

# ISO/IEC JTC 1/SC 22/WG 9 N620

## Convenor's Report, 2020-2021, ISO/IEC JTC 1/SC 22/WG 9 (Ada)

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### Business Plan for JTC 1/SC 22/WG 9 (Ada)

#### Period Covered:

1 July 2020 - 1 July 2021

#### Submitted By:

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## 1 MANAGEMENT SUMMARY

The focus of WG 9 over the year was to conduct the various items of work. This work was conducted with the following priorities:

1. (highest priority) Respond to Defect Reports on ISO/IEC 8652
2. Prepare the draft for the next revision to the Ada Standard, ISO/IEC 8652 and provide to SC 22
3. Develop Technical Reports or Standards improving the Ada libraries
4. Moving documents to Live Link (now "ISO Documents")

### 1.1 JTC 1/SC 22/WG 9 Statement of Scope

JTC 1/SC 22 WG 9 is responsible for the development and coordination of ISO standards and Technical Reports for Programming Language Ada.

### 1.2 Project Report

#### 1.2.1 Completed Projects

**Third edition for TR 24718, Guide for the Use of the Ravenscar Profile in High Integrity Systems.** The Committee Draft was approved for registration as a Draft International Standard in August 2019.

**Update to the Ada Part to WG 23 Technical Report on Language Vulnerabilities.** The Ada Part (ISO/IEC TR 24772-2) was updated and submitted to WG 23 for joint submission with the revised language independent Part (ISO/IEC TR 24772-1): Technical Report Guidance to avoiding vulnerabilities in programming languages.

**Update to the Ada Conformity Test Suite (ACATS).** Development of a new set of tests for the Ada Conformity Assessment Test Suite that are in alignment with the new edition of the standard. ACATS 4.1 was released on 29 June 2016; it contains 134 new tests for Ada 2012 along with an experimental set of grading tools for the ACATS to characterize ACATS test results.

**ISO/IEC 8652:2012/Cor.1: 2016 Programming Languages – Information Technology – Ada Technical Corrigendum**

The resolution of Defect Reports on ISO/IEC 8652:2012, published in January 2016.

**ISO/IEC 8652:2012 (Ed 3), Information technology – Programming languages – Ada**

The new edition of the Ada Standard includes the content of the Amendment ISO/IEC 8652:1995 and the Technical Corrigendum ISO/IEC 8652:1995. The ISO/IEC 8652:2012 Standard was published in December 2012 and is known as Ada 2012.

**22.10.01 -- IS 8652:1995 Programming Languages: Ada and ISO/IEC 8652:1995/Cor.1:2001 Technical Corrigendum**

The Standard was published in 1995 and a Technical Corrigendum was published in 2001. WG 9 determined that the best strategy for updating the standard was to develop an Amendment. SC 22 approved the project subdivision in N3310.

**22.10.01.01 -- IS 8652:1995 Programming Languages: Ada and ISO/IEC 8652:1995/Amendments to ISO/IEC 8652:1995**

Subdivision of project 1.22.10.01 approved per JTC 1 N6567. N 4051- FPDAM ballot passed. Published 9 March 2007 as Ada 2005.

**22.15291-- IS 15291:1999 Ada Semantic Interface Specification (ASIS)**

WG 9 voted in June 2003 to confirm this standard upon its reaching the five-year review point. SC 22 endorsed the request in its 2003 plenary meeting. The Status shown on the ISO web site is 90.93 (confirmed).

**22.15942 -- TR 15942:2000 Guidance for the use of the Ada Programming Language in High Integrity Systems**

WG 9 has requested that this Type 3 Technical Report be made freely available on an appropriate web site. The request was approved by SC 22 and JTC 1 and was implemented.

**22.18009 -- IS 18009:1999, Ada Conformity Assessment**

WG 9 voted in June 2003 to confirm this standard upon its reaching the five-year review point. SC 22 endorsed the request in its 2003 plenary meeting. The status is shown on the ISO web site as 90.93 (confirmed).

