

## Support for Fortran Standards Development in 2018-2019

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### Introduction

Fortran is still the language of choice for much scientific, engineering, and economic programming, particularly for use on supercomputers and for very large programs that have evolved over many years. The development of most major programming languages is now undertaken by standards committees and BCS has supported the UK contribution to the development of international Fortran standards since 2003. The initial case from 2002 is at [www.fortran.bcs.org/2003/devrep03.htm](http://www.fortran.bcs.org/2003/devrep03.htm) and subsequent annual reports are linked from [www.fortran.bcs.org/standards/stanhome.php](http://www.fortran.bcs.org/standards/stanhome.php).

UK members participate in the ISO Fortran committee (SC22/WG5), the BSI Programming Language committee (IST/5) and its Fortran panel (IST/5/-/5), and the US Fortran committee (PL22.3 aka J3). BCS has contributed to the costs of members attending BSI and international meetings while much discussion of development work takes place continuously on email. The BSI Fortran panel and the BCS Fortran Specialist Group make every effort to represent the UK as a whole at international meetings.

### Activity 2018-2019

This has been a busy year for Fortran development. The 2017-2018 Fortran standards development report ended with the Final Draft International Standard (FDIS, SC22 N5307) submitted for ballot. On 20-OCT-2018 The BSI Fortran panel recommended a simple 'yes' vote without comment. The FDIS was approved by 24 ISO member states as 12-0-12 (Approval-Disapproval-Abstention) and the new standard was finally published as ISO/IEC 1539-1:2018 in NOV-2018.

Work on the next revision of Fortran started immediately. Five papers from UK were submitted for PL22.3 meeting #217 (OCT-2018), ten papers from UK for PL22.3 meeting #218 (FEB-2019), including 1 interpretation request and 1 new "large" feature proposal - MACRO processing facility to address multiple generic programming needs in Fortran, and five interp requests from UK were submitted for PL22.3 meeting #219 (AUG-2019). One UK member attended #217 and #218 meetings. Four UK members attended meeting #219.

A very prolonged and thorough discussion took place on ukfortran mailing list on the UK feature requests for Fortran 202x, from March to July 2019. The focus of the discussion was the balance between user demands for new features, costs of implementing new features in the standard, vendor costs in implementing the new standard in the processors, and the already agreed WG5 publication schedule, which specifically expected Fortran 202x to be a "minor" revision, allowing implementors to catch up with the standard. Two "large" features, popular with the users (from multiple surveys, including the largest ever user survey, undertaken by BSI Fortran panel in 2018, and opinions expressed in [comp.lang.fortran](http://comp.lang.fortran)) were facilities to aid generic programming and structured exception handling. The majority view was that exception handling is too large to be included in Fortran 202x.

The BSI Fortran panel is lucky to include members from three Fortran processor vendors. Their opinions carried a lot of weight in this discussion, particularly on the issue of implementation costs of any generic programming facilities. Following extensive discussion, the majority view was to recommend MACRO processing instead of templated functions or parametrised modules, although these two latter proposals also have attracted some considerable support. The UK proposals for revision of Fortran 2018 were submitted to WG5 (N2167) just before the WG5 meeting in Tokyo in AUG-2019. Only 3 countries have submitted such requests, the other two were US (N2165) and Japan (N2168). Four UK members participated in the Tokyo meeting. One of them received BSI AITS funding.

The minutes of the WG5 2019 meeting are in N2169 and the resolutions are in N2170. The consensus was to exclude exceptions from Fortran 202x and defer generics to the following revision, Fortran 202Y. The UK proposed feature, specification of pointer lower bounds in C\_F\_POINTER, has been accepted for inclusion into Fortran 202x. The WG5 meeting concluded with an updated strategic plan for Fortran 202x (N2171) and the new business plan (N2172). The next revision of the Fortran standard is expected to be published in JAN-2023.

For many years UK members have participated in developing TR 24772-8 (Guidance to Avoiding Vulnerabilities in Programming Languages through Language Selection and Use, Part 8 Fortran). In JUN-2018 ISO cancelled this project because its original target date has been exceeded. This project was reclassified as a Preliminary Work Item until it is ready for development (SC22 N5361). One of the resolutions of the WG5 Tokyo meeting is to request Dan Nagle, the editor of TR 24772-8, to progress this work. It is hoped that this work will resume soon.

In DEC-2018, after some discussion, the BSI Fortran panel voted to "withdraw" two technical specifications (TS): TS 18508:2015 Additional Parallel Features in Fortran, and TS 29113:2012 Further interoperability of Fortran with C, as the content of these TS has already been incorporated into ISO/IEC 1539-1:2018. At its AUG-2019 meeting SC22 agreed that these TS should be withdrawn (SC22 N5413). However, at the time of writing, both TS are still shown as "under review" by iso.org.

### **Conclusion**

The UK continues to play a major role in the development of the Fortran language. After 41! years David Muxworthy stepped down as the BSI convener, but remains a very active member of the group. The UK continues to provide the project editor, a major undertaking, and the email administrator, plus (usually, but appointed on an ad hoc basis) the minutes secretary and the editor of the Technical Corrigenda. Fortran development papers, other than draft standards, are open to all interested. WG5 and J3 documents are available from <https://wg5-fortran.org> and <https://j3-fortran.org> respectively.

The Group is extremely grateful for the continuing BCS contribution to this project.