, ease of use, portability, and extensibility.

The result of the reimplementaion was the Translation Support System (TSS), a comprehensive translation environment that was ALPS's flagship product. It included the principal modules as enhanced and renamed: SDL was now SelecTerm, ADL was AutoTerm, and CTS was TransActive. The enhanced dictionary editor permitted editing, listing, and merging any number of dictionaries of varying degrees of specificity, and also matching a hierarchically-designed set of dictionaries against documents, generating WNF and KWIC lists, etc. The full-function multilingual word processor and dictionary editor were more tightly integrated. A whole host of translation management job control facilities was available via a menu interface. It included tracking translation and terminology jobs, specifying document import/export, formatting, and printing processes, and even integrating custom input/output document conversion filters.

Though they were not released in the first TSS version, from 1982 on I was actively developing French-source projects with my team. These products were incrementally released, were the first non-English source products developed, and were fully integrated with the overall translation support system. German-source products were also under development at the same time. For the German-source work ALPS developers—linguists and systems programmers alike—cooperated to design a completely new software development approach. A high-level programming environment called PeriPhrase was specified and implemented; its purpose was to allow linguists to address linguistic structure manipulations without having to code in C or any other computer programming language.

In a new development parallel to the TSS rewrite, in 1984 ALPS released a Russian source ADL to the U.S. Department of Defense (DoD). Work was also started on a new project, called Automatic Scan of Keywords (ASK), which would perform gisting of foreign-language documents for DoD purposes. Within the next couple of years ASK products would be delivered for a handful of languages including Arabic. The Arabic project was particularly noteworthy in that it involved a radically different technology

and approach from traditional ALPS products: two-level morphological transduction. Its developers have since gone on to make significant contributions in the areas of Arabic lexicography and finite-state linguistic tools development.

The 1980's saw dramatic increase in computational power and the diversity of hardware/software platforms; in 1985 we were able to release TSS on the IBM PC/AT, and in 1986 on the IBM VM/CMS. Indeed, considerable effort was expended to eventually port TSS to every conceivable hardware/software platform: Unix, Xenix, Vax, MS-Dos, OS-X, etc. In fact, a motto appearing on internal documents (but not marketing materials) was: "Doing everything for everybody on everything." In retrospect that effort, though it contributed to a more attractive sales pitch, was probably too costly to be worthwhile.

Other developments were afoot outside of the R&D offices. March 1985 saw a major change in executive management, including a reduction in force of several sales and marketing personnel. Due to the increased government work, the company opened an office in Vienna, VA in 1985 which only lasted for about a year. During this time the company was also seeking and gaining increased visibility in the Far East, where competitors were already gaining a foothold and where the Fifth Generation Computer Project was firing imaginations. By the end of 1985 the company had raised some \$15 million via private sales of securities, and realized cash flow revenues of almost \$8 million

More companies were asking about and trying the system, and reactions were mixed. Some liked it well enough to justify a purchase, whereas others were nonplussed by the performance, linguistically and otherwise. Even though there were some negative evaluations of the system's performance, it should not be assumed that ALPS ignored quality control. On the contrary, considerable resources and effort went into assuring that the programs performed according to specifications (when they existed) and tracking the reporting and fixing of bugs. Highly skilled and relatively cheap labor abounded with the company's proximity to BYU; whole teams of part-time language experts worked on pre-releases of the system. My code, of course, was subjected to intense scrutiny as was everyone else's. Somehow, though, I managed to attract the attention of the quality assurance manager, and after an office romance we were married.

### Full steam ahead

1986 was in some ways a watershed year. ALPS counted among its TSS customers 4 of the top 5 American computer companies. The first quarter was profitable (indeed the first ever), as was the whole year. New target languages were introduced: Spanish (full TSS), and Portuguese and the CJK<sup>3</sup> languages (all but TransActive). New source languages were even introduced for full TSS: French and German (both to English). In June the company went public and raised almost \$8 million in public stock. In October, ALPS entered the retail software market with its MacProof product, an English spelling, grammar, and style checker.

One forte of the ALPS approach was consideration of the end-user's linguistic context. ALPS went to incredible lengths to provide hardware modifications that would make the software more acceptable to users. In the days before configurable keyboards,

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<sup>3</sup> Chinese, Japanese, and Korean.

