

Work Programme of ISO/IEC JTC1/SC22/WG9 (Ada)



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In this presentation, Jim Moore is representing his opinions as an officer of ISO/IEC JTC1/SC22/WG9. His opinions do not necessarily represent those of The MITRE Corporation or any of its sponsors.



Goal for the Presentation

- A quick description of international standardization.
- An overview of the work programme of the standards committee responsible for Ada.
- A description of the process and constraints for amending the Ada language standard.

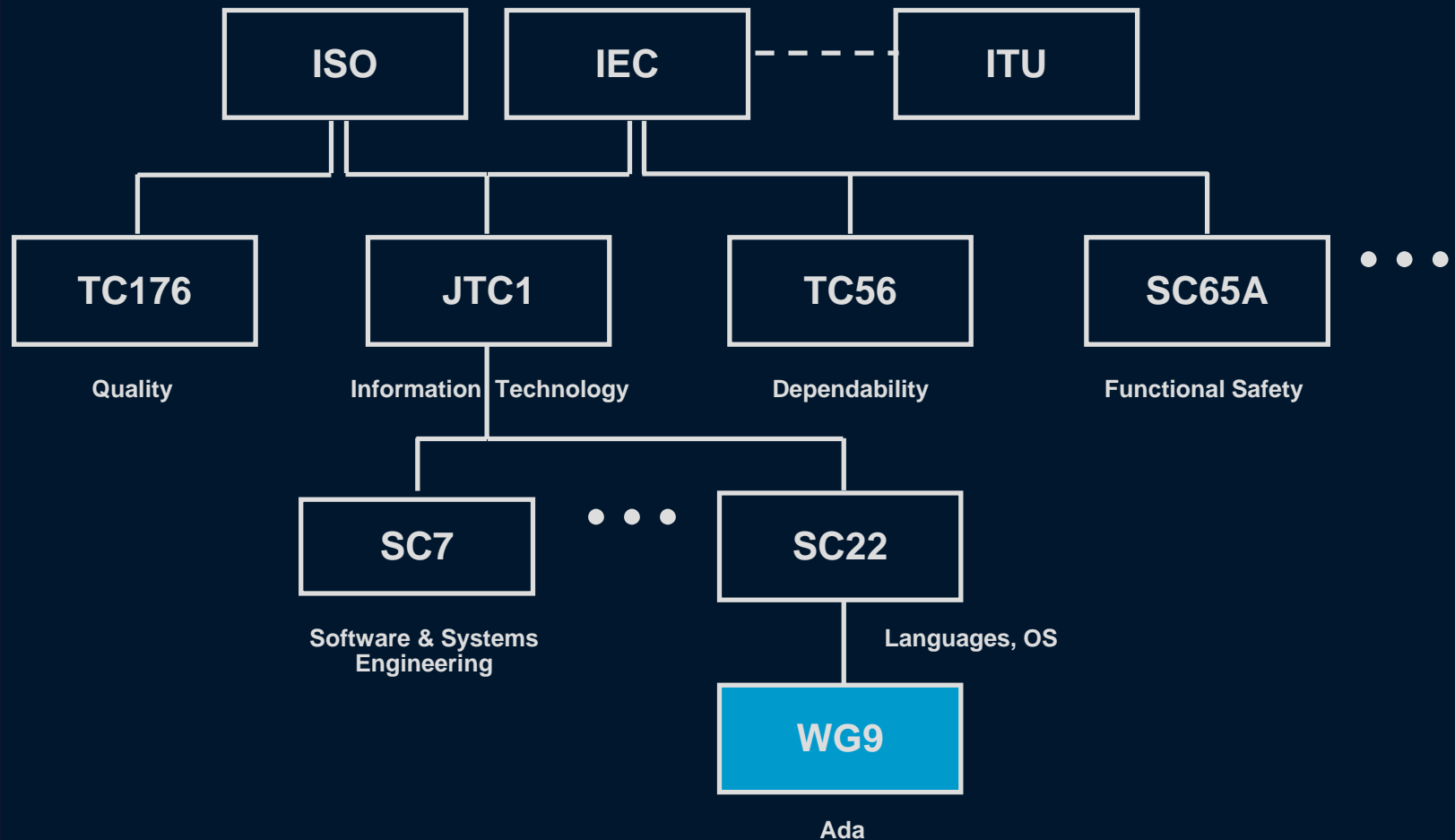


Who Makes Standards?

