## INCITS Annual Report

## Annual Report for: Select Technical Committee/TAG

## Covering the Period from April 2018 to March 2019

#### Executive Summary

SC 22 WG 9 is responsible for the development and coordination of ISO standards and Technical Reports for the Programming Language Ada. Ada is the language of choice for important parts of the real-time, embedded systems community, such as commercial airliners and airspace control, as well as space systems and aerospace and defense segments. Ada is also used in other market segments, such as automotive, railway, and banking.

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

1. Respond to Defect Reports on ISO/IEC 8652 (highest priority)

2. Develop the next revision to ISO/IEC 8652

3. Update the Ada Part to the WG 23: Vulnerabilities Guidelines Ed. 3 Technical Report ISO/IEC DTR 24772

4. Facilitate and consult on the update to the SPARK Part to the WG 23: Vulnerabilities Guidelines Ed. 3 Technical Report ISO/IEC DTR 24772

5. Update TR 24718:2005 Guide for the Use of the Ravenscar Profile in High Integrity Systems

6. Develop Technical Reports or Standards improving the Ada libraries

7. Consider proposals for extending the Ada language

#### Accomplishments

The work on the next revision to ISO/IEC 8652 is nearing completion and is expected to be submitted to SC 22 in the coming weeks.

The Ada Part to the WG 23: Vulnerabilities Guidelines Ed. 3 Technical Report ISO/IEC DTR 24772 was completed and provided to WG 23 for publication.

The update to the SPARK Part to the WG 23: Vulnerabilities Guidelines Ed. 3 Technical Report ISO/IEC DTR 24772 was not started. The work requires experts in the SPARK language with time available to update the document. No such volunteers were available in this period. However, SPARK is primarily developed by Ada Core Technologies, the employer of several WG 9 members including the Convener, so we are still trying to find available resources within the company.

The technical content for the update to TR 24718:2005 Guide for the Use of the Ravenscar Profile in High Integrity Systems was completed. The document is now being reformatted per ISO requirements for Technical Reports. This reformatting is required because the previous version was in the form of a report from the University of York, England, and the ISO rules no longer allowed the TR format variations.

#### Challenges

Some European national bodies remain unable to support their Ada technical groups at this time. However, we are exploring ways forward with the individuals involved.

#### Future Trends and Related Technical Activities

Ada continues to be a language of choice for many projects in the high-integrity application domain. For example:

* Boeing and Airbus use Ada extensively on their latest airplanes, both commercial airliners and military systems, such as the Boeing 787 Dreamliner’s use of Ada for the Flight Management System that controls the aircraft.
* The European Space Agency (ESA) continues to use on their latest Ariane 6 launcher, and Ada has been selected for NASA’s Climate Absolute Radiance and Refractivity Observatory (CLARREO) Pathfinder mission.
* Ada is one of the primary languages supported in the Future Airborne Capability Environment (FACE), an open avionics environment for all types of future military airborne platforms.
* Ada was recently selected for development a new industrial process management and control application.
* In the medical sector, Ada and SPARK (a programming language based on Ada) were recently used to develop Total Artificial Heart, an artificial heart created by a Scandinavian company as an alternative to heart transplants.
* In the automotive sector, DENSO, a Tier 1 supplier to the world’s automobile manufacturers, recently completed a research project using Ada and SPARK, with a goal of simplifying the development of safety-critical automotive applications in an ISO 26262 context.
* Nvidia recently adopted Ada and SPARK for their security-critical firmware used in applications including automated and autonomous driving.

We expect the trend of new systems adopting the language will continue in the high-integrity and safety-critical domains.

The language itself continues to evolve to meet current advances in hardware and in software development. For example, the next revision provides direct support for fine-grained parallelism for multicore architectures, and increases the unmatched support for the latest developments in real-time systems, such as new scheduling regimes for hard real-time applications.

We will continue to enhance the language to meet future advancements and new technologies, such as support for formal methods. Indeed, the content of the Ada language is directly influenced by the content of the SPARK programming language. SPARK is designed specifically for formal proof and is based directly on Ada. As the two languages evolve, they are adopting features from each other.

#### Liaison Activities

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 designated a liaison to SC 22/WG 23, Erhard Ploedereder, former president of Ada-Europe. WG 23 co-locates some of its meetings with WG 9. The main work of the WG 23 is to identify vulnerabilities in programming languages. For each 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.

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. 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 as well additions to the Fortran language.

#### Other Administrative Information

None.

1. ***Does your committee collect funds?***

No.

1. ***Committee membership and officer information will be added by the Secretariat***