Doc No: SC22/WG21/N1155
J16/98-0012
Date: March 11, 1998
Project: JTC1.22.32
Ref Doc:
Reply to: Herb Sutter
CNTC
2695 North Sheridan Way
Suite 150
Mississauga ON Canada
L5K 2N6
+1-416-805-9088 TEL
+1-905-822-8785 FAX
herbs@cntc.com

J16 Meeting No. 26
WG21 Meeting No. 21
8-11 March 1998

Record of Discussion

ECOLE SUPERIEURE EN SCIENCES INFORMATIQUES
930, Route des Colles
BP 145
F-06903 Sophia Antipolis CEDEX

Phone: (+33) 4-92-96-50-50
Fax: (+33) 4-92-96-50-55
http://www.essi.fr

(WG21) Sunday, March 8, 1998, 18:00 - 20:00

1. Opening and introductions

Plum called the meeting to order at 17:59 MET, March 8, 1998.

1.1 Welcome from host

Rigault welcomed committee. ESSI is an extension of the University of Nice, and has about 320 students and 30-35 staff members. Internet connections are available via Sun workstations, and 50 email accounts have been provided. Details will be explained tomorrow. Rigault introduced the breakout rooms, and welcomed the committee.

1.2 Roll call of technical experts

In attendance were:

Clark Nelson (US, Head of Delegation)
Steve Clamage (US)
Bjarne Stroustrup (US)
JC van Winkel (Netherlands, Head of Delegation)
Andrew Koenig (US)
Dietmar Kühl (Germany)
Valentin Bonnard (France)
Vincent Lextrait (France, Head of Delegation)
Lois Goldthwaite (UK)
Robert Klarer (Canada)
Francis Glassborow (UK, Head of Delegation)
Beman Dawes (US)
Herb Sutter (Canada, Head of Delegation)
Nico Josuttis (Germany, Head of Delegation)
Seiji Hayashick (Japan, Head of Delegation)
Hiroshi Monden (Japan)
Jean-Paul Rigault (France)
Tom Plum (Convenor)

1.3 Select meeting chair

Plum was acclaimed.

1.4 Select meeting secretary

Sutter is serving as acting secretary due to Corfield’s injury. The committee sends condolences to Corfield.

1.5 Select language

Plum nominated English. Approved by acclamation.

1.6 Adopt agenda

Dawes asked to add an item about making the standard public in electronic form. The item was added. The agenda was adopted by acclamation.

1.7 Select drafting committee

Plum nominated Glassborow, who accepted. Klarer was also nominated, and accepted. There should be little or no drafting to be done.

1.8 Approve minutes from previous meeting

Plum said he has heard no objections to minutes of previous meeting. Plum asked if there were any, and no one objected. The minutes were approved by acclamation.

1.9 Review action items from previous meeting

Koenig reported that FDIS copy has been entrusted to ISO (and was completed on time in 1997!). At some point either the letter ballot will go out, or he will receive requests to make editorial changes, or both. Plum said that he's been asking weekly by email, and the reply is always the same: it's in some process in Geneva and should be ready within the week. Dawes asked whether this is a reasonable delay. Plum said he did not know, and that we should make another email/call to Reinhuls, and then consider what pressure we can bring to bear. Clamage reported that be had received an email that the FDIS was under editorial review since the week of February 3 and that the editor was away and was to have been back last week. There was a discussion about the new ISO procedures (which went into effect shortly before the Morristown meeting) and whether the new requirements would all apply to our FDIS and could be slowing things down.

There were no action items.

1.10 Recognize documents

Monden brought forward a new project proposal, and Stroustrup brought forward a paper. Rigault went to make copies of these documents. Plum asked whether there were any additional documents. Klarer said he brought Lajoie's action items, and this was deferred until the combined meeting with ANSI J16.

2. Status, liaison and action item reports

2.1 Small group status reports

(No discussion.)

2.2 Liaison Reports

(No discussion.)

2.2.1 SC22 report

Plum said we haven't had any SC22 action since the last meeting.

2.2.2 SC22/WG11 (Binding Techniques) report

Deferred to Monday session.

2.2.3 SC22/WG14 (C) report

Deferred to Monday session.

2.2.4 SC22/WG15 (POSIX) report

Deferred to Monday session.

2.2.5 SC22/WG20 (Internationalization) report

Deferred to Monday session.

3. New business

Review FDIS ballot results (hopefully)

Plum reported that he has written communications from all five delegations that voted No on CD2, and all have said they intend to vote Yes. The FDIS has unfortunately not yet gone out for balloting.

Initiate Defect Report procedures

Plum reported that we are entitled to start addressing (but not voting on) these issues, and it is now appropriate to begin discussion in subgroups of issues that have already been raised. When the entire committee reconvenes, it will be time to review policy decisions. Plum said that Lajoie's resignation as Core chair presented an issue; Steve Adamczyk and Bill Gibbons were the other Core chairs, and since only Gibbons is here he should be asked to act as Core group chair. Dawes said that this is a good time for the Library group to self-organize, in case any people are tired of acting as chairs or want to change the three-group Core structure.

Stroustrup noted that our getting the FDIS to this state has unleashed a wave of extension requests on the web and other places, and that we should consider forming an Extensions group again. Plum suggested that all groups put aside extension requests for this meeting, and that an Extensions group be considered at the next meeting, to avoid the appearance of instability (and, Stroustrup added, "creeping extensions"). Koenig suggested redesigning our process to emphasize throughput and de-emphasize turnaround; for example, to require that all procedures for issues take two meetings (one to consider them, the second to vote on them). This is because we've had meetings where certain issues seemed important and critical, but those same issues didn't even come up in the following meeting. Dawes expressed agreement, and said that for the library he had categorized the defect reports we might get, and that Koenig's process is a good idea for substantial issues whereas minor corrections like typos be handled as soon as we're sure what the fix is (which could take several meetings).

Dawes suggested publishing an errata list, possibly on the web, in order to avoid getting a lot of duplicate defect reports. Koenig proposed that such a list should carry no official weight with the committee, that it could be called a "PIL" (Public Issues List), and that the only statement we should make about it is that, to the best of our knowledge, it reflects what we were thinking about at our last meeting.

Glassborow also differentiated between tidying (correcting things that are obviously not what we meant to say), correcting ambiguities (which should be corrected as early as possible in order to avoid incompatible implementations) and actual conflicts (things that cannot be implemented because standard contains mutually contradictory statements). Koenig said the worst defect may not be such conflicts, but a feature that is in the standard but doesn't work because of something we didn't think of.

Dawes summarized by saying that publishing an errata list would be meant to be mainly a public relations issue. Stroustrup noted that publishing an errata list could be used as a tool against the language/standard (as happened with C++PL3).

Plum added that proposals for extensions should not be classified as defect reports. Plum summarized the process: someone of the public brings forward a comment, and either the Project Editor or a National Body can register it as a defect via a Defect Report. Plum asked that the latter route (via National Bodies) should not be encouraged, and all DRs be registered through the Project Editor. Glassborow took the reverse view, that people should first approach their local committees, in order to weed out frivolous or duplicated requests. Nelson agreed that the filtering is great, but that the NBs should then try to always let the Project Editor register the DRs. Plum agreed and pointed out that going through the Project Editor would give more consistency. Koenig said that it would be best if the Project Editor were never the point of first contact.

Plum raised another aspect of the process: he hopes that WG21 and J16 will continue to work together as they have; WG14 and J11 evolved a similar relationship, and there was an agreement in principle that as soon as WG14 logged a DR it was turned over to J11 for resolution. Doing this in WG21 will require a vote at some point if we want to do that. This deals with a different phase: something has already been made a DR.

Dawes proposed a process: Dawes gathers an issues list based on issues from the reflector and what's emailed directly to him; brings it to the next meeting; library WG discusses them, calls some frivolous/spurious, and for the others comes up with an agreed proposed resolution; these should then be transitioned into a Defect Report. Plum summarized and said that we may want to authorize subgroup chairs to send those worth logging directly to the Project Editor without requiring another round of scrutiny; then the UK panel specifically would be an appropriate second channel. Glassborow suggested that the wider the net of people who do triage, the better, so that there's no one bottleneck who becomes demonized as "the bottleneck" or "the brick wall;" procedures should allow the maximum room for flexibility. Plum said that he still intended that the other NB panels be there, but that they be a last resort. Josuttis said that this discussion has made an unwarranted assumption, namely that people go through NBs; on the Internet we had German comments going to the U.S., and some NBs such as Germany are already reduced to only two or four people and could/would not handle potential-DR issues. Stroustrup pointed out that many people have no NB to go to, or only an inactive NB to go to; he cited examples. Koenig pointed out that the US NB accepts anyone as members, US or not, and it could announce that it would accept DR issues from anyone.