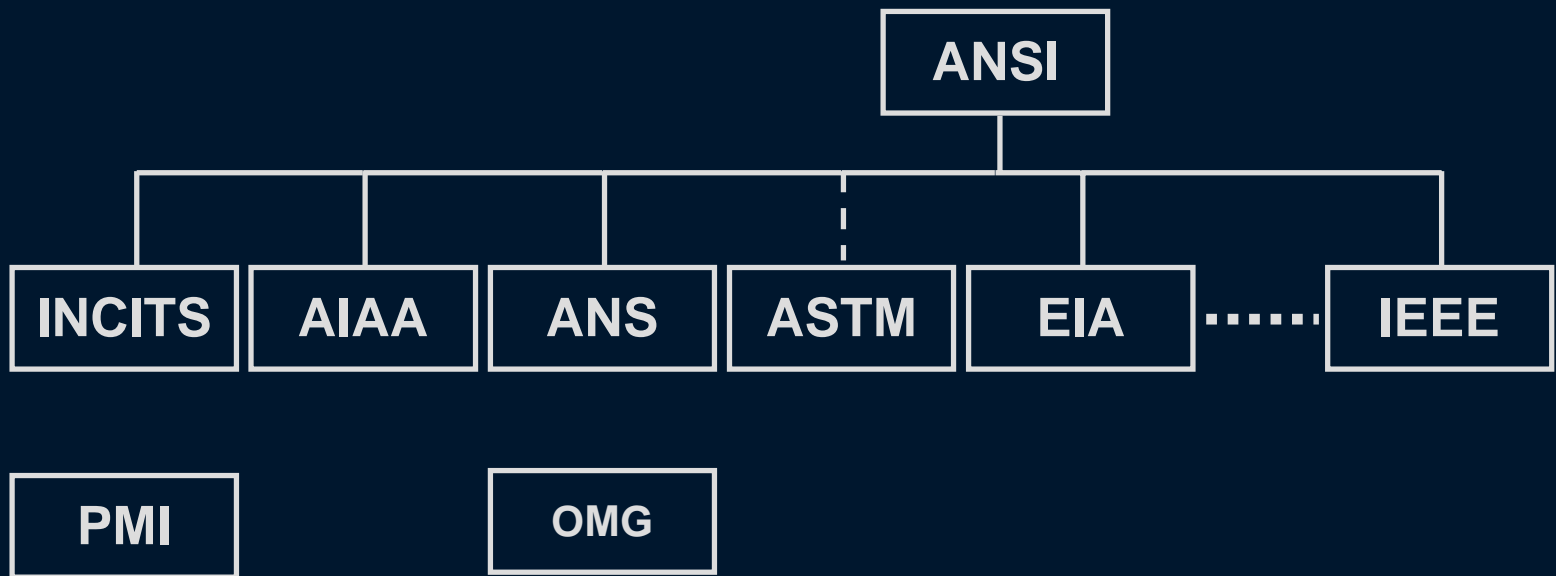
Today's
Subject

- *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



Developers of US Standards



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. former 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 and Technical Reports

- International Standard (sometimes called IS):
A normative document
- 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
- International Workshop Agreement (IWA):
Consensus result of a (relatively) informal workshop



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



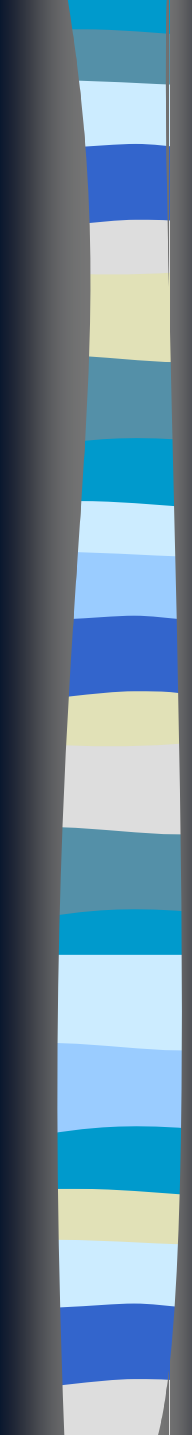
JTC1: Membership

- “National Bodies” -- Each country is represented by their statutory national standards organization. (Exception: The US is represented by ANSI.)
 - *P-Members* (Participating Members) vote.
 - *O-Members* (Observing Members) are provided with information.



