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NASTRAN: DISSEMINATION EXPERIENCES AND USER BENEFITS

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It has long been contended in the NASA technology transfer program that the act of making computer programs openly available to all U.S. users would be one of the most visible kinds of transfer activities that we could undertake. This is because our other efforts tend to deal with technology and technical information less easily visualized, less well packaged, and which often requires the aggregation of inputs from many different research facilities and groups. Likewise the adaptation which is often necessary to convert aerospace technology to other purposes frequently constitutes a difficult investment decision: the share of the obtainable market compared to the cost of the adaptive engineering is a difficult analysis for the user to perform. Computer programs, however, come in more clearly defined packages; the elements of the package are usually all physically present in the same location; and the marginal costs of adaptation, while still difficult to judge, seem to be relatively easier to estimate than in other kinds of technology. Thus, it has appeared that whatever we could do to make programs available would be a good investment of our limited resources.

NASTRAN, of course, is too large, significant, and unique to justify a complete extrapolation from it to our entire program for software transfer. However, it is clear that if we can nearly replicate the value that has accrued to NASTRAN users in some other situations, the software dissemination program will be proven to be of great benefit to the American economy.

In the past year, a preliminary survey was conducted of the NASTRAN user community. Briefly, the study found that after NASTRAN had been publicly available for less than two years:

- quantified annual user cost savings totaled at least $14.5 million
- new product development revenues to users totaled at least $5.65 million

The significance of NASTRAN is indicated by the following, as of the time of the study:

- users had spent at least $1.732 million of their own funds to develop new applications and modifications
- at least 186 discrete applications had been developed
- at least 667 persons, primarily engineers, were found to have used NASTRAN

Applications have included the design and analysis of:

- aircraft fuselages, wings and tail assemblies
- automobile frames and other motor vehicle components
- high speed railroad tracks
- turbine blades
- space vehicles and related launch facilities
- skyscrapers
- helicopter blades
- a sports stadium roof, and many others

The past year has been instructive in that we have encountered some new experiences with NASTRAN. These have included the demonstration of significant foreign interest in the program, certainly not unique to NASTRAN but amplified by its exceptional value. This has contributed to several reviews of our policy on foreign dissemination. The many problems in servicing the program, borne primarily by the Langley NASTRAN Systems Management Office, and the distribution problems encountered by COSMIC have been unusual because of the sheer size of NASTRAN. The observation of how the industrial community has reacted, including the activities of service bureaus, large companies, universities, and entreprenurial groups, has been very interesting. We anticipate that if we are able to do another user study, about 18 months to two years after the release of Level 15, this complex user interaction and response will prove even more interesting.

In summary, it is now clear that the economic and technical significance of the public availability of this new tool is very large and pervasive, and goes a long way to make the case for Federal computer software transfer programs.