Josuttis suggested discussion during the week about the future and direction of C++. Plum agreed and noted that it must be allocated a bounded time. Stroustrup agreed that it would be useful to have the discussion, especially in light of the Embedded C++ questions that are on the table. Plum asked Clamage to allocate time during the week for such a discussion. Koenig suggested that this be done, but not until the FDIS clears.

Future meeting schedules

Plum reported that he has done work behind the scenes since the last meeting. Silicon Graphics has offered to host, in October, both the C and C++ committees at the same hotel at the same week. Plum has had discussions with the C committee, and they agreed not to try to hold full joint sessions between the two groups, but that during the evenings the officers would get together for discussions. Plum expressed concern that our current structure – no overlapping meetings, 'flame wars' on the reflectors – does not help either language. Plum noted that the WG14 attendance dropped considerably after the standard was passed, and some WG21 delegations have already said that they intend to stop sending delegations; were the meetings co-located, and sending a person on one trip could/would participate in both C and C++, there might be more incentive to participate. Koenig asked about WG14's schedule; Plum said they have three meetings each year and may cut back to two.

There was further discussion about schedules and the details of co-location.

Glassborow said that co-locating was extremely important, because perhaps the biggest problem with C and C++ is the lack of coordination. Goldthwaite and others concurred. Plum deferred further discussion in order to be able to have productive discussions in full committee with J16.

Copies of two documents were distributed: a document tentatively numbered SA-1 by Stroustrup entitled "Standard C++ for Embedded Systems Programming," and document J16/98-0008 WG21/N1151.

Discuss ISO copyright and distribution issues

Plum suggested we discuss this in full session

Any new project proposals

Plum said that he had specifically invited the Japanese body to draft a new project proposal regarding Embedded C++. He said that he has been working with a group in Japan for several years to broaden existing Embedded C++ work to the ISO level. Plum turned this part of the session over to Monden.

Monden presented document J16/98-0008 WG21/N1151 to propose a new working group under WG21. C++ is already popular in embedded systems programming, and many programmers want to use it. The specification of C++ is quite large, and includes features which can cause "unexpected" code to be generated, which is a problem for embedded and real-time systems. It is also desirable to avoid having many different variants on different compilers, and to have high-quality compilers. Many small-sized embedded systems run on hardware with only 1MB, 300K, 64K, or less of ROM; this includes Internet TVs, cameras, and PDAs. The emphasis would be to develop a pure subset of ISO C++, not a dialect or a derived language with extra additions; to avoid complexity for C programmers migrating to Embedded C++; and avoid practically unpredictable overhead in both time and memory, specifically including for real-time systems and resource-poor or cost-sensitive environments. A desirable structure would be a "core Embedded C++" and a "full C++" with optional intermediate-sized subsets in between that would support features not in the core Embedded C++ (for example, exception handling) without supporting full C++.

Monden also presented much further extensive information, including background and proposal details.

Plum thanked Monden and asked for some general discussion tonight, to be followed by more complete discussion in the full group. Stroustrup clarified that the document tentatively numbered SA-1 was a letter to the editor of Embedded Systems Journal in response to an article by P.J. Plauger, and described the origins of the document as in part due to requests from the journal to write about using C++ in embedded systems. Plum noted that there have been vocal discussions about what features to put into an embedded C++ language, specifically templates.

Plum noted that some expertise is here in the US and Japanese delegations, but that if we do not find five NBs with sufficient direct interest to participate then probably no subgroup would be formed. Plum expressed the hope that in this week the members of the committee would be able to gain more exposure to Embedded C++ issues.

Goldthwaite expressed the understanding that Embedded C++ seemed to be essentially "a better C" at the core, with additional "layers" for templates and other features. Koenig asked whether the standard library is to be considered part of the language in terms of being a subset, and pointed out that this is not currently the case and that it may in fact not be possible to have a true subset of the C++ standard library without all C++ features.

Several people agreed. Plum expressed the idea that the Embedded C++ people have already decided on the subset of the core language that is desired, and do not need ISO to decide that; however, there could be a good project in defining the rest of the standard library subset, but there would be version-tracking issues as C++ itself changes (just as the C++ standard incorporates a particular version of the C standard by reference, but that this does not mean it automatically incorporates future changes to what is incorporated by reference).

Glassborow and Stroustrup brought out that there can be trademark and copyright issues with using the name C++ or using the C++ standard document. Glassborow pointed out that the C committee did something similar when setting up a working group to deal with numerical programming. Plum added that in his opinion the C committee is not very interested in embedded systems, and that C9X is a revision of C most heavily influenced by concerns about numerical programming, not embedded programming. Plum stated that his opinion of the process was that, if we recognize that embedded systems programmers are seeing usefulness in C++, and C is not actively interested in the needs of these programmers, that then the C++ committee should consider being a group that is interested in the needs of these programmers. Stroustrup pointed out that many of the people attending C++ committee meetings have a background in embedded systems; he also pointed out that many of the applications mentioned in the proposal have been done in C++, specifically at AT&T.

Plum suggested we break the session and continue with closing items at an extra WG21 session later in the week. Plum moved to recess. Monden said that a representative from Cygnus Solutions would attend tomorrow and demonstrate how Embedded C++ can be used and why existing implementations use unnecessary resources.

Plum asked whether there were any other comments before recessing. There were none.

Plum moved to recess until 16:00, Wednesday, March 11, 1998.

Committee recessed at 20:06 MET, Sunday, March 8, 1998.

(WG21 and J16) Monday, March 9, 1998, 09:00 - 17:30

1. Opening activities

Clamage called the meeting to order at 09:18 MET, March 9, 1998.

1.1 Opening comments

Clamage distributed an updated agenda J16/98-0010 WG21/N1153.

1.2 Introductions

Clamage had everyone introduce themselves around the table.

1.3 Membership, voting rights, and procedures for the meeting

Clamage summarized voting rules and referred to Mike Miller anyone with question about their voting rights.

1.4 Agenda review and approval

Clamage reviewed the updated agenda. Approved by acclamation.

1.5 Distribution of any documents that were not distributed before the meeting.

Miller mentioned two: one about universal character names issues, and outstanding issues for core working group.

1.6 Approval of the minutes of the previous meeting

Moved by Charney, seconded by Gafter.
J16: lots in favour, 0 opposed, 0 abstained

Minutes approved.

1.7 Report on the WG21 Sunday meeting, including FDIS status

Plum said that many WG21 issues had been deferred for discussion in full committee. Plum said the status of the FDIS is unfortunately reported to be the same every week: it's still in Geneva, it's somewhere within ISO, it hasn't yet gone out for ballot, and it's to go out the week after the inquiry. Plum confirmed that Koenig did complete the final draft for Geneva before the end of calendar 1997. Koenig said that ISO prefers to receive the document in electronic format, but after two weeks Reinhuls found that there was no address where such electronic copy could be sent, and it was finally submitted on paper. Plum said that DR procedures had been discussed at length and will be discussed in full committee on Wednesday. Monden had presented a paper and there was discussion about Embedded C++. There had been seven delegations present: Canada, France, Germany, Japan, Netherlands, UK and US.

1.8 Liaison reports

Clamage said that there is only one, namely with the C committee. Benito said that the C ballot period will close on April 7, and so in the last meeting the C committee worked on rationale and on comments received so far. Koenig asked whether the April 7 date is the closing date for public comments. Benito said that the public comments period has already closed. Stump asked how many CDs were to be produced. Benito said they intended to produce a second CD this year and a DIS in 1999, on schedule.

Rigault summarized meeting facilities and introduced ESSI, our hosts, the computer engineering school of the University of Nice.

1.9 New business requiring actions by the committee

(No discussion.)

2. General Session.

2.1 Future meeting schedule

Clamage said the options discussed include reducing from three to two meetings each year, and/or co-locating meetings with the C committee. The C committee meets three times per year in February, June, and October. Clamage said that one option is to skip our July meeting and meet with the C committee, which Plum said would be on October 7-9 (hosted by Silicon Graphics); C is meeting October 5-9. Benito said that the C committee is meeting October 26-30. Plum and Benito will confirm which it is, and no one objected to either date.