**22.24718 -- TR 24718:2005, Guide for the Use of the Ada Ravenscar Profile in High Integrity Systems**

A Type 3 Technical Report, ISO/IEC TR 24718, Guide for the use of the Ada Ravenscar Profile in high integrity systems, was completed during 2005. The status shown on the ISO web site is 60.60 (published). Although the normal process was used to approve the report, the document is an adoption of a report developed by the University of York, UK. Both the University of York and the UK National Body have agreed to cooperate with JTC1 if any revisions are made to the report.

On March 7, 2005, JTC 1 recommended that the Technical Report should be made freely available. This request was approved by SC 22 and JTC 1 and was implemented.

## **1.2.2 Projects Underway**

**Maintenance of ISO/IEC 8652:2012, Information technology – Programming languages – Ada.** Continued work on Defect Reports on ISO/IEC 8652:2012.

**Draft for next revision to the Ada standard, ISO/IEC 8652.** The bulk of the draft revision is nearly complete, with a few additions and refinements remaining. Work on these additions and refinements continues.

Originally WG 9 planned to submit the draft to SC 22 in the latter part of 2019. However, at the request of the compiler vendor AdaCore, we voted to postpone submitting the draft so that some of the new capabilities can be reviewed and prototyped.

The prototyping and review period ended 1 June, 2020. In several cases AdaCore identified issues that we agreed to investigate further, and this feedback resulted in updates to the draft language. In other cases, primarily lightweight parallelism, AdaCore reserved the right to await customer feedback before committing to implementing those constructs.

We intend to complete a new draft of the Ada standard early in 2021.

**Update to the SPARK Part to WG 23 Technical Report on Vulnerabilities (ISO/IEC TR 24772).** In December 2019, the SPARK Annex lost its status as an active ISO document because the revised TR 24772 Part 1 subsumes the old TR 24772 that contained the SPARK Annex. The role of WG 9 is to facilitate and consult on the effort as needed. However, to date the primary source of expertise on SPARK, a vendor, has been unwilling to dedicate resources to the effort. We hope to induce them to do so in light of the new C++ and C Parts.

**Update to TR 15942:2000 Guidance for the use of the Ada Programming Language in High Integrity Systems.** We have finally found a volunteer to work on this update.

### **1.2.3 Projects Withdrawn**

None in this period.

### **1.2.4 Standards and Technical Reports Withdrawn**

None in this period.

### **1.2.5 Cooperation and Competition**

There are two major professional societies in this area: Ada-Europe and the Special Interest Group on Ada (SIGAda) of the Association for Computing Machinery (ACM). The semi-annual meetings of WG 9 are typically scheduled to coincide with the conferences and workshops organized by these two groups. Officials of both organizations are active participants in the work of WG 9. Both groups have the status of Category C liaison with WG 9.

There is one major vendor consortium, the Ada Resource Association (ARA). Informal liaison with ARA is maintained via the US TAG.

As requested by SC 22, WG 9 has designated a liaison to SC 22/WG 23, Erhard Ploedereder, former president of Ada-Europe, and has invited WG 23 to collocate meetings with WG 9.

WG 9 has a liaison with Fortran, INCITS PL/22.3, Van Snyder (Caltech Jet Propulsion Laboratory (JPL)) is the representative from INCITS PL/22.3. JPL is an FFRDC.

## 2 PERIOD REVIEW

### 2.1 Market Requirements

Ada is the language of choice for important parts of the real-time, embedded systems community as well as aerospace and defense segments. For example, Ada is used extensively in commercial airplanes and regional airspace control. Ada is also being used in other market segments, such as railway and banking. WG 9 has completed the update to the language standard by means of a Revision to meet the needs of the current market.