JTC1: Structure

- SC 02 - Coded Character Sets
- SC 06 - Telecommunications and Information Exchange Between Systems
- **SC 07 - *Software and System Engineering***
- SC 11 - Flexible Magnetic Media for Digital Data Interchange
- SC 17 - Cards and Personal Identification
- **SC 22 - *Programming Languages, their Environments and Systems Software Interfaces***
- SC 23 - Optical Disk Cartridges for Information Interchange
- SC 24 - Computer Graphics and Image Processing
- SC 25 - Interconnection of Information Technology Equipment
- SC 27 - IT Security Techniques
- SC 28 - Office Equipment
- SC 29 - Coding of Audio, Picture, and Multimedia and Hypermedia Information
- SC 31 - Automatic Identification and Data Capture Techniques
- SC 32 - Data Management and Interchange
- SC 34 - Document Description and Processing Languages
- SC 35 - User Interfaces
- SC 36 - Information Technology for Learning, Education, and Training
- SC 37 - Biometrics



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

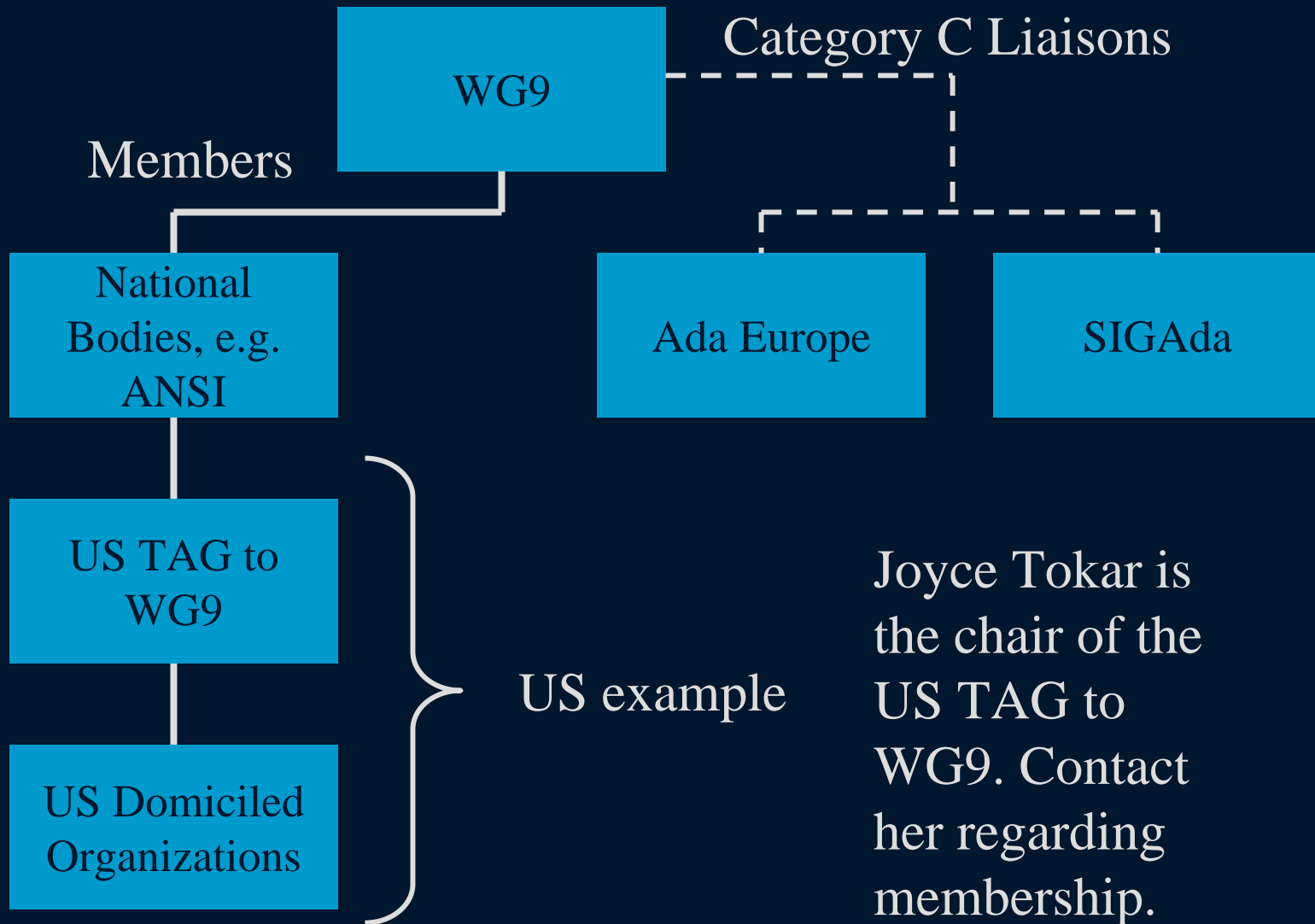
- Lingering responsibility for Pascal, Algol, PL/I, Basic, FIMS, PCTE, CHILL, MUMPS, Extended BNF, Forth