Plum stated that his concern is that we will improve the quality and bandwidth of liaison by at least sometimes meeting together. One item planned for October is to have a meeting with the officers of both groups. Plum said that there is a second possibility: many countries have stopped sending delegations to the C committee, and we may see something similar with C++; the greater the extent to which C and C++ are co-located, it should help both groups achieve better representation due to cost savings and convenience.

Plum said that the proposal that seemed to have the greater chance of consensus in WG21 is to have two meetings for C++ in 1999, which would be a meeting in April for three or more days followed by a co-located meeting with WG14 in October. Plum offered the possibility of hosting the latter in Hawaii. Josuttis said that Germany is in favour of having meetings together with C, but feels that three days may not be practical, and there are many work items including garbage collection and DRs to be done. Nelson asked whether a two-meeting schedule would consist of one US and one international meeting; Plum and Clamage confirmed that this had not been discussed but would be probable. Koenig mentioned that O'Riordan had offered to host a meeting in Ireland in 1999, and that April would then be convenient. Plum will follow up with O'Riordan.

Plum answered a question from Fukutomi that it is not inappropriate for the C committee to co-locate with us and discuss changes even though they are in a CD ballot. Stroustrup said that there were proposed changes to C discussed on newsgroups that he, and presumably others, did not know about and it would be good not to look at things only after the events. Koenig suggested that it is now too late to make changes in C. Plum and Benito disagreed and Benito said that the C committee would definitely entertain comments. Glassborow said that the WG14 meeting in London had seemed very inward-looking through no fault of WG14's own, and the same could happen to WG21 as our group becomes smaller. Goldthwaite asked whether a high-level summary of C changes could be made available, since the C draft is some 600 pages long. Stroustrup mentioned the example of using ":" instead of "*" for dynamic array syntax, and repeated that joint meetings would help. Dawes summarized by saying he has heard many reasons to co-locate and suggested a straw vote on the question of two meetings versus three meetings in future years (no straw vote was taken). Plum and Clamage confirmed that the July meeting has been cancelled.

Miller asked whether we couldn't still have a five-day meeting in October, and Plum and Koenig responded that the intent was to permit members of each group to attend the other's meetings. Glassborow suggested that it might still be possible to schedule a five-day WG21 meeting. Plum responded that the current proposal, to have the C++ committee meet for three days and the C committee meet for five days, was the result of intensive negotiations. There was concern why the C++ committee would adjust its schedule to meet for three days to accommodate the C committee and not the reverse. Plum stated that the goal was to allow C++ committee members the opportunity to attend the C committee. Koenig opined that we have offered two concessions (minor: to move our meeting; major: to reduce our time) in order to promote cooperation, and it would be not unreasonable to expect some reciprocal movement. Stroustrup stated that we should act in such a way that compatibility and commonality is increased, by creating a framework that is mutual, not one-sided; that is, to do more than just allow C++ members sit in on C meetings. Charney stated that the co-location proposal's scheduling issue is not very different from choosing which C++ working group to attend, and that he will decide day by day and event by event which events to attend. Koenig stated that the concern was that the arrangements were not symmetric. Glassborow expressed that the C committee cannot prevent us from coming and co-locating, and that we have been actually invited by them to co-locate.

Miller proposed that we will have the possibility for informal subgroup meetings on Monday and Tuesday (of the October meeting) which would not count toward WG21/J16 attendance but where C++ concerns could be heard. There was further and extended discussion about three vs. five days, whether to have official vs. unofficial technical sessions, and similar issues. Koenig officially requested to have a straw vote on whether to have technical sessions – not part of the meeting – on Monday and Tuesday. Josuttis and Becker said to first decide whether five days were needed, and only if so to decide scheduling. Dawes expressed concern only about simultaneously cutting the meeting time to three days and reducing the schedule to twice a year, and expressed that he was in favour of Monday and Tuesday scheduling sessions. Clamage summarized that there has been little or no suggestion that five days are undesirable, and to ask the hosts to make meeting facilities available for five days.

Clamage moved on to the question of meeting frequency – twice or three times yearly. Clamage asked whether anyone wanted to speak in opposition to reducing meetings to twice yearly. Koenig asked when the next meeting would be, since we plan to meet in October. Because of environmental factors, it would likely not be before March, so stretching it to April should be easy and we could take up the question again in October. Clamage said that we need more notice to arrange facilities than that timing would provide. Glassborow suggested making a provisional twice-yearly schedule which is not irrevocable. Plum agreed that we should fix a schedule at least a year out, and suggested an October (US), April (Ireland if possible), and October (Hawaii if acceptable) schedule.

Clamage observed that the major purpose of this week's meeting is to establish procedures for the next several meetings (for DRs and other things), and to that end we will be experimenting with possible procedures at this meeting. He suggested that when we're done with that, on Thursday, we come back to this topic and take a formal vote then.

2.2 NCITS voting rules, possible changes to

Clamage said that NCITS has sent out a request for comments on potential changes to voting rules. The current rule is that "two of three consecutive meetings" allows voting rights. More groups are using electronic communications and/or scheduling fewer meetings. The new proposal is intended to allow electronic participation to count. Koenig stated that the meetings requirement is to show people are serious. Clamage said that another reason is to give new members time to learn the culture of the group.

There was considerable discussion. Face-to-face meetings are important, and electronic contribution can be very useful but is difficult to quantify.

Plum suggested that we could suggest the following: if the meetings are twice a year or more often, the rules stay the same; if the meetings are less often, the committee could vote to grant some member voting rights at a first meeting, or for a letter ballot. Several agreed.

Clamage cut short discussion. Broke for lunch at 11:50 MET.

Reconvened at 13:36 MET.

Glassborow made two points: it might be unwise to allow committees the discretion to grant voting rights, due to litigious nature of some countries; videoconferencing might be a good alternative to face-to-face meetings. Gibbons suggested that one of the purposes of NCITS' query was to encourage doing more work electronically, and having electronic straw votes on issues before the actual meeting would encourage people to do more work electronically. Stroustrup noted again (as others had before) that the "talking over a beer" time is very important, and so we should encourage physical presence; deciding something at a meeting that went against a prior electronic straw vote could open the committee members present to a charge of ignoring the wishes of those who could not be present.

Klarer suggested that even if we don't have a complete and nicely-packaged solution to recommend to NCITS, we could usefully provide a list of things that would and would not be acceptable to us; for example, one recommendation might be that a person should not be able to vote at the first meeting they attend (which is less than the current rule). Miller said that it is still important that people be allowed to participate in the first vote (which could be a letter ballot) when they have attended one full meeting, which demonstrates that the person intends to participate past one meeting. Charney expressed concern about what could seem like "universal suffrage" with loss of control over the value of technical input. Glassborow said that he supports Miller's idea of advancing the time at which a member could vote, and he would not want to change the rules about retaining voting rights to ensure that a member could not just attend one meeting in his life and vote forever after. Glassborow and Koenig expressed concern about possible abuses.

Clamage suggested we have a vote on two proposals so far: Miller's to allow voting immediately after attending one meeting (including a letter ballot), and Glassborow's to not allow indefinite voting rights based only on attending one meeting ever. There was discussion about whether these are compatible, and it was agreed that they are. Miller volunteered to write these up as a proposal. Clamage agreed. Miller will have the proposal drafted for tomorrow morning.

2.3 ISO copyright issues

Clamage gave the floor to Plum.

First, the national member bodies of ISO derive a major part of their revenue by the sale of standards on paper; we cannot ignore their funding needs. Second, the ISO member bodies encourage participation through the channels of their organization, and charge fees for such participation. If committees adopted procedures that allowed people to participate by writing email instead of going through the national body's procedures, the committee process would undercut the NBs' procedures. Many NBs get by on volunteer work and otherwise get by on the budgets and staff that they have. It would be nice to provide easier access to standards documents without undercutting the NBs' revenues. When a documents reaches FDIS status, ISO asserts and defends a copyright, and ISO attempts to fund NBs by allowing NBs to sell copies of standards. ISO currently computes such costs based on page count. Standards of size similar to the C++ FDIS can cost US$200.

ISO started to assert copyright on WG numbered documents. JTC1, with strong support from SC22, suggested that this is not appropriate for information technology. (There were comments by Gafter, Koenig, and Stroustrup that the ISO copyright assertion does not reflect understanding of US and international copyright law.) ISO has allowed the WGs to determine their documents' distribution policies for several years more, but only up to the level of FDIS. Since our document now is an FDIS, WG21 does not have the authority to decide distribution rights, and in particular we no longer have the latitude to put it onto a website. If someone wants a copy of the FDIS, they must join a NB; when it is published, it must be bought from a NB.