### 2.2 Achievements

- Identified and formally documented the process by which Ada revisions are developed and contributed (N612). This document is useful to WG 9 and SC 22, but also for the general public in case of copyright questions, and will ensure the ongoing free availability of the source documents contributed.
- Developed the draft revision of ISO/IEC 8652, the Ada Standard, and contributed it to SC 22.
- Commented on and currently finalizing updates to WG 23's ISO/IEC TR 24772-2:2020 (Guidance to avoiding vulnerabilities in programming languages – Vulnerability descriptions for the programming language Ada); (Part 2 is the Ada Part) WG 9 will address their comments on the Ada Part of WD 24772.
- Produced the SPARK Part ISO/IEC TR 24772-6 to upgrade the outdated Annex of TR 24772:2013 to match the new SPARK language and the new Part 1. (SPARK is a formal methods language based directly on Ada.) Undergoing final review now.
- Worked on Defect Reports on ISO/IEC 8652.
- Work on moving the N-documents to the ISO facility was preempted by the work on the new draft. but will recommence now that that work is done.

We share the concerns of other Working Groups regarding the ISO policy concerning the availability of Technical Reports, prompting the consideration of converting them into Guidance Standards.

### 2.3 Resources

Given the guidance provided in the ISO directives, National Bodies designate experts to participate in WG 9. WG 9 has representatives from Canada, Finland, Italy, Spain, Switzerland, Portugal, UK, and US.

Implementation of the Category C Liaisons with Ada-Europe and ACM SIGAda has broadened the base of technical review and support for language standardization. Similar results have occurred due to the liaison with the Fortran Working Group.

All new work item suggestions are screened by the requirement for active support from five national bodies. This has worked well, resulting in explicit commitments from national bodies supporting a possible project.

WG 9 uses Rapporteur Groups to perform the drafting of its technical documents. This allows WG 9 itself to meet only twice per year – for approximately one-half-day at each meeting. When appropriate, WG 9 delegates initial drafting to national bodies working with Rapporteur Groups. (For example, the US contributed the draft of the revision to ISO/IEC 8652.)

WG 9 has been using Web conferencing capabilities to make access to our meetings available to those members that are unable to attend our meetings in person.

## **2.4 Environmental Issues**

(Not applicable)

## **2.5 Participation Metrics**

Seven to eight national bodies regularly send designated experts to participate in the work of WG 9; most of them regularly attend meetings. Each of the experts typically vote at the WG 9 level. Those that are P-members of SC 22 typically vote at that level.

# **3 FOCUS NEXT WORK PERIOD**

## **3.1 Deliverables**

The following deliverables are anticipated during the next 12 months:

- Continue to address Ada Defect Reports
- Submit the next revision to the Ada Standard, ISO/IEC 8652, to SC 22
- Update the SPARK Part (ISO/IEC 24772–6) of ISO/IEC TR 24772.
- Finish review of ISO/IEC TR 24772-2:2020 (Part 2 is the Ada Part)
- Move WG 9 materials to the “ISO Documents” online repository

## **3.2 Strategies**

We delegate technical work to the Rapporteur Groups. We collaborate with professional societies via liaison relationships. We achieve full consensus within Rapporteur Groups prior to initiating formal balloting.

### **3.2.1 Risks**

- Unexpected technical comment at the SC 22 level has the potential to delay the work of WG 9. WG 9 mitigates this risk by providing mechanisms for full treatment of NB technical concerns at the RG and WG level. Although we observe all requirements of the directives, we view SC 22 and JTC1 level balloting as approval of documents that have already been completed.
- The UK National Body no longer has a Committee Manager responsible for mirroring SC 22 so there is uncertainty about whether any vote from its Programming Languages Committee will be passed on (for any language).

### **3.2.2 Opportunities**

With the increased interest and concern with software and systems safety, WG 9 intends to continue working with WG 23 on the development of guidance for the prevention of software vulnerabilities.

### 3.3 Work Program Priorities

- (Highest) Address Ada Defect Reports
- Finalize the next revision to the Ada Standard, ISO/IEC 8652, for submission to SC 22
- Develop Technical Reports or Standards improving the Ada libraries

## 4 Other Items

### 4.1 Possible SC 22 Plenary Actions Related to WG 9

As per WG 9 Document [N612](#), Randall Brukardt, a member of the U.S TAG, acting as AXE Consultants, has submitted a contribution to WG 9 as a replacement for the Ada Reference Manual, ISO/IEC 8652:2012.