WG9: Ada Programming Language

- P-Members: Canada, France, Germany, Japan, Switzerland, UK, USA
- Formal Liaison Organizations: Ada-Europe and SIGAda
- Rapporteur Groups
 - Ada: Language maintenance, Pascal Leroy
 - Annex H: High integrity systems, Alan Burns
 - ASIS: Library interfaces, Currie Colket
- Web Site: <http://anubis.dkuug.dk/JTC1/SC22/WG9/>, Clyde Roby

How to Participate in WG9





Work Programme of WG9: Ada Language

- ISO/IEC 8652:1995 Information Technology—Programming Languages—Ada
- ISO/IEC 8652:1995/COR.1:2001, Technical Corrigendum
- Planned ISO/IEC 8652:1995/AMD.1:200y, Amendment

Maintained by ARG



Work Programme of WG9: Conformity Assessment

- ISO/IEC 18009:1999, Conformity Assessment of an Ada Language Processor

Maintained by ARG

Work Programme of WG9: High Integrity Systems

- ISO/IEC TR 15942:2000,
Guidance for the Use of Ada
in High Integrity Systems
- Proposed New Project: Guide to the
Usage of the Ravenscar Profile



Freely
Available

Maintained by HRG



Work Programme of WG9: Ada Semantic Interface Specification

- ISO/IEC 15291:1999, Information Technology—Programming Languages—Ada Semantic Interface Specification (ASIS)

Maintained by ASIS RG



Work Programme of WG9: Numerics

- ISO/IEC 13813:1998, Information Technology—Programming Languages—Generic Packages of Real and Complex Type Declarations and Basic Operations for Ada (including Vector and Matrix Types)