ALPS would design language-specific keyboard layouts based on currently understood best practices, and even manufacture keycaps with the appropriate foreign letter-diacritic combinations. Character display was even more involved: we would design our own character sets and then burn our own read-only memory chips for direct insertion into computer terminals to allow for software-specifiable foreign character display. Perhaps the most extreme example was in providing a bilingual English/Russian printing capability for a DoD contract. The apex of technology at that time was daisy-wheel printing, and "tulips" that printed both English and Russian characters could not be found anywhere. We set to designing such a print wheel and made arrangements to have them custom-manufactured at an understandably huge start-up cost. Only a few were needed by the customer, however, so the cost for each was (as I recall) over \$1000 per item. Apparently it was not as expensive as the leaded shielding that had to be installed post-delivery by others to block the printer's electromagnetic commands from being intercepted from any hostile spy satellites that may have been monitoring the premises.

ALPS developers also made notable contributions in the area of corpus analysis and lexicography as they relate to MT. The competitive advantage of involving interaction in source-text analysis, source-target mapping, and target-language generation had an implication for dictionary development. Instead of requiring prodigious amounts of system-specific coding of arcane linguistic features whenever a word needed to be added to the system (which was a typical requirement for most competitors' customers), ALPS could simplify the lexicons and use human knowledge and intuitions during interaction. The trade-off required minimizing interactions to those that would be most helpful, and that required finding passages demonstrating maximal ambiguity. A comprehensive pre-translation stage of automated lexicon development—called first dextraction (for "dictionary extraction") and later the dictionary setup utility (DSU)—allowed the user to specify a hierarchy of prioritized end-user and system lexicons for optimal terminology management. A batch process matched the lexicons against the source document creating a lean, tailor-made document-specific lexicon that would drive the interaction process as the document was being translated.

One final major contribution made by ALPS to the field of MT was the development of what has since been called translation memory tools. Early on ALPS realized that its interactive environment allowed immediate feedback from the human in the loop. As translations were generated (and often corrected by the human), they could be saved in an ISAM file. This file could subsequently be consulted whenever similar sentences were encountered in the future, and the translations automatically retrieved. This became particularly valuable in the translation services area, where documents (e.g. user manuals) are often only revised from previous versions before being retranslated. This "repetitions processing" capability was a powerful selling point, and was offered at all three levels of translator support. The capability was further extended by allowing fuzzy matches so that even never-before encountered sentences, as long as they varied minimally and predictably from previously handled ones, could be automatically generated with the relevant substitutions. The notion of leveraging bitext (source/target alignments of human translated material) has since been pursued with vigour and success in MT research.

During the mid 1980's a visionary series of meetings was held at ALPS Provo that involved primarily developers, though anyone in the company was welcome. The weekly

meetings featured well-prepared, technical but informal talks on relevant topics, and they served as a valuable springboard for further discussion and research efforts. Topics included competitive reports on other current MT systems, general trends in MT methodologies (e.g. transfer-based and AI-based approaches, chart parsing, translation theory, cognition and parsing strategies), as well as our own ongoing development work (e.g. corpus-based dictionary extraction, exploiting monolingual technologies, developing our own lingware, etc.) and reports from recent conferences. The results from these meetings were always informative and provocative, and they produced reading materials that are relevant and interesting even today.

One venue that is often (but understandably) overlooked when considering early papers on MT-related topics was sponsored by BYU, and the local talent was supportive. In 1975 the Deseret Language and Linguistic Society (DLS) symposium began holding a yearly linguistic conference of one or two days. Literally dozens of state-of-the-art MT papers from Utah Valley MT researchers found their way into the DLS program and proceedings. Though an exhaustive list is given elsewhere (Luthy, 1991), a few illustrative topics include papers on: tools derived from MT work; a two-level engine for morphology; discussions on evaluating MT; meta-languages developed for morphology and syntax analysis; terminology interchange and term banks; word sense disambiguation; translation mismatches; interlingual mappings; and n-gram reaccentuation of French text. Even the venerable Martin Kay from Xerox PARC and Stanford was a keynote speaker at DLS in 1985 and gave a well received keynote speech on unification and linguistic computing.

A strategic relationship that was productive and beneficial for ALPS was forged with the Monterey Institute for International Studies (MIIS). Their top-notch translator and interpreter training programs were populated with bright students who needed internship opportunities, and ALPS was a good venue with its own fledgling translation services complement to the development side of the company. For a few summers several students came to Provo to develop lexicons, test outgoing products, work on translation projects, and sample the Utah Valley surroundings. In fact, several enjoyed the environment(s) enough to hire on with ALPS after graduation. It was helpful for the company to have new blood and new perspectives from the interns, who in turn were exposed to active product development and translation services project workflow. The MIIS overseer of that effort was well-known expert on translation and interpretation, who would later serve on my dissertation committee.