WG 9 has reviewed the contribution and approved it for submission to SC 22. The WG 9 convener has provided the contribution to the SC 22 Committee Manager, along with a cover letter describing the copyright understanding. (N612 describes the process by which the Ada standard “source document” is produced and provided to ISO so that the copyright and free availability of the source document is maintained.)

Therefore, WG 9 respectfully requests SC 22 approval to add to its program of work the revision of ISO/IEC 8652:2012. We request the “accelerated timeframe” process, in particular, with the intent to go directly to the DIS stage.

Project Editor: Randall Brukardt  
Project time: 18 months  
DIS date: 1 September 2021  
Publication date: 19 January 2022 (DIS date plus 20 weeks)

The new document does not expand the scope.

The source document for the revision is WG 9 [N619](#) (“AXE Consultants Ada 202x contribution to WG 9”).

## 5 ADMINISTRATIVE INFORMATION

### 5.1 Project Editors

#### 5.1.1 IS 8652 (Information Technology--Programming Languages—Ada)

Steve Baird and Randy Brukardt

#### 5.1.2 IS 15291 (ASIS Standard)

Bill Thomas and Greg Gicca

#### 5.1.3 TR 15942 (Guidance for the Use of Ada in High Integrity Systems)

Alejandro Mosteo.

#### 5.1.4 ISO/IEC 18009 (Conformity Assessment of an Ada Language Processor)

Erhard Ploedereder

### **5.1.5 TR 24718 (Guide for the Use of the Ravenscar Profile in High Integrity Systems)**

Alan Burns

### **5.1.6 ISO/IEC TR 24772-2:201X(E) (Information Technology — Programming languages — Guidance to avoiding vulnerabilities in programming languages – Vulnerability descriptions for the programming language Ada)**

Joyce Tokar

## **5.2 WG 9 Liaisons**

WG 9 has two Category C liaison relationships.

### **5.2.1 Category C Liaison with ACM SIGAda**

SIGAda is a Special Interest Group of the Association for Computing Machinery (ACM). Its 80,000 members make ACM one of the world's premier technical professional organizations related to computing.

SIGAda is one of the world's largest organizations serving the needs of professionals interested in the Ada language. SIGAda is a powerful resource for the software community's ongoing technical and scientific activities concerning the usage, education, standardization, and implementations of the Ada language and related Ada technologies.

In the past, SIGAda members have played an important, but individual, role in the standardization work of SC 22/WG 9. For example, ISO/IEC 15291 is largely based upon technical material originally developed by individuals acting under the auspices of SIGAda. SIGAda has also played an important role for Ada language improvements in the areas of performance, real-time, numerics, and distribution.

### **5.2.2 Category C Liaison with Ada-Europe**

Ada-Europe is an international organization, set up to promote the use and knowledge of Ada, and to promote its introduction into industrial, academic, and research establishments. It aims to spread the use and the knowledge of Ada and to promote its introduction into academic and research establishments. Above all, Ada-Europe intends to represent European interests in Ada and Ada-related matters.

In its current form, Ada-Europe was established in 1988. Because there is no European legal framework to govern such organizations, it was established according to Belgian Law. Currently, national member organizations are: Ada-Belgium, Ada-Denmark, Ada-Deutschland, Ada-France, Ada-Spain, Ada in Sweden, and Ada in Switzerland. Individual members of these organizations can become indirect members of Ada-Europe. Direct membership is available to individuals in countries without national member organization.

The best-known of Ada-Europe's activities is its annual conference, first held in 1994, which provides an international forum for researchers and users of Ada and other technologies geared towards reliable systems (see <http://www.ada-europe.org/conf/ae>). Ada-Europe publishes the Ada User Journal quarterly magazine to keep its members and others abreast of the latest developments related to Ada.