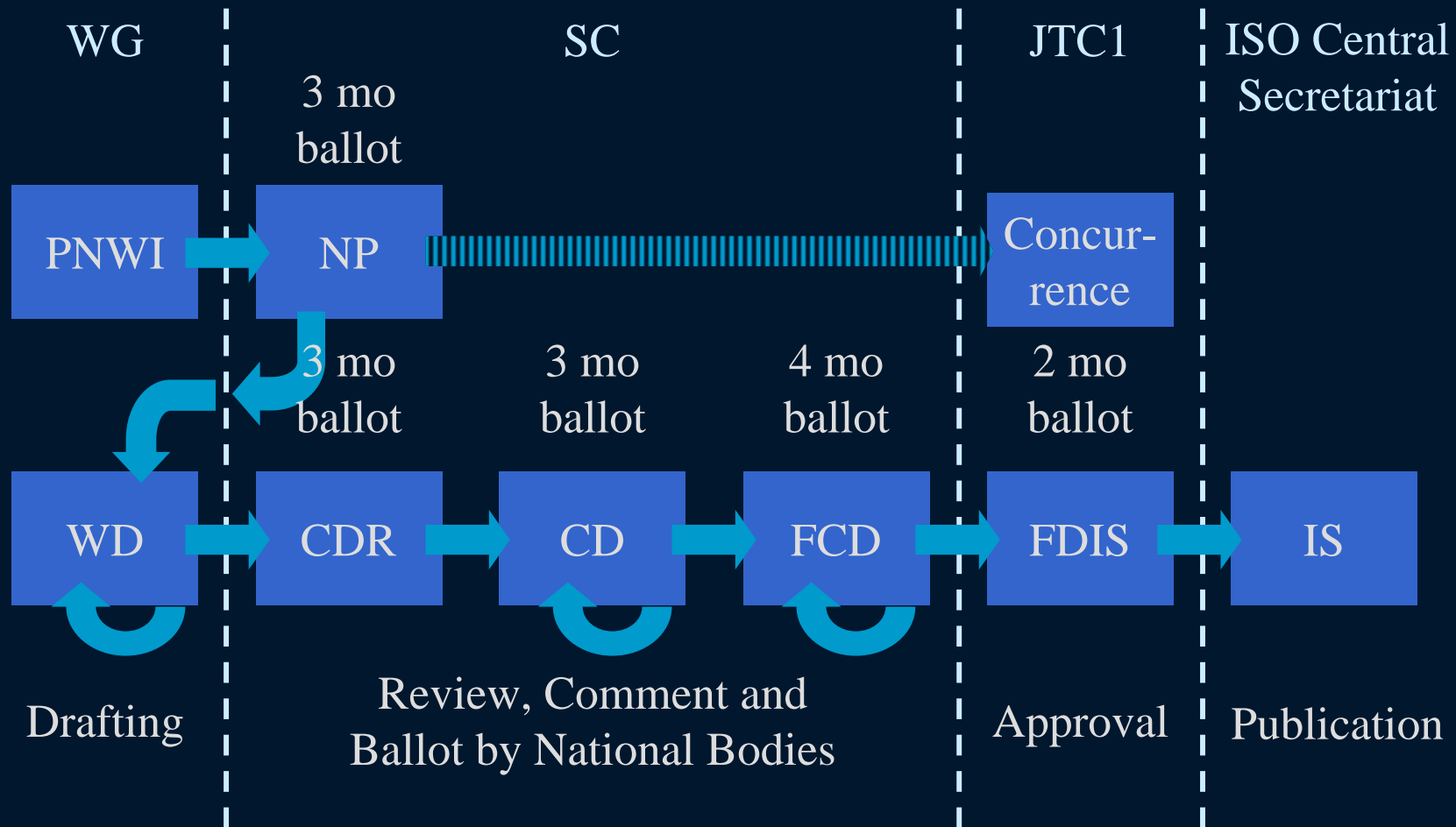
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