Plum returned the floor to Clamage.

Goldthwaite asked about the volume of sales of Schildt's book (*The Annotated C Standard*), which contained on alternating pages a page from the ANSI C standard and a page of commentary. Clamage gave background, and said that this was done by paying ANSI for the right to reproduce the standard. Glassborow noted that Schildt's book made more money than BSI ever did on the C standard. Glassborow suggested that there are economies of scale to have a single publisher produce all books, use the NBs as distribution channels, and give royalties to NBs based on the books sold in their jurisdictions. Glassborow urged ISO to consider establishing a royalty fee, since there is currently no way for honest people who would be happy to pay $10 or $25 to have a legitimate electronic copy of the FDIS or of the standard. There was discussion about details of making this work, and the choice of publishers. Charney opined that the problem could be that the standards bodies did not understand product packaging and marketing as well as Schildt or his publisher. Goldthwaite suggested that an *Annotated C++ Standard* annotated even by committee members, and available in local bookstores rather than by mail only, would be of value and something consumers would buy along with all their other $50 books. Stroustrup noted that one cannot have tens of thousands of bookstores dealing with ISO, or even have the bookstores track the nationality of people to whom they sell. Stroustrup contrasted this with the standard-publishing approaches of Java and Ada. Reeves noted that he and others have joined a NB, not to vote, but to gain access to the standards document while it was in progress. Plum noted that there is ongoing discussion on this topic within ISO, because this affects other standards. Plum said he has been told that the IEEE developed a process whereby a machine-readable copy is licensed to the machine that downloaded it, with a per-copy charge.

Dawes brought up that an author had published a URL for "where to get the C++ Standard," but the latest document that can be found on the web is CD2; "the cat is out of the bag." Stroustrup said that he receives bug reports for his book because it disagrees with CD2. Stump concurred, and pointed out that people will be using CD2 as a reference for years to come if no newer electronic copy is available, and that we may need to recognize it and go on since ISO and companies cannot give up revenue streams. Stump concluded that there may not be much we can say or do. Glassborow and Stroustrup noted that they must tell readers not to use CD2, that there is a standard, but that it's not available and there is no publication date.

Dawes suggested two possible solutions: 1. That putting out an electronic version that is in a not-easily-printable format, like HTML, may not compete with a real printed book. 2. That ISO could sell an electronic copy via the web. Josuttis and others discussed whether it would be legal or acceptable to produce "CD2 with diffs/errata" and it was largely agreed that it would not be acceptable. Charney suggested that ISO sell the rights to publish the book to a regular publisher and distribute it, just as when the publisher gives the author a royalty, and the publisher can choose to publish on CD. Koenig said it was a good idea but would probably not be accepted. Glassborow asked whether the BSI could choose to offer to sell FDIS on CD for £25 or $25, and various said that ISO could probably not object but likely would.

2.4 Proposals for new projects

Clamage asked for new project proposals, other than Embedded C++ which is on tomorrow's agenda. Plauger distinguished and clarified the processes and requirements for requesting the right to produce Technical Reports and/or normative Addenda, and that the committee process Defect Reports. Plum confirmed that DRs are clearly not intended to be used as a back door to make changes to the standard, and DRs are closely scrutinized to prevent such usage. Items such as hash tables and garbage collection would be candidates for TRs. Plum noted that the burden of proof is upon those who believe that change is needed and that it should be rapid.

Koenig suggested that we should plan to have a technical session at the October meeting to developed a shared understanding about the state of the industry with respect to language extensions; if one was developed, it would be made into a numbered document and later the convenor would be asked to create a new work item based on that numbered document; if one was done, it would create a report with no official status but which could be adopted later if it was deemed desirable. Kühl cautioned against making severe changes quickly, but that the first new project should be to find the direction we want C++ to go. Josuttis said he would support that, but that the discussion about the future of C++ has been deferred to Thursday and yet many discussions we are having now seem to be that discussion. Josuttis suggested that we may not even produce a TR for five years. Koenig clarified that his proposal acknowledges that there will be discussion on technical items whether we produce a technical report or not. Koenig said that he wants a place where these ideas can be discussed, not a place where what is decided will get a stamp of approval as soon as we decide what it is. Dawes said he has independently been going through the library issues and has reached the same conclusion as Koenig, that we must have a new standard in five or six years that incorporates changes, and that work needs to be done in advance to reach that.

Glassborow said that we must promise the world that we are not going to change the standard library, but that that does not prohibit us from managing the development of existing practice so that in five years we can add enhancements (like hash tables) based on existing practice whose seeds we can plant now while retaining some degree of control to prevent 25 different versions of hash tables. Stroustrup said that we need not just stability but the impression of stability so that implementers can spend time on quality of implementation instead of just catching up on features; we should be a forum for extensions dealing with specific applications areas, but we shouldn't rush; GC and hash tables seem to be minor fiddling with the language, not unimportant, but not much compared with the entire standard; we should take time, be a forum to discuss future directions for a few hours, discuss potential work, but be reluctant to start new work items especially about relatively small things; the next meetings should be a discussion of proper areas to attack and look at over the next five years; not proposals for doing specific things; not fiddling with hash tables and GC and create the impression that the standard is malleable and will change in a minute.

Goldthwaite proposed that our priority between now and October be to produce rationale documents. Gafter said that we had discussed the possibility of doing rationales in a previous meeting and we had decided not to do that; we could do it now, but D&E covers a lot of what we would want in a rationale. Reeves supported a clear separation by having the committee restrict itself to dealing with DRs, while (using other people) keeping extensions in the committee without taking them up. Charney agreed with Goldthwaite, and said that a rationale would be useful to direct where we are going with the language and would be a suitable reason for exploring new areas in the standard. Josuttis pointed out the apparent schizophrenia between "we have to be clear we're not doing anything now" and "we've got to start doing something about extensions now." Stroustrup suggested that, to avoid too much inventiveness, someone should do the work, present it in a technical session (perhaps during an evening), and then decide whether to go further; at this stage we have nothing beyond "let's have a technical presentation at the next meeting." We must be careful not to take bits and pieces; is there a connection between hash tables and the people who want persistence of containers, for example. Glassborow said that we have to be good gardeners, to plant ideas, cultivate them, let them mature. Stroustrup affirmed that while we may produce informal technical documents, this is no time to take votes or start new work items.

Dawes asked to restate and confirm that this is what he has heard, in terms of the library: For the next year, our job is to process DRs and notice that this must not become a back door for extensions; that we start a discussion of nothing specific but of what new work item areas for the library we might wish to bring up for a vote in three meetings from now. Stroustrup agreed that we should have a general idea of the direction of the language before considering extensions; the extensions group has served as this kind of guiding force, and there should be some mechanism like it as a gatekeeper; worth noting that some of the problems for users was that some vendors adopted extensions in a different order, so when making TRs/suggestions we have a definite order so that we can say "we're working on these things, and we think that this is the proper order for attacking them, and we suggest this sequence be used by vendors for the benefit of users." Charney contrasted small feature sets like hash tables and larger ones (like the STL); only by iterating over a wide variety of problems, in informal discussion, will we get an idea of where the language will intend to go. Glassborow opined that we could not produce a rationale because that would include reasons like "because of time pressure" and "it's a mistake;" many people here write, but not all can keep up with all the reading; those who write could/should share with the committee those things that we write, at meetings or over a committee reflector, to share each other's expertise. Josuttis agreed, and said we would benefit from reviewers too.

Stump returned to a prior point, what we consider as modifications to the standard's five-year mark: we should seek wide consensus from the users and implementers to get feedback and see interactions and then standardize what is in common use instead of being overly inventive.

Clamage said that since we have finished our agenda items for the day, we can break for the day or organize our working groups, including finding a replacement for Lajoie. Stroustrup summarized the documents already available for review that will be covered in the Embedded C++ discussion tomorrow. Clamage asked Gibbons to take charge of the Core group for this meeting, and the Core group will organize itself and decide how to replace Lajoie and whether to continue having three subgroups.

Lextrait summarized food arrangements for this evening. Lextrait then summarized arrangements for the Friday session.

Lextrait brought and distributed copies of the papers for tomorrow's session.

Clamage adjourned the meeting at 16:10 MET.

(WG21 and J16) Tuesday, March 10, 1998, 08:30 - 17:30

2.5 C++ for embedded systems

Clamage called the meeting to order at 08:50 MET, March 10, 1998.