Marketing MT was a challenging prospect. ALPS was a company that spanned both the services and R&D realms. There were the usual tensions between R&D personnel and claims made by over-zealous marketers whose salary was commission-based. There was a larger problem, though: the whole field faced scepticism from people who either had heard of the ALPAC report, or who relied on translators who feared losing their jobs to menacing technological advances. This put marketers in the uncomfortable (and perhaps unenviable) position of needing to sell not only the ALPS philosophy and product line, but the whole idea of MT in the first place.

Several approaches were tried, and none were ever wholly successful. There was the numbers game: how "correct" were our translations? Outlandish claims by competitors' marketers and by our own need not be repeated here. More realistic claims could be made when a cost-benefit analysis could be woven into the sales pitch. This,



though, was an expensive and invasive proposition for both parties. More than one high-level executive was brought in from the outside to help our people relate better to the wider marketplace and whose connections with big business on the east and west coasts and the rust belt could be leveraged. This was not always successful; most leaders brought in from elsewhere to run the company did not fit well with the local society or with ALPS corporate culture, so they usually left before too long, by choice or by force.

There were some rather embarrassing marketing gaffes; mention of three will suffice. One marketer sought to simultaneously express editors' putative enthusiasm for our grammar checker and his distain for communism by making and distributing red pens imprinted with the motto "Stop the Red Menace". Another occasion saw the production of a literature folder that was even more gratuitous: the cover featured a young woman with an enticing smile, a lurid double-entendre caption, and a lenticular eye that would wink with a tilt of the folder. The most egregious incident involved another literature folder, this one featuring male and female models dressed in (unfortunately stereotypical) ethnic costumes from around the world. Displayed in several languages was the motto "ALPS speaks your language". Sadly, careful and serious proofreading lacked, and only after several thousand folders were printed was it discovered that the typesetter had introduced a typo into the Arabic version. So several thousand folders were sent out proclaiming in Arabic something to the effect that "ALPS speaks your sponge."

The business intelligence side saw good times, though, and for a while the MT and translation markets, as well as our competitors, were closely tracked by ALPS personnel and by contractors outside the company. Even we developers were involved in occasional meetings to assess current industry trends, assess the competition, and help plot future directions.

One visionary development was the creation of a linguistic engine (code-named JOUST), prompted mainly by negotiations with East Asian customers who already had their own end-user editing environment. This involved separating the linguistic processing from our own editor and embedding it in the users' own environments. A fortunate side effect was that it gave the linguistic components more modularity and thus made them easier to develop and enhance. A similar improvement made for similar reasons was to create a client/server architecture, where the resource-intensive dictionary and terminology management was carried out on a central server, and translators worked on remote client workstations. Here again, for these languages, translation memory played an important role in the linguistic engine.

### A shift in focus

In the late 1980's the U.S. Eighth Army in Korea announced a theater-wide command and control project called TACCIMS that would involve considerable Korean language development. The local companies scrambled for a piece of the action, and ALPS formed its own team; we developed prototype software to support our bid for the wider contract. Eventually ECS (Executive Communication Services, the third local MT competitor), with its Asian focus, won most of the language-related development. Through an arrangement ALPS managed to subcontract some involvement, though. I was the person designated to meet with them about our participation, and I felt somewhat out of place

talking with competitors, even though they were just down the road from our current office and literally across the street from our first ALPS offices.

1987 saw a complete turn in direction. In August it was announced that the software would no longer be sold; the company would completely focus on translation services, and use its own proprietary software in-house. It acquired two European translation agencies with a combined 15 offices worldwide. By the end of the year it had acquired another two agencies, one in Europe and one in Canada. By the end of 1987 ALPS had 21 locations worldwide and had become the world's largest commercial translation services network. It had managed to integrate its own software seamlessly into the computerized document workflow necessary for translation service companies. The marketing focus now became in-house translation departments in large multinational corporations. Though efforts looked promising, the company hemorrhaged \$7 million that year.