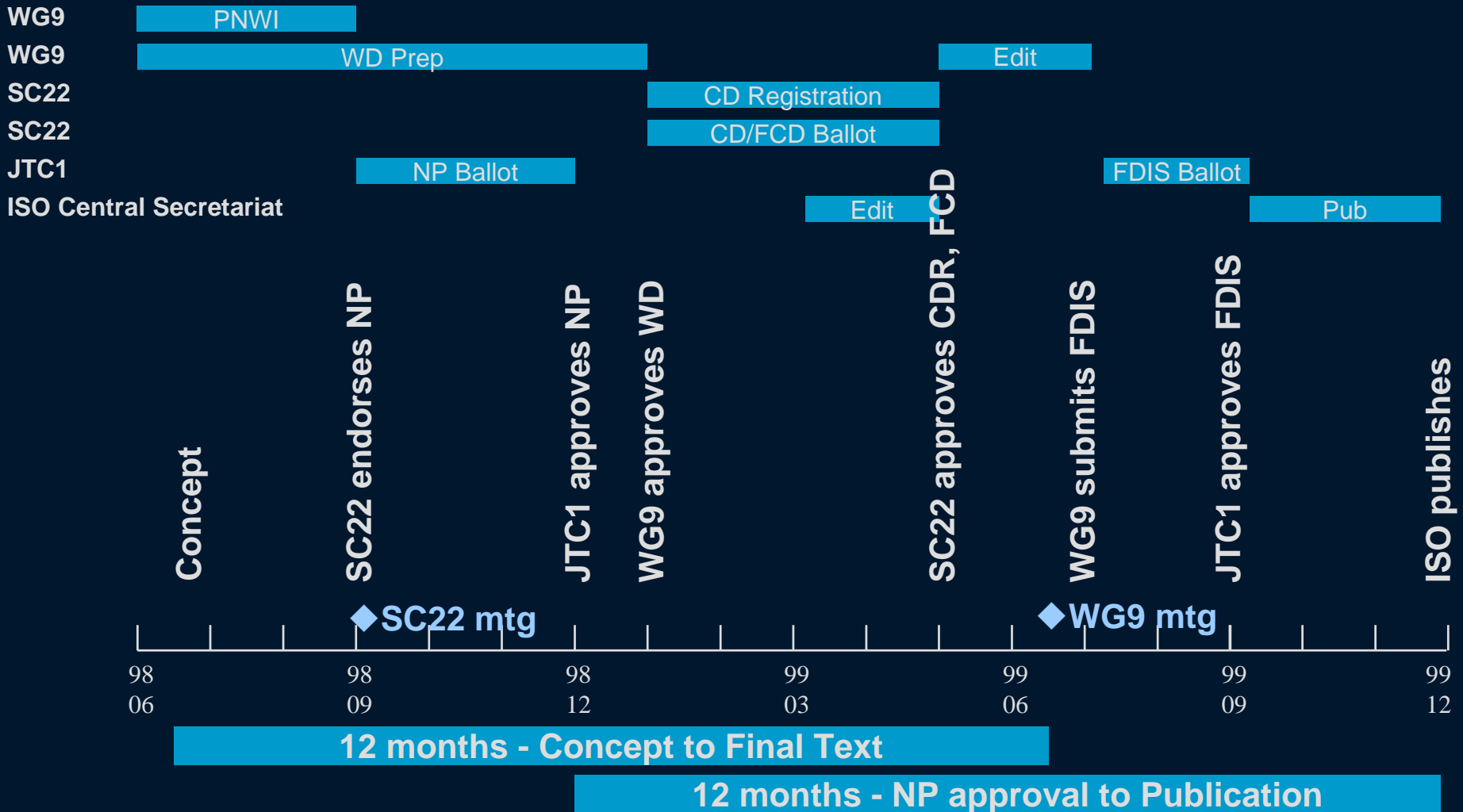
Withdrawn Standards