Monden presented a proposal to set up a new working subgroup for embedded systems programming, which would begin using the EC++ specification as its base document. C++ is already popular in both Windows and embedded environments, and in Japan 15% of ES programmers are already using C++. Some problems in C++ are that the C++ specification is very large and that "unexpected" code may be generated by compilers. What is expected is to keep the spirit of C++ as much as possible, have high-quality compilers, and have no or very little "unexpected" code. The EC++ Technical Committee was formed in December 1995; the first international meeting was in March 1996 (Tokyo); the first draft in June 1996; the third international meeting in September 1997 (San Jose). The basic design philosophy of EC++ is for it to be a proper subset of ISO/ANSI C++, not a dialect or derivative; to avoid too much complexity; to avoid practically unpredictable overhead in time and memory to benefit real-time and resource-poor or cost-sensitive environments. The scope is intended to cover all programs except for native applications on PCs and workstations. Examples of required ROM sizes range from up to 256K for a camera and 8MB for an Internet-TV to as low as 64K for rice cookers and printers; 4- and 8-bit CPUs are common. Available commercial products are available from companies including EDG, Green Hills, Cygnus, and Dinkumware. The desirable structure is a "core" which is EC++ and various "optional" parts, the sum of which equals full ISO C++. Conclusion: for C++, need a focus on embedded systems, need a wider discussion with language experts and ES designers; for EC++, need to be more open, need to refine along with IS. Proposed new working subgroup brings benefits for both.

Printed copies of a slide presentation entitled "Compilers – C++ vs EC++" were distributed.

Dawes asked how many members are active in the EC++ group. Monden referred to the paper distributed yesterday. Becker emphasized the importance of ROM sizes, where many Japanese developers use only the ROMs on the chips, not external ROMs, and a size overhead of even 5-10% is very important if it pushes you off the chip. This is a subject to which we must pay serious attention.

Charney expressed concern about using criteria for today's processors and even next year's processors; chip capacity is going up rapidly and the cost of subsetting a language is high. He asked whether it had been considered that there is a tradeoff between using a somewhat more expensive chip vs. providing support for a subsetted language.

Stroustrup said that he had direct experience with many embedded systems, including with less memory than the examples shown in the EC++ presentation; the two key sources of savings are iostreams/locales, and exceptions; we should look at embedded systems and get support for it, we should document relevant programming techniques, but the concern is subsetting the language which has not always gone well when it has been tried before; it is important to be extensible so that even if you don't use locales today you can internationalize next year when you need to; a concern is whether it would be a complete subset (e.g., no templates means users will have to create their own container libraries again) and the incongruous appearance of celebrating the standard by starting to define a subset; the combination of missing namespaces and templates is that you cannot have a complete subset of C++, yet these features, when unused, need not cost a byte or a cycle and, when they are used appropriately, cost no more than you would have used anyway; today "getting close enough" will require compiler switches; in favour of working within ISO framework to address needs of embedded programming, but not in favour of defining a subset.

Koenig restated what he feels is the major technical issue: if the subset does not include templates, there is no I/O since I/O uses templates (other than the C library), so you are forced to use the C library. Becker and Plauger said that iostreams still exist but are not templatized.

Dawes said that he accepts that there is a serious problem here as evidenced by the number of companies involved. Gibbons said he was concerned that doing this could encourage developers to put their efforts in the wrong directions because the tradeoffs should be made per application and not as a language design decision, and the tools suppliers to put their efforts in the wrong directions, into subsets instead of into optimizing embedded code so that there's no need for subsets in order to have embedded code. Henkel-Wallace said that it would be appropriate for a standardization committee to provide guidance for tools developers by defining two or three subsets.

Stump said that he has not seen sufficient persuasive technical details; the numbers shown in the handouts seem to be library-related (there were many nods); the issue seems to be similar to "if printf adds too much overhead, don't use printf;" the tradeoffs will always be with us, and boil down to selecting a competitive library to use; rather than enforcing subsets, just don't use what you don't want to pay for, since it's a quality of implementation issue. Reeves said that, as of the last time he'd looked at it, the EC++ spec was in fact not a subset of ISO C++; however, vendors are going to provide switches to turn off features like exceptions and so it would be beneficial to exercise some control over what happens when you do that (e.g., what does operator new do).

Stroustrup said that he did not use iostreams in the real world until he had an implementation that didn't pull in the locales library if it wasn't being used; you can get the effect by subsetting the language or by quality of implementation; similarly if exceptions are not used there shouldn't be exception overhead; if you do that via a compiler switch you have to define what happens in other places like operator now, or you can do it by implementing good default optimizations; the proper thing for a WG on embedded systems is to provide guidance for implementers, not necessarily subsetting by defining a separate language which is almost always by definition bad.

Plum said that the discussion so far demonstrates that there are relevant issues in using C++ in this application area; just as with the other subgroups, an embedded subgroup should give consideration to people's expertise in the area; we need to reach consensus on the ground rules, what such a group could do; discussion so far has already converged on the idea that the product will be a technical report of some sort; the topics covered in that TR should be those of interest to those writing for embedded systems; specific features mentioned were exceptions, templates, namespaces, dynamic configurability of locales in the library, parameterization of the library for arbitrary character types; for N features, one could get up to 2^N subsets, and some vendors supply a great number of these subsets; the subgroup would not define one specific subset of C++, but should report on possible subsets and performance impacts of specific features, and not overlook the importance of improved compiling technology to avoid the need for subsetting; Plum emphasized need for active participation of several NBs at the WG21 level; he suggested that by the October meeting each NB identify people who would be interested in a problem of that sort; the debate here is exactly what should occur in a subgroup on embedded systems, not in full committee until it's been "baked" in the subgroup, just as we don't for Core or Library either.

Clamage asked whether we should charter a new work project on this topic, and if so, to answer what the charter should say and what form of TR would we expect. Dawes asked Plum what he meant by subgroup, whether it was to be a subgroup, like the Core or Library group, that meets during regular meetings and reports to full committee. Plum said that yes, that was his proposal.

Clamage said there are two possibilities (besides "do nothing"): form another subgroup like Core or Library, or form an actual project. Plum said that our only charter as a WG is to address defects on the FDIS/IS, and so we need another project in order to even form a subgroup to do work on it.

Charney asked what factors within the FDIS is a problem/incompatible with the ES group; these seem to be quality of implementation issues. Plauger answered that the problem says to do certain things in certain ways; iostreams require that streams be imbued with locales/facets; existing technology makes it difficult to not load a lot of code for cin and cout by just mentioning their names; the standard as written only lets an implementer optimize so much; the EC++ committee has identified a dozen places where relaxing the standard a little, such as allowing only a single locale or character type, would give implementers the “wiggle room” to create programs a tenth as large. Koenig asked whether it’s not possible to get the wiggle room by partial specialization. Plauger said no, the standard library is not easy to optimize down, not given current compiler technology. Charney asked whether we have a list of those features. Plauger offered to give more details offline.

Glassborow noted that C++ has a long history of adding “unnecessary” features that help programmers, such as the redundant “try” keyword; he urged that we spend time looking at the issue even if the TR result is that there is no problem; also instead of doing something for the ES community we produce a TR about managing performance and resources in C++.

Stroustrup said he would very much like to see iostreams with minimal overhead, regardless whether it is provided by a good optimizer or by a compiler switch; the issue seems to be primarily iostreams and exceptions, but not templates; templates for embedded systems can reduce code size and increase speed by reducing the overhead of virtual functions and real functions; templates are a key to efficiency and simplicity, including simplicity for novices compared to class hierarchies and virtual functions; templates would allow the subset property to be strict. Miller asked whether the quality of implementation issues is within the purview of this group. Plauger agreed with Stroustrup’s basic outline of the issues; “a compiler switch is a dialect;” C chose to have only two dialects, namely hosted and embedded; a TR is a good idea because we can make recommendations without being binding and labeling something “embedded;” a committee can’t regulate what people do outside the standard (can’t say “how nonstandard” it is); people have been turning off exceptions for years and will continue to do so; he cited several existing customers for the Dinkumware library who are doing these things; need a restructured library, not just a subsetted one, to get any real improvements; agree with Plum that there’s enough interest in order for this committee to start a project to look at the use of C++ in embedded applications.

Clamage read the drafted new project proposal. Plum said that we shouldn’t have a specific proposal brought forward this morning, and at least five countries should express support; between now and October we should draft a specific proposal.

Miller asked about the issue of template usage in EC++; one potential problem is the possibility of the compiler doing something behind the programmer’s back, and Miller asked for more information on why templates should be not included. Plauger said that the pragmatic reason was that template technology was and is a work in progress; it will take several years for compilers to catch up; those issues do not apply to what this committee decides about whether to include or exclude templates.

