To: NCITS
From: J3
Subject: J3 response to request for comment on ISO 10967-2 (LIA-2)

At its December 1999 meeting, J3 discussed ISO 10967-2, fourth committee draft (1999-09-30), which will be referred to in this report as LIA-2.

As noted in the J3 response in November 1998, J3 needs to focus its efforts on the revision of the Fortran Standard, and has not collectively invested the time necessary to make detailed suggestions and edits to this document. Of the observations J3 noted in November 1998, the only one that seems to have had an effect on the current draft of LIA-2 was the observation that the reference to the Fortran standard was to an "obsolete (withdrawn) version of the standard."

J3 responded in November 1998: We advise a no vote. It is hard for J3 to imagine a revision that would make the LIA-2 Standard acceptable to our community.

J3 continues to believe that the LIA-2 standard, as it stands, will not be helpful to the community of users of the Fortran language, or to developers of Fortran language processors, and therefore continues to advise a no vote. J3 continues to find it difficult to imagine a revision that would make the LIA-2 Standard acceptable to our community. Informally, members of J3 question whether the LIA-2 standard, in its present form, is useful to any language standard committee, for reasons that will become clear below.

Nonetheless, J3 offers the following additional comments:

Most seriously, the LIA-2 standard requires new exceptional values for objects of integer data type, *viz.* **overflow**, **invalid**, and **pole**. Although computers commonly detect the conditions leading to these exceptional values, it is also common not to distinguish them. The values themselves are not provided by any computing equipment known to members of J3. It is not helpful to users of the Fortran language, or to developers of Fortran language processors, to require support for a facility for which no known computing equipment provides support.

Although the bindings of functions specified in Annex C.6 are not normative, J3 offers the following additional comments on them:

1. The *hypot* function is a restriction of the general function from linear algebra known as the "L_2 norm." Since the *hypot* function as specified by LIA-2 is restricted to two dimensions, its usefulness is questionable.

2. Fortran 90 and Fortran 95 include an intrinsic function having functionality similar to the *shift2* function.

3. The integer square-root function, $sqrt_I$, can be evaluated by `int(sqrt(real(x)))` in Fortran. Many other functions specified by LIA-2, too numerous to list in this short response, can also be evaluated by trivial expressions in Fortran.

4. The Technical Report ISO/IEC TR-15580, that integrated parts of ISO 60559 into Fortran, specifies methods to produce the exceptional values $+\infty$, **qNaN**, and **sNaN**.

Annex C of the LIA-2 standard, while being informative instead of normative, suggests wide latitude in the method of implementing the requirements of LIA-2 in a programming language.

The LIA-2 standard merely suggests bindings to Fortran, but does not provide sufficiently detailed specifications of the necessary linguistic mechanisms. E.g. is the facility to be provided by a module, or by a collection of intrinsic functions? If a module, what is the precise name

and nature of that module? What are the precise names and natures of the functions? What are the types, kinds, intents, ranks, and other attributes of the function arguments and results?

It is therefore unrealistic to expect a Fortran standard simply to refer to an LIA-2 standard. In order to integrate LIA-2 into the Fortran family of standards, the linguistic mechanism of its implementation must be specified substantially more precisely.

J3 urges parties interested in LIA-2 to pose a Fortran binding to LIA-2 as an optional part of the Fortran family of standards. In order to be a useful standard, it is necessary that a document that describes LIA-2 explain precisely how it can be integrated into the Fortran language and standard. This requires that one learn the Fortran language and standard. We suggest that parties interested in LIA-2 study the Technical Report ISO/IEC TR-15580, that integrated parts of ISO 60559 into Fortran, and perform the technical and editorial work necessary to produce a document having a similar level of detail. No member of J3 has expressed an interest to do so – they are all volunteers who have matters of more immediate import to themselves and the communities they represent pressing upon them.

J3 suspects that the above recommendation would be a useful step in integrating LIA-2 into the standards for other computer programming languages standardized by ISO.

Finally, one should note that "exemplified" is consistently mis-spelled as "examplified" throughout Annex C.6, and perhaps elsewhere in the document.