The objective of this theoretical inquiry is to examine the controversial issue of a fully automatic high quality translation (FAHQT) in the light of the past and projected advances in linguistic theory and hardware/software capability. The principal purpose of this study is to determine whether the concept of FAHQT is justifiable as a long range R&D proposition. The study is also concerned with the intermediate range alternatives to FAHQT, i.e., machine translation forms that are adequate to the user's needs with or without post-editing. Machine aided translation, based on the automated dictionary look-up, is excluded from the study in consideration of the fact that this by-product of machine translation R&D is well within the current state-of-the-art.

In the context of FAHQT, "full automation" implies that the entire translation process is autonomous in the computer without pre-editing of the source language text and post-editing of the target language output. "High quality" seems to be undefinable in an absolute sense. In referring to machine translation of 100% quality, Bar-Hillel (1) introduced the following qualification.

"When I talk about "100%", I obviously have in mind not some heavenly ideal of perfection, but the end product of an average human translator. I am aware that such translator will on occasion make mistakes and that even machines of a general low quality output will avoid some of these mistakes. I am naturally comparing averages only".

Thus viewed, even the concept of 100% quality is not equatable with the error-free performance in either form of translation. Understandably enough, participants and consultants failed to reach a unanimous agreement as to the definition of "high quality" in machine translation. This is reflected on p. 48, quote, "There is apparently no absolute standard. Rather, standards must be defined with reference to specific users and specific purposes". In the absence of absolute and universally valid quality criteria, the user of machine translation can be legitimately considered an ultimate judge of its quality. This viewpoint was first expressed by Reitwiesner and Weik (2) as early as in 1958.

According to Lamb (3), "all translation can be viewed as human translation since machine translation is nothing but another kind of human translation". It follows from this observation that the fundamental constraints on machine translation parallel those imposed on human translation. Assuming the well-known limits of translatability, this seems to imply that either form of translation is a priori constrained. In summarizing the problem of translation equivalence between SL (source language) and TL (target language),
Catford (4) draws the following conclusion.

"The limits of translatability in total translation are, however, much more difficult to state. Indeed, translatability here appears, intuitively, to be a cline rather than a clear-cut dichotomy. SL texts and items are more or less translatable rather than absolutely translatable or untranslatable. In total translation, translation equivalence depends on the interchangeability of the SL and TL texts to (at least some of) the relevant features of situation-substance".

Ray (5) recognizes the fact that "every translation necessarily involves some distortion of meaning". However, as is reflected in his statements below, this deficiency is not only manageable, but even unimportant in the practice of translation.

"The translation operation is, like the limit operation, possible only under such conditions as "sufficiently" and "arbitrarily", that is, only by the exercise of some evaluative judgement, however little. Since distortion of meaning cannot be avoided, the problem becomes one of confining it to allowable measures of allowable kinds in allowable places along allowable directions".

"..., while no two languages will match exactly in the total range of possible discourse, there are infinitely many specific limited ranges of discourse where the distortion of meaning can be legitimately dismissed as of no account".

The feasibility of FAHQT must be, therefore, considered within the limits of translatability, i.e., taking into account the constraints on the total-translation. Since the concept of high quality is untenable in the absolute sense, the question of what is feasible in the context of FAHQT is quite probably more meaningful. It would be patently unreasonable in this stage of R&D to postulate machine translation requirements beyond the limits of translatability imposed on human translation.

Machine translation research, based on puristic notions and oriented toward a global solution, was once compared to a search for the Holy Grail. This all-or-nothing attitude has probably caused as much damage to the progress of machine translation research as the early announcements of quick and easy solutions. Perfectionists in this area have generally tended to ignore the injunction by Lecerf (6) that "entreprendre la mise au point d'ensembles de traduction automatique, c'est avant tout accepter la contrainte du reel".
According to Ljudskanov (7),

"The widespread so-called 100 percent approach, along with the belief that MT presupposes the presence of a complete mathematical model of language in general and of the specific languages in particular, in practice amounts to equating the nature and extent of the knowledge of language in general, which is necessary from the point of view of theoretical linguistics, with the extent of knowledge necessary for the achievement of translation from one language into another. This approach also amounts to equating the description of communication in general with that of the translation process; it ignores the specific characteristics of the process as mentioned above and the general linguistic problems of the theory of translation (both HT and MT) in the general problem area of mathematical linguistics".