Plum suggested that those delegations which have not brought embedded systems experts before should identify such and bring them. Clamage suggested the creation of a new reflector for this discussion. Koenig said he would set it up and announce it.

Plauger asked for a straw vote for sentiment in favour of inviting NBs to come to the next meeting with support for this. Stroustrup said that we cannot vote without knowing what “it” is. Plum said that his concern is that a straw vote is premature. Miller said that the area of efficiency vs. language is evidently of interest to a large part of the user community. Plauger asked again for a straw vote, just to see the level of general support. Glassborow said that there was clear interest in pursuing this and that he in particular would go back to his NB to pursue it. Plauger asked specifically what is the sentiment in favour of having WG21 request a new work item pursuing a TR dealing with embedded systems. Miller said we could confirm that there was sentiment in favour of investigating whether we should pursue a new work item, rather than saying now that we should pursue it. Plauger said that that is what he meant. Glassborow wanted the wording to “include” the requirements of embedded systems rather than be just the requirements of embedded systems. Clamage said “including but not limited to.” Gafter asked whether this could be first addressed as a DR. There was loud and wide disapproval. Josuttis asked for paper wording. Plauger said that he and Sutter would draft it, and that the purpose was not to make a go/no-go decision but to document the interest level of the committee. Clamage said that we will spend five minutes tomorrow to take such a straw vote.

Extra item: Discuss other procedural issues, and 98-0013/N1156

Clamage said that Rumsby had changed jobs and could no longer maintain the committee website. Kehoe offered that Cygnus could do it, and that they already have mirror sites in Europe and Asia.

Plum said he had just received an email from Reinhuls saying that there is no explanation for the long time delay. ISO have received the text and should have a proof ready by the end of this month. Koenig said that it could be that he will return to see an FDIS in his inbox with thousands of requests for changes, and he would like to know what the committee's position would be on any of several classes of changes that might be demanded. Stroustrup suggested that we could select a small executive committee with whom Koenig can speak, and the committee can deal with these issues expeditiously; suggest Koenig, Plum and Clamage. There was discussion about the extent of possible changes required.

Josuttis asked to have a confirmed date for the next meeting. Plum has sent an email and is expecting a reply.

Document 98-0013/N1156 was distributed and considered. Josuttis said that compatibility between C and C++ is a key property; we are required to document incompatibilities with C89; this proposal is to ask WG14 to document incompatibilities between C9X and C++; he was not happy about suggesting it because we should have done this two years ago and it could cause a problem for WG14 due to their time schedule; but the topic is important enough to risk that. Benito said that when C9X started C++ was still in flux, whereas when C++ started C was already a standard; also the C committee may not have the expertise to generate such a document. Glassborow expressed support for Benito, and that if we pass this motion then we may look like we are trying to delay the C standard. Stroustrup said that if this is not done it would be a major issue between C and C++. Koenig said that the NBs voting on the C CD ought to be aware of the effects of incompatibilities with C++ and that lack thereof indicates lack of attention to compatibility with C++. Various people responded strenuously that this was not so. Josuttis expressed greater discomfort after hearing the discussion; his concern was compatibility, even though we have diverged somewhat with C9X, but we need an answer to this problem.

Charney observed that we are on the path to that answer by co-location and other efforts. Plum said that the C committee is meeting in June in Copenhagen and then together with us in October; if people from this group are willing to do the work together with C then he will support the resolution, otherwise he will not; some users will follow the C subset of C++ has the “historical” C language they used to know, while others will follow C9X with its numerical extensions.

Plauger said that when the C committee began five years ago, it drafted a paper saying within what limits it would work, and that it would not be bound to C++ but would nevertheless avoid gratuitous incompatibilities as long as C can evolve. Stroustrup said that it is understood that C can and should evolve in whatever way the C committee feels it should evolve; it is assumed by all that C and C++'s common subset will not be decreased and that C++ will adopt some of the new features in C9X; he is shocked to be told that the new incompatibilities are not known and that there is not the expertise in WG14 to know about them. Plum said that a very important question is whether the C9X/C++ intersection has been reduced below what it already was for C89/C++; WG21's requirement was to document any incompatibilities between C++ and C89; a separate question is whether/how to include the ways in which C9X is evolving.

Dawes asked if the C++ committee could convince some of its members to be at Copenhagen; is it still too late for the C committee to do anything about it and would that have any effect. Plum said that it wouldn't be any more welcomed by WG14 than a similar input would have been welcomed by us after our CD went out. Goldthwaite offered to spend BSI funds if Glassborow would attend Copenhagen. Glassborow said he would be happy to attend, but to document incompatibilities between C9X and C++ requires a depth of understanding that very few people in the world have; _complex is an example where the C committee needs to serve users asking for the feature to work in a way that the C++ committee has rejected. Josuttis said that various people have knowledge of specific incompatibilities, and he just wanted a document for others to read in order to know about them for the future. Glassborow said that it's one thing to list incompatibilities of which we are aware, but not to document all possible incompatibilities.

Kühl said that the main issue with possible C9X incompatibilities is the expectation outside the committees that all features in C9X will make their way into C++; we need to know about them so that we can include them or not include them; could rephrase proposal to say all "known" incompatibilities. Stroustrup pointed out that our list of incompatibilities with C89 could well be incomplete, but he would certainly like to see a list of known incompatibilities that some people could put together. Josuttis pointed out that the proposal as written doesn't ask for a guarantee that no aspect is missed, just a general goal to document the incompatibilities. Plum expressed concern that we are in danger of slipping our agenda. Dawes asked whether Josuttis wants to insert the word "known." Josuttis said it would be acceptable to insert it, that the major issue is important and not that detail. Vandevoorde asked what is the strongest argument why the C committee should do it and not the C++ committee. Koenig pointed out that SC22 imposed on the C++ committee the responsibility to document incompatibilities with C89; it seems reasonable that the C committee ought to take a similar requirement on themselves. Charney asked whether there exists a difference document between C89 and C9X. Benito said no. Charney asked the same about the differences between C93 and C9X. Benito said such a difference document does not exist but could be generated.

Broke for lunch at 11:47 MET, to resume at 13:30 MET sharp.

Reconvened at 13:32 MET.

Plum said that he had spoken with several people over lunch and strongly discourages taking any further action with respect to C9X at this meeting; we will have the opportunity to increase the bandwidth at a co-located meeting; SC22 has not asked C9X to document incompatibilities with C++, C9X is going its own way in some things; we should not make C9X regret that they ever invited us to join them. Glassborow made an informal suggestion to ask WG14/J11 to briefly summarize only the changes (not additions) made since C89 so that not just C++ but the public as a whole knows about the changes to semantics of existing code, and that this would be helpful to the community as a whole. Koenig said that there was a proposal on the table which should be voted upon. Clamage said that the proposal had not yet actually been moved. Josuttis said he would prefer to wait before possibly moving it. Plum said that WG21 meets tomorrow. Koenig said that therefore anything to be voted upon has to be in writing today. Josuttis asked Glassborow whether he has better words. Glassborow said that an informal statement as he proposed a few minutes ago would be better than sending something up to SC22 and back down again. Benito emphasized that WG14 is doing the same thing as WG21, and is not trying to interfere with WG21; he would like to present the suggestion to WG14 and see if someone would volunteer to work on it, which would be easier if someone from WG21 also volunteered; he agreed that the informal route is the only way to go.

No motion was on the floor, and Clamage insisted we move on.

Miller reminded Clamage of previous unfinished business regarding NCITS voting procedures. Miller summarized it briefly. The text of the motion was:

> *Move to instruct the chair to inform NCITS that the sense of the Committee regarding possible changes in requirements for obtaining and retaining voting membership on Technical Committees is as follows:*
>
> *1) It is important to facilitate the full participation of new members of TCs that meet infrequently, without compromising the benefits of in-person long-term participation in the work of the committee that provide the rationale for the current membership rules.*

2) New members of TCs should receive voting rights immediately after attending one full meeting of the TC. This would represent no change for voting rights at meetings but would allow earlier participation in letter ballots for TCs that conduct substantial business in this fashion.

3) The rules for retaining voting rights should remain unchanged for TCs that meet more than twice a year. For TCs that meet two or fewer times a year, members should lose their voting rights if they do not attend at least one meeting per year.

