Ada Standardization: Status and Issues

James W. Moore
The MITRE Corporation

The views and opinions expressed in this presentation are those of the author and do not represent MITRE or the Department of Defense.
Scope of Presentation

- Standardization
  - Who makes standards?
  - How are they made?
- Ada Standards
  - Status
  - Plans
Who Makes Standards?

◆ *De jure* standards are formal standards made by organizations authorized, in some way, to make them. Examples include ISO and IEEE standards.

◆ *De facto* standards (more properly called specifications) are those recognized by the marketplace as important. Examples include OMG CORBA, Windows API.
Developers of International Standards

ISO
TC176
TC1
JTC1
TC56
SC65A
SC7
SC22

IEC

ITU

Quality
Information Technology
Dependability
Functional Safety

Software & Systems Engineering
Languages, OS
How the US is Represented in JTC1, SC22 and WG9

JTC1 TAG: Members are US domiciled organizations

CT22: Members are reps of WG TAGs

WG9 TAG: Members are US domiciled organizations

* Caution: This is a unique arrangement.
About 550 organizations in the U. S. make standards. About half of them are accredited by ANSI, allowing them to participate in international standardization activity.
Three Ways to Make a US Standard

* Accredited Standards Organization: An organization that does many things including making standards, e.g. IEEE.

* Accredited Standards Committee: An organization created purely for the purpose of making standards, e.g. X3.

* The Canvass method
What Sort of Standard is Ada?

- Ada is an international standard, approved by JTC1:
  - Originally in 1987
  - Revision in 1995
- Ada is an ANSI standard, developed via the Canvass method:
  - Originally in 1983
  - Revision in 1995
International Standards

- The International Organization for Standardization (ISO is not an acronym) teamed with International Electrotechnical Commission (IEC) in 1986 to set up a Joint Committee (JTC1) with the scope of Information Technology
“National Bodies”: Each country is represented by their statutory national standards organization. (Exception: The US is represented by ANSI.)

-P-Members (Participating Members) each have one vote.

-O-Members (Observing Members) are provided with all information.
## JTC1: Structure

<table>
<thead>
<tr>
<th>Technical Direction</th>
<th>Subcommittees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural and Linguistic Adaptableity and User</td>
<td>SC22/WG20 - Internationalization</td>
</tr>
<tr>
<td>Interfaces</td>
<td>SC35 - User Interfaces</td>
</tr>
<tr>
<td>Data Capture and Identification Systems</td>
<td>SC31 - Automatic Identification and Data Capture Techniques</td>
</tr>
<tr>
<td>Data Management Services</td>
<td>SC32 - Data Management and Interchange</td>
</tr>
<tr>
<td>Document Description Languages</td>
<td>SC34 - Document Description and Processing Languages</td>
</tr>
<tr>
<td>Information Interchange Media</td>
<td>SC11 - Flexible Magnetic Media for Digital Data Interchange</td>
</tr>
<tr>
<td>Multimedia and Representation</td>
<td>SC17 - Cards and Personal Identification</td>
</tr>
<tr>
<td>Networking and Interconnects</td>
<td>SC25 - Interconnection of Information Technology Equipment</td>
</tr>
<tr>
<td>Office Equipment</td>
<td>SC06 - Telecommunications and Information Exchange between Systems</td>
</tr>
<tr>
<td>Programming Languages and System Interfaces</td>
<td>SC22 - Programming Languages, their Environments and Systems Software Interfaces</td>
</tr>
<tr>
<td>Security</td>
<td>SC27 - IT Security Techniques</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>SC07 - Software Engineering</td>
</tr>
<tr>
<td>TBD</td>
<td>SC36 - Learning Technology</td>
</tr>
</tbody>
</table>
SC22: Programming Languages, Environments, System SW Interfaces

- Programming Languages
  - WG3, APL
  - WG4, COBOL
  - WG5, Fortran
  - WG9, Ada
  - WG13, Modula-2
  - WG14, C
  - WG16, ISLisp
  - WG17, Prolog
  - WG21, C++

- Environments
- System Software Interfaces
  - WG15, POSIX
- Other
  - WG11, Binding Techniques
  - WG19, Formal Specification Languages
  - WG20, Internationalization
- Lingering responsibility for
  Pascal, Algol, PL/I, Basic, FIMS, PCTE, CHILL, MUMPS, Extended BNF, Forth
**WG9: Ada Programming Language**

- Active Member Bodies: Canada, Germany, Japan, Switzerland, UK, USA
- Rapporteur Groups
  - Ada: Language maintenance
  - Annex H: High integrity systems
  - ASIS: Library interfaces
International Standards and Technical Reports

- *Technical Report* (often called TR): Any document that is *not* normative:
  - Type 1: A document that failed to achieve consensus
  - Type 2: A document on which work continues
  - Type 3: Material not suitable for standardization, e.g. a reference model
How are International Standards Made?

**Drafting**
- WG
- PNWI
- NP

**Review, Comment and Ballot by National Bodies**
- WD
- CDR
- CD
- FCD

**Approval**
- FDIS

**Publication**
- IS

**Central Secretariat**

**JTC1**
- 3 mo
- 4 mo
- 2 mo

**ISO**
- ?
ISO/IEC 18009: A JTC1 Standard in One Year

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PNWI</td>
<td>WD Prep</td>
<td>CD Registration</td>
<td>CD/FCD Ballot</td>
<td>FDIS Ballot</td>
<td>Pub</td>
</tr>
<tr>
<td>SC22 endorses NP</td>
<td>JTC1 approves NP</td>
<td>WG9 approves WD</td>
<td>SC22 approves CDR, FCD</td>
<td>WG9 submits FDIS</td>
<td>JTC1 approves FDIS</td>
</tr>
<tr>
<td>SC22 mtg</td>
<td>WG9 mtg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>98</td>
<td>98</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>06</td>
<td>09</td>
<td>12</td>
<td>03</td>
<td>06</td>
<td>09</td>
</tr>
</tbody>
</table>

12 months - Concept to Final Text

12 months - NP approval to Publication
Language Standards

- ISO/IEC 8652:1995, IT--Programming Languages--Ada
  *The Ada Language Reference Manual*

- Technical Corrigendum to ISO/IEC 8652
  *Formal disposition of many of the “Ada Issues”*

- ISO/IEC 18009:1999, Conformity Assessment of an Ada Language Processor
  *The replacement for “compiler validation”.*
Technical Corrigendum 1 will be approved this year by SC22.

Another CORR is planned circa 2003.

Language revision will be considered circa 2005.
ISO/13813:1998, IT--Programming Languages--Generic Packages of Real and Complex Type Declarations and Basic Operations for Ada (including Vector and Matrix Types)

ISO/13814:1998, IT--Programming Languages--Generic Package of Complex Elementary Functions for Ada
Integrity Standards

- Refers to 15 standards from other areas of ISO, IEC, JTC1 and other bodies, including:
  - IEC 880, Software for computers in the safety systems of nuclear power stations
  - IEC 61508, Functional safety: Safety-related systems
  - ISO/IEC 15026, System and software integrity levels
  - ISO/IEC 15408, Evaluation criteria for information technology security
ASIS Standards