"....it can be asserted that the current critical state of MT research throughout the world, although much has happened that legitimately causes well-grounded anxieties and doubts as to its possibilities, is due to a certain degree to the maximalistic tendencies, however laudable they may be in themselves, of the global strategy. By giving due consideration to the particular characteristics of the translation process and of its study, as well as to the differentiation of the aims of mathematical linguistics from the theory of MT and of the fields of competence and performance from each other, research in this field would be channeled in a direction both more realistic for our time and more closely in accord with the facts".

The report highlights on p.4 an important, but often ignored, difference between scientific and technical translations and translations of literary and religious texts, in spite of its importance from the viewpoint of machine translation requirements.

"Even articles and monographs dealing with machine translation have failed to be adequately explicit about the special problems of translating technical and scientific materials by computer. Instead, they have confused the problem by comparing machine translation with the long-practiced human translation, by equating the problems of translating scientific materials with those involved in translating literary materials, and by using the same evaluation criteria for the results".

It is now a commonplace that the style of writing is of paramount importance in literary translation, whereas the accuracy constitutes the most important quality criterion in scientific and technical translations. According to Gingold (8),
"It is not the translator's job to abstract, paraphrase, or improve upon the author's statements. He cannot be expected to convert an article that is poorly organized and badly written in the original language into a masterpiece of English scientific writing. In technical translation, he must always be willing to sacrifice style on the altar of accuracy".

Savory (9) has expressed a similar opinion in his statement that "the translation of scientific work is an ideal example of translation of a writing in which the subject matter is wholly on the ascendant and the style is scarcely considered".

The report further emphasizes the crucial importance of timeliness in production of scientific and technical translations. According to the statement on p. 5, "...timeliness is of increasing importance to users of scientific translations. Even in a relatively unhurried field like linguistics, few articles retain their importance over a long period. Statements have been made repeatedly about the obsolescence of publications issued a few years earlier. The insistence among technical specialists and scientists for speedy translation contrasts markedly with the length of time permitted for completing literary translations". The requirement of timeliness was stressed elsewhere by Gingold (10), quote, "The delay between the appearance of the original journal and its English translation, which may be a year or more, is also a disadvantage, particularly to industry, where time is usually of great importance".

The principal findings of the study, as related to its objectives, can be summarized as follows.

Computer hardware is no longer considered a crucial problem in machine translation. "Remarkable improvements, especially in rapid-access storage devices, have largely eliminated the problems caused by inadequate computers. Lexical items can now be retrieved as rapidly as were the major syntactic rules a decade ago. And with further improvements of storage devices in process, computers no longer pose major problems in machine translation". (p. 12). Developmental prospects in this area are very bright indeed, particularly with the advent of holographic memories. The impact of such memories on both linguistic and computational aspects of machine translation R&D is discussed in detail by Stachowitz in one of his contributions to the report ("Requirements for Machine Translation: Problems, Solutions, Prospects", pp 409-532). This contribution is considered significant because it provides a complete blueprint for a realistic implementation of a large-scale machine translation system.

Equally encouraging is the appreciation of advances in computer software. "Programming has evolved as rapidly as have computers... A key factor here was the enrichment of programming language data types which made possible efficient representation and manipulation of linguistic structures". (p. 13).
The report reflects a unanimous agreement of participants and consultants that "the essential remaining problem is language" (pp 14-15). It is, therefore, not surprising that linguistics has received much more attention in the study than computer hardware and software. Recommendations presented on pp 49-51 are exclusively oriented toward linguistic research in the context of machine translation.

The report points out that there is "no conflict between specialists in descriptive linguistics, linguistic theory and machine translation... As descriptive linguists improve their understanding of language, and the models by which to express that understanding, machine translation specialists will update their procedures and models". (p. 24). However, the report also reflects a difference of opinions between machine translation experts and linguists as regards the nature, orientation and scope of linguistic research involved in machine translation. It is further worth noting that some linguists participating in this study have not acknowledged Ljudskanov's caveat about "maximalistic tendencies of the global strategy".

The reader is referred to Conclusions (pp 45-48) and Recommendations (pp 49-51), summarizing the results achieved in performance of this study. Recommendation of support for research in machine translation is based on the fact that "quality translations can be achieved in the near future. This recommendation agrees strikingly with conclusions reached in a study carried out in the Soviet Union". (p. 49). Galilei's challenge ("Eppur si muove!") , aptly chosen as a motto in the Introduction to (11) by Kulagina and Mel'chuk, would be equally appropriate as an expression of views and sentiments embodied in the main part of this report.

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