Moved by Miller. Seconded by Glassborow.
J16: 14 in favour, 0 opposed, 2 abstained

Clamage to forward to NCITS secretariat. Plauger asked informally whether there was a quorum, for informational purposes only. Miller confirmed that there was, that he was not certain of the exact number, but that we are well above it. (Miller later reported that there are 36 voting members of J16, with 12 required for a quorum, and that 19 voting members are represented at this meeting.)

2.6 Discuss DR procedural issues, no conclusions

Clamage asked Plum to clarify ISO requirements: When something is raised as a DR we are obliged to answer it, in two years at most. The response needs to be either a change to the standard (editorial or substantive) or a response to the author of the DR that doesn't require any change to the standard. The former is eventually published as a Technical Corrigendum, the latter as a Record of Response. ISO periodically collects the pieces and publishes TCs with accumulated changes, and in Plum's experience with WG14 it was often done badly. Plum said it would be nice if we could go a couple of years before publishing a TC. The impact of the standard for C was diminished by having continual DRs being published every few months/years because the standard had in some ways again become a moving target, even though many of the changes were tiny. Most vendors more or less ignored the changes. Plum would also like to announce ahead of time that this two-year wait is going to happen, so that there will be user community interest. We do not want to change the functional behaviour of the standard in response to a DR; clarifying the standard is all right, or correcting something obviously broken that couldn't work as written.

Clamage asked: We evaluate a DR, we draft a response, and are these sent immediately to ISO or batched? Plum said that we could hold on to them. Plum said that the project editor has the authority to unilaterally take any input and make it a DR. The second avenue is through any of the NBs using whatever procedures they have; some have C++ panels. Plum discouraged setting up parallel work. The proposals made on Monday included using the moderators of comp.std.c++ as a first line of triage, the BSI as a second, J16 to address the DRs that have been accepted. Plauger added that if a DR comes from a NB, it must be accepted, period; the convenor has the responsibility to maintain the defect report log and report once a year on what the committee is doing. The C committee generated reports itself, most of which were turned into DRs by the project editor, and presumably we will do the same. Miller asked whether we as J16 are to follow ANSI procedures. Clamage said the procedures are an ISO standard which ANSI just adopts.

Clamage asked whether we needed to use the actual DR form. Plum and Benito said that they routinely use other forms. Josuttis suggested introducing a form to categorize the input so that we know how to handle it; for example, a section number and title, and a category for bug (obvious vs. ambiguity vs. error), request for clarification and extension requests. Dawes suggested that this kind of detail will be handled by Core and Library, and it is on the Library agenda. Plum said he would like to have a form for impact (could also be called "severity"), so that people submitting a DR should define what they think the impact of their problem is on real people. The intent is that DRs without a severity, or an unconvincing severity, can be severely delayed with no impact. Munch and others concurred.

Clamage broke the meeting up into working groups. All of Core will meet together, and all of Library will meet together, and no other groups need to be formed for this purpose. Room arrangements were made. The full committee should meet together first thing tomorrow morning at 09:00 to review progress.

Clamage adjourned the full committee meeting at 14:15 MET.

(WG21 and J16) Wednesday, March 11, 1998, 09:00 - 17:30

Clamage called the meeting to order at 09:10 MET, March 11, 1998.

2.7 Appoint subgroups and chairs

(No discussion.)

2.8 Continue subgroup work

(No discussion.)

2.9 Finish setting DR procedures

Clamage reported that the conclusion of both Core and Library subgroups was that no further subgroup time was required. Gafter said that we still haven't come up with a mechanism to record the work we do on the issues, officially and informally. There was general discussion about what had and had not been done yesterday.

Clamage asked to hear from the subgroup committee chairs.

Gibbons said that Core had "processed" some of the issues, for practice only, as though they were DRs. WG14 has a website where they maintain open and closed DRs, and that seemed like a good approach to take. For one issue, they discovered that there was one area of the draft that was very unclear, and it didn't need to be changed but should definitely be cleaned up the next time the draft is reopened in five years, and we don't want to forget this information. Such items should be saved in some manner.

Dawes said the Library working group would continue to organize as in the past, to meet as a whole when volumes are lower or in three subgroups if needed, and subgroup chairs have not changed. The LWG will continue to maintain an issues list, but also make it available on a website. The issues list will be used as the memory of the committee, including for items that are not DRs. There was concern about issues falling into the cracks between Core and Library; we have not had many problems with this in the past, but there have been issues that were delayed for a meeting or two because each group thought that the other was dealing with it. There was discussion about future directions for the library, and nothing was to be brought forward for further consideration. We looked at an email log of items that could turn into DRs, but no one thought that there was anything worth looking at before October.

Gafter said that CWG was to maintain a website with open/closed issues, and asked whether it had been decided who would come up with forms and maintain that website. Gafter also asked whether the LWG issues list would include issues that had tentative (but not final) resolutions. Dawes answered for LWG that they didn't know the answer to that yet, and that it could depend on volume; creating an archive was possible if necessary. There was discussion as to whether having separate mechanisms for CWG and LWG was all right, and the sentiment was that it was and that the administrative overhead of creating a single mechanism was not necessary. Gafter said that we will be receiving DRs from different sources, and we want to ensure that each one is at some place in the process. Gibbons agreed that there should be a master list somewhere to track all issues and to whom they are assigned. Plum suggested that we continue the discussion on the -admin reflector; he briefly mentioned several more details of possible website structure and content, all of which should be deferred to -admin discussion. Dawes agreed with Plum. Glassborow said that we should aim to have a uniform and coherent interface between ourselves and the world; we should not foster the impression that we have finally decided our internal organization and DR procedures; we have only tentative ideas, even if continuing with separate Core and Library WGs seems reasonable for now. Plum said that we have mostly discussed DRs as a means of clarifying the standard, which has been the case with C for the past 10 years; but in earlier standards efforts this was used as a means to resolve disputes on large contracts, which would require more timely and formal responses and be the focus of more interest and attention.

Clamage summarized is that it sounds like we have decided to move the details of DR procedures to the -admin reflector over the coming months. Plum asked about the issue of the roles of comp.std.c++ moderators, UK NB, and other proposed communications channels for receiving DRs. Plum summarized his understanding of our previous discussion: if the moderators of comp.std.c++ are requested to triage communications that they see and forward important ones (to the project editor or some intermediate body), and finally the project editor makes it a DR; it should be put up on a website or similar place and if the original commenter was dissatisfied there should be a place to fall back upon; the proposal is that we designate an alternative channel to whom everyone brings their issues uniformly; commenters' last resort is to go through their NBs. Gibbons said that submissions via comp.std.c++ should be handled such that the original commenters can follow what happens to them. Glassborow said that what we do not want is for someone to submit a DR via a NB that has no experts. Plauger thanked the UK for volunteering as ombudsman, and said that he welcomes it but that we're not to be seen as imposing legalisms that might be objectionable to SC22. Clamage noted the implicit assumption that the comp.std.c++ moderators would volunteer, but that he had not yet asked the other comp.std.c++ moderators for their assent, and that even his own answer could depend on the amount of work involved.

Plum said that at some point WG21 should agree that it would turn DRs over to J16 for discussion and resolution. Plum said that we may want to continue this week's practice of having a second WG21 meeting at the end of the week to ratify ideas.

Plum talked about the change from paper to electronic communication, and that ISO has begun to recognize that this change affects the standards process; there is no longer a linear communications chain as a physical piece of paper moves from one place to another. Koenig said that this reinforces the opinion that we should be wary of using the web for our internal procedures because the communications modalities affect how we work, and reminded that there are benefits to first designing a manual system before setting up a computerized system; he cautioned against immediately relying on electronic formats as a fundamental part of our procedure, although clearly using the web would be useful for distributing things which would otherwise be distributed anyway; there would be chaos in an office if the way that things were done were that work items were posted on a bulletin board and people pick up items from there to handle them.

Stump asked about whether we wanted to put all DRs, even unhandled ones or ones with tentative answers, on a public website; Gibbons said that we could, and as the issues are handled further internally the external status could be updated. Dawes said that there has to be a distinction between a committee website and a public website for LWG issues, because many are wrong or propose solutions which are completely wrong. Plauger suggested that whenever we have an answer we are ready to show the submitter we are ready to show it to the world. Clamage and Dawes said that an advantage of publishing them sooner is to help weed out duplicates by letting later people see that others have already asked the question. Stroustrup, Plauger, Clamage and Dawes agreed that some of the comments received are poorly worded and need editing, and one should only correct spelling and grammar and otherwise stay faithful to the original.