In the past, Ada-Europe members have played an important, but individual, role in the standardization work of SC 22/WG 9. For example, ISO/IEC 18009 and ISO/IEC TR 24772-1 and -2 incorporate technical material provided by Ada-Europe members.

### 5.2.3 Liaison with WG 23

The main work of the WG 23 is to identify vulnerabilities in programming languages. For language addressed, the WG focuses on how those vulnerabilities are to be handled specifically for that language. WG 9 maintains a liaison relationship with WG 23 to stay apprised of the findings of WG 23 and how they apply to Ada.

### 5.2.4 Liaison with Fortran INCITS PL/22.3

The main work of Fortran INCITS PL/22.3 is on the programming language Fortran. The liaison relationship with WG 9 is to ensure that the content of the Ada Standard section on interfacing with Fortran is correct and to coordinate efforts on parallel programming.

## 5.3 Meetings of WG 9

### 5.3.1 Future Meetings

- Meeting #82 will be held 20 September 2021 (virtually).
- Meeting #83 will be held in mid-June 2022, virtually, if necessary, otherwise in conjunction with the [26th International Conference on Reliable Software Technologies Ada-Europe 2022](#) in Ghent, Belgium.

### 5.3.2 Recent Meetings

- Meeting #81 of WG 9 held (virtually) the morning of Tuesday, 29 June 2021.
- Meeting #80 of WG 9 held (virtually) the morning of Monday, 19 April 2021.
- Meeting #79 of WG 9 held (virtually) the morning of Monday, 11 January 2021.
- Meeting #78 of WG 9 held (virtually) the morning of Friday 12 June 2020.
- Meeting #77 of WG 9 held the morning of Saturday, 5 Oct 2019 in Lexington, Massachusetts.
- Meeting #76 of WG 9, held in conjunction with the [24th International Conference on Reliable Software Technologies Ada-Europe 2019](#), the morning of Friday, 14 June 2019 in Warsaw, Poland.
- Meeting #75 of WG 9, held the morning of Friday, 22 Oct 2018 in Lexington, Massachusetts.
- Meeting #74 of WG9, held in conjunction with the [23<sup>rd</sup> International Conference on Reliable Software Technologies Ada-Europe 2018](#), the morning of 22 June 2018 in Lisbon, Portugal.
- Meeting #73 of WG 9, held the morning of Friday, 13 Oct 2017 in Lexington, Massachusetts.
- Meeting #72 of WG 9, in conjunction with the [22nd International Conference on Reliable Software Technologies Ada-Europe 2017](#), the morning of 16 June 2017 in Vienna, Austria.
- Meeting #71 of WG 9, in conjunction [ACM HILT 2016](#) in the morning of 8 Oct 2016 in Pittsburgh, PA.
- Meeting #70 of WG 9, in conjunction with the [21<sup>th</sup> International Conference on Reliable Software Technologies Ada-Europe 2016](#), Friday morning 17 June 2016 in Pisa, Italy.
- Meeting #69 of WG 9, in conjunction with the Ada Rapporteur Group (ARG) Meeting, Friday morning 15 Oct 2015 (06:00-10:00 PDT) in Bennington, VT.

- Meeting #68, in conjunction with the [20<sup>th</sup> International Conference on Reliable Technologies, Ada-Europe 2015](#) on the morning of Friday, 26 June 2015.
- Meeting #67, in conjunction with [High Integrity Language Technology 2014 \(HILT 2014\)](#), on the morning of 20 Oct 2014 (07:00-10:00 PDT) in Portland OR, USA.
- Meeting #66, a teleconference Friday morning 27 June 2014. Some attendees were collocated with the [19th International Conference on Reliable Software Technologies Ada-Europe 2014](#).
- Meeting #65, in conjunction with [High Integrity Language Technology 2013 \(HILT 2013\)](#), Friday morning 15 November 2013 in Pittsburgh, PA, USA.
- Meeting #64, in conjunction with the [18th International Conference on Reliable Software Technologies Ada-Europe 2013](#), Friday morning, 14 June 2013 in Berlin, Germany.