- ISO/IEC 11430:1994 Information Technology--Programming Languages--Generic Package of Elementary Functions for Ada
- ISO/IEC 11729:1994 Information Technology--Programming Languages--Generic Package of Primitive Functions for Ada
- ISO/IEC TR 11735:1996, Information Technology--EXTensions for Real-Time Ada
- ISO/IEC 12227:1995, Information Technology--Programming Languages--SQL/Ada Module Description Language (SAMeDL)
- ISO/IEC 13814:1998, Information Technology--Programming Languages--Generic Package of Complex Elementary Functions for Ada

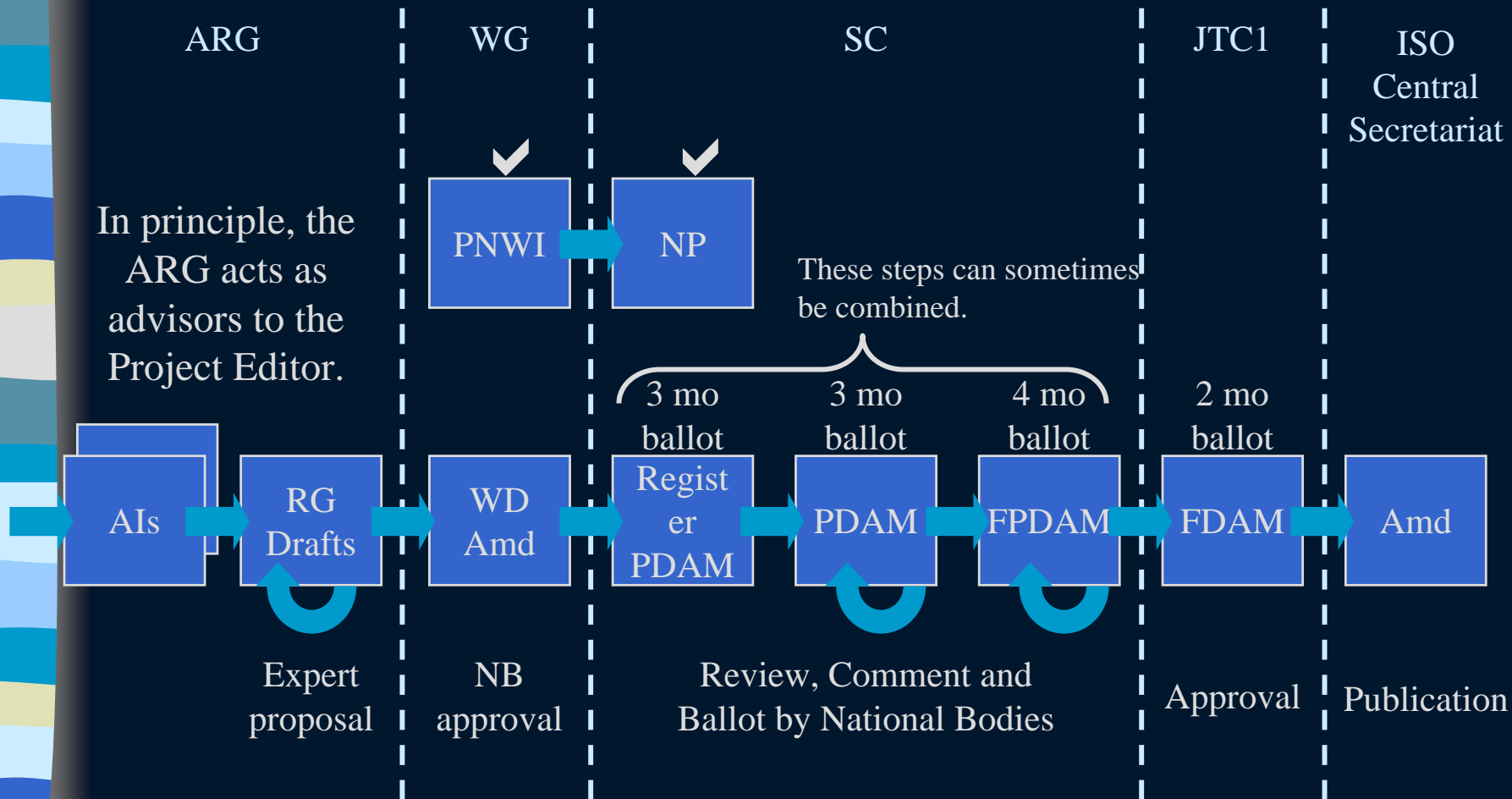
How are International Standards Made?



ISO/IEC 18009: A JTC1 Standard in One Year



How will the Amendment be Made?





Some Realities

- Strictly volunteer effort
- No DoD subsidy

An economical approach is appropriate



Community Participation in Preparation of Amendment

- In principle ...
 - Individuals participate only through their national bodies.
- However ...
 - ARG will try to be responsive to submitted Ada Issues.
- Come the end of the day ...
 - The amendment has to be approved by National Body voting.



WG9's Instructions to the ARG

- In October 2002, WG9 prepared instructions to the ARG:
 - N412, Instructions to the Ada Rapporteur Group from SC22/WG9 for Preparation of the Amendment to ISO/IEC 8652, 10 October 2002
- This presentation reproduces those instructions and provides my comments.

Purpose

This presentation quotes the complete text of the instructions in Roman typeface.

“The ARG is instructed to prepare a working draft of an amendment to ISO/IEC 8652. The main purpose of the Amendment is to address identified problems in Ada that are interfering with Ada's usage or adoption, especially in its major applications areas (such as high-reliability, long-lived real-time and/or embedded applications and very large complex systems). The resulting language changes may range from relatively minor, to more substantial.”

- The purpose of amendment is to address identified problems. WG9 rejected wording calling for language update and support of new paradigms.
- The phrase “usage or adoption” suggests appeal to both current and prospective users.
- Ada’s “major application areas” are identified.
- Substantial language changes are permitted. This wording steers a middle course between requiring substantial change and prohibiting substantial change.

In some cases, I offer my comments on the intent or significance of the instructions in sans-serif typeface.



Two Specific Improvements

“Examples of worthwhile changes are:

- inclusion of the Ravenscar profile;
- inclusion of a solution to the problem of mutually dependent types across packages.”

WG9 makes two specific requests of the Amendment:

- Ravenscar Profile
- Solving problem of mutually dependent types



Two Categories of Improvement

“The ARG is requested to pay particular attention to the following two categories of improvements:

- (A) Improvements that will maintain or improve Ada's advantages, especially in those user domains where safety and criticality are prime concerns;
- (B) Improvements that will remedy shortcomings in Ada.”