In September 1987 an extraordinary opportunity arose that led to the other chance career-forming encounter for me. ALPS had been making some progress in Japan, as had its competitors, and desired a more convincing presence there. The company chose to send me to the MT Summit in Hakone, Japan at the foot of Mount Fuji. After an overnight in Tokyo I boarded a bus for the ride to Hakone. During that ride I happened to make the acquaintance of two MT pioneers headed to the same conference and who—as a testament to my naïveté—were completely unfamiliar to me. Jaime Carbonell and Masaru Tomita were very gracious in discussions with me about my work, and in educating me about the work they were doing at Carnegie Mellon's Center for Machine Translation in Pittsburgh, PA. I was captivated by their description and by their encouragement to apply to their program if I ever decided to pursue graduate studies.

By 1988 ALPS had become (perhaps arguably) the largest producer/user of computer-assisted MT software. It had found a focus, and accordingly spun off its MacProof product and divested itself of its Medical Products Division. In October it changed its name to Alpnet, reflecting the global nature of its business and resolving a long-standing dispute with an electronic printer company over the name Alps. Alpnet also acquired the largest translation services company in Canada, and had a huge spike in revenue (\$24 million), more revenue than in all previous years combined. There was a growing list of customers worldwide, including about \$1 million of U.S. DoD contracts. Still, the company lost some \$6 million that year and was forced to close its very active Swiss office.

By the end of 1988 Alpnet had over 500 employees in 80 offices in almost a dozen countries. There were still 30 R&D personnel who were doing mostly maintenance and customer support, with some customized linguistic enhancements. By this point in time almost \$40 million had been invested, though only about \$10 million had been recouped by those involved.

1989 was another year of waning for the Utah Valley office. There was a sizable layoff of most R&D personnel, most of the top management personnel in Utah were cut, and the remaining staff were consolidated into smaller offices. Yearly losses were thus cut to about \$1.5 million. Still, work on a translator workstation continued, as did some U.S. DoD contract work.

By the end of the 1980's, the company had downsized several times, and it had transformed mainly into a translation services organization. Except for some work with a

Swiss government ministry that I was involved with, there was little R&D left to do. On one of the last projects I worked on before leaving Alpnet, I was providing technical support for the Arabic team who was translating documentation on the M-1 Abrams tank from English to Arabic for the Saudi military. Only about a year later I would see news footage of those same tanks rolling across the border into Iraq at the onset of the first Gulf War. Again I was reminded of the time-critical nature and the far-ranging implications of crosslinguistic and crosscultural translation, whether done by humans or machines—or both.

Alpnet continued to survive through the 1990's, though—as mentioned above—primarily with a translation services orientation but no ongoing MT development. On the other hand, the activities of product globalization, internationalization, and localization were lucrative, and previous experience in such areas proved valuable to Alpnet personnel. In 2001 Alpnet was the subject of a hostile takeover bid by one of its European competitors in translation and localization services. In 2002 the company ceased to exist as a separate entity and its common stock expired.

### Epilogue

As Alpnet R&D was winding down I felt the need to update my linguistic and MT credentials, so I decided to enrol in graduate studies. I left Alpnet in the spring of 1990 and my wife and I moved to Pittsburgh to attend graduate school at Carnegie Mellon, encouraged by the chance encounter in Japan a few years earlier. The experience we both gained at ALPS/Alpnet would prove invaluable in the new KANT project at the Center for Machine Translation. But that's another story...

Alpnet alumni have subsequently found employment with many of the top language industry providers, many of them familiar company names. In its heyday WordPerfect—another Utah Valley company—employed dozens of former Alpnet personnel, whether in marketing and management, product development, or translation/localization services capacities. Many joined Novell, some of them from WordPerfect as it transitioned its office to Corel's headquarters in Ottawa. Several former Alpnet employees moved to the Seattle to work for Microsoft. A few employees worked for Xerox-related efforts and spin-offs. Some left the field altogether, pursuing interests in such diverse fields as nanotechnology, tourism, and government. Since the late 1990's we have been meeting informally every year or so for lunch at a local restaurant where we renew old acquaintances, catch up with each others' lives, and relive the good old days.

For the last 10 years or so the MT field in Utah Valley has been very subdued. But in its heyday the region hosted a vibrant and healthy industry that brought together high-powered outsiders and home-grown talent to tackle still-unsolved high-tech issues. The heady MT years in this valley resulted in the exportation of products and expertise worldwide. The MT companies in this sheltered valley served as incubators for language industry talent that is today much more widespread and renowned. Though these enterprises didn't make a lot of money for their investors, the payoff was in less lucrative but more intangible ways. W. John Hutchins (1989) quite accurately summarized the overall contribution of ALPS by saying: "Alps...more than anything else, alerted the

translation profession to the possibilities of exploiting the increasing sophistication of computers in the service of translation".

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