- Amendment should build on Ada's advantages, particularly for safety and criticality.
- Amendment should remedy shortcomings. WG9 removed the words “with respect to other languages” suggesting that the ARG should not focus on feature-by-feature matchup with other languages.



Suggested Prioritization (1 of 3)

“Improvements in the *real-time features* are an example of (A) and should be considered a high priority. Improvements in the *high-integrity features* are an example of (A) and should be considered a high priority. Features that increase *static error detection* are an example of (A) and should be considered a priority, but less important than the two listed above. Improvements in the facilities for *interfacing to other languages* are an example of (A) and should be considered. Improvements in the *object-oriented features*—specifically, adding a Java-like interfaces feature and improved interfacing to other OO languages—are an example of (B) and should be considered.”



Suggested Prioritization (2 of 3)

- (A) Build on Ada's advantages, particularly for safety and criticality
 - Real-time features
 - High-integrity features
 - Static error detection
 - Interfacing to other languages
- (B) Remedy shortcomings
 - Object-oriented features—specifically, adding a Java-like interfaces feature and improved interfacing to other OO languages



Suggested Prioritization (3 of 3)

The instructions create three priority levels:

- High Priority
 - Real-time features
 - High-integrity features
- A priority but less important
 - Increase static error detection
- Should be considered
 - Interfacing to other languages
 - Object-oriented features—specifically, adding a Java-like interfaces feature and improved interfacing to other OO languages

This list is notable, not only for the prioritization, but also for what is missing. WG9 considered adding “design by contract features” to the list but decided not to add it. No other categories of features were considered.



Considerations in Selection

“In selecting features for inclusion in the amendment, the ARG should consider the following factors:

- Implementability (vendors concerns). Can the proposed feature be implemented at reasonable cost?
- Need (users concerns). Does the proposed feature fulfill an actual user need?
- Language stability (users concerns). Would the proposed feature appear disturbing to current users?
- Competition and popularity. Does the proposed feature help improve the perception of Ada, and make it more competitive with other languages?
- Interoperability. Does the proposed feature ease problems of interfacing with other languages and systems?
- Language consistency: Is the provision of the feature syntactically and semantically consistent with the language's current structure and design philosophy?”

“Uniqueness and innovation” was considered as a criterion, but was not included.



Backwards Compatibility

“In order to produce a technically superior result, it is permitted to compromise backwards compatibility when the impact on users is judged to be acceptable.”

- Compromise of compatibility may be considered.
- It was difficult to reach agreement on wording here. I interpret this instruction as saying that the Amendment is permitted to be less strict than the Ada 95 revision in maintaining backward compatibility.
- The voting on this section was close, suggesting that “acceptable impact” may be closely judged.



Secondary Standards

“The use of secondary standards should be minimized; secondary standards should be proposed only when they would include material so important as to require standardization but so voluminous as to preclude inclusion in the Ada language standard. In particular, material similar to the current ISO/IEC 13813, Generic Packages of Real and Complex Vector and Matrix Type Declarations and Basic Operations for Ada, should be incorporated into the language standard.”

- Minimize secondary standards.
- A rationale for use of secondary standards is provided.
- Move function of ISO/IEC 13813 into the language standard.



Schedule (1 of 2)

“WG9 targets the following schedule for the development of the amendment:

- Dec 2002: Presentation at SIGAda, providing for discussion groups and feedback.
- Jun 2003: Similar presentation at Ada-Europe
- Sep 2003: Receipt of the final AIs from groups other than WG9 or delegated bodies
- Sep 2003: Presentation at IRTAW
- Autumn 2003: Presentation at SIGAda
- Dec 2003: Receipt of the final AIs from WG9 or delegated bodies



Schedule (2 of 2)

- “Jun 2004: WG9 approval of the scope of amendment (perhaps by approving AIs, perhaps by reviewing draft amendment)
- Informal circulation of draft, receipt of comments and preparation of final text
- Spring 2005: Completion of proposed text of amendment to be contributed to WG9
- Mid 2005: WG9 email ballot
- 3Q 2005: SC22 FPDAM ballot
- Late 2005: JTC1 FDAM ballot.”



Results

- Most notable result is the repeated emphasis on safety and criticality as Ada's niche.
- Despite spirited discussion, WG9 approved the instructions by a unanimous vote of all nations who cast a ballot (six of them).