Clamage suggested working through an example to see what the process would look like. Dawes illustrated that NB DRs immediately go into processing; otherwise, in the LWG there would be an issues list maintainer who receives email from different sources (reflector traffic, well-formed issues, and others), makes them into well-formed issues if appropriate (done by the list maintainer himself or by bouncing it back to the submitter), the LWG reaches a consensus and the ones that the LWG thinks should be treated as DRs are brought before the full committee to be voted upon as a batch and made DRs.

Dawes and others drew a diagram:

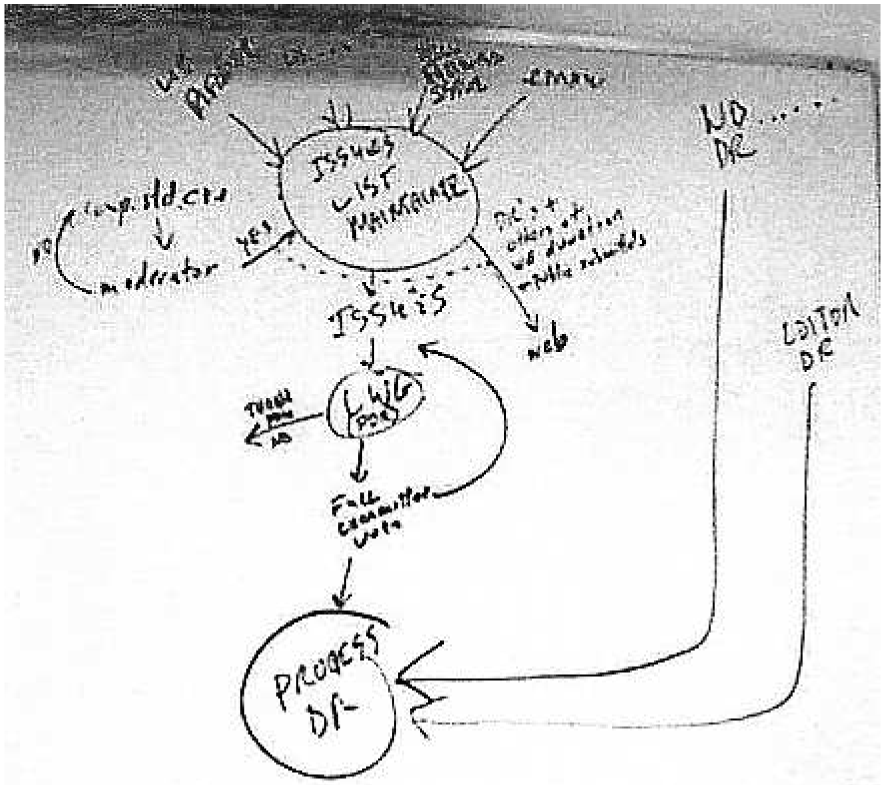


Figure 1: DR whiteboard diagram

Short Legend: "lib reflector – well-formed issue – email – issues list maintainer – comp.std.c++ – moderator – DRs + others at WG discretion + public submittals – web – issues – LWG(PDR) – thank you no – full committee vote – NB DR – Editor DR – process DR"

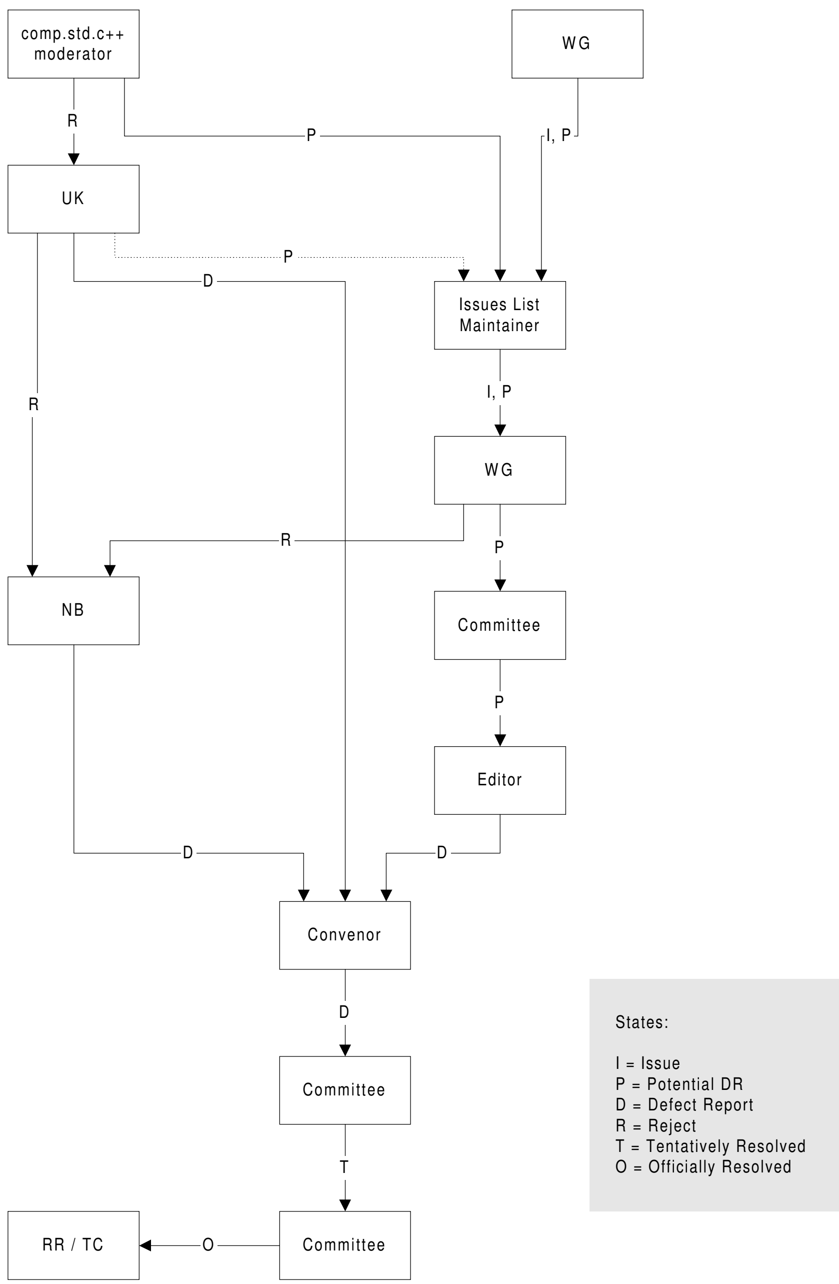
There was discussion about whether this is a state diagram and, if so, what all the transitions were. Plum said that what's new here is that the committee at the same time could categorize something as a DR at the same time as they answer it. Plum asked whether we target a "C++ 2000" document to give implementors something concrete to which to refer. Dawes and Stroustrup talked about having the naming reflect the importance of the update. Koenig's term "mid-course correction" had general support. Wilcox asked whether the chart means that there is only one issues list. Clamage clarified that for the moment there are separate lists for Core and Library. Goldthwaite reminded about issues that could get lost between Core and Library where each thinks the other is dealing with it. Miller said that this would be addressed by having a single list on the website.

Plum suggested that there should be a new subgroup for the C/C++ intersection, initially to consist of Plum and Benito and possibly to include only those who are members of both committees. Clamage noted that Sun has a representative on J11 who does not attend J16 meetings. Glassborow said that the subgroup should consist of members of both committees, which is easier with co-location. Clamage and Dawes pointed out that DRs on the intersection are not theoretical; we have some already; an example is the question about "what is a byte." Plum said that it was probably worthwhile for this group to establish an intersection subgroup; Plum and Benito would raise the same suggestion in Copenhagen at the next C meeting; it would be distressing if the languages should diverge due simply to deficiencies in our procedures. Stump expressed strong approval, and asked whether such DRs should be on our DR list, on C's DR list, or both. Plum said that if it's channelled through our WG it has to be tracked as part of our DR list. Plum and others said we would duplicate them on both, and that having a cross-reference as a comment would be a good idea, but having a cross-reference as a symbolic link would be unwise.

Broke for lunch at 11:48 MET, to resume at 13:30 MET sharp.

Reconvened at 13:33 MET.

Miller presented a flowchart and state transition diagram for DR procedures. The states are: [I]ssue, [P]otential DR, [D]efect Report, [R]eject, [T]entatively Resolved, [O]fficially Resolved; all but [I] would be tracked in the public web site. The flowchart was as follows:



There was general agreement. This concluded the DR reporting discussion.

Plum reported that at lunch Comeau also offered to work on the C/C++ intersection working group.

Sutter asked for an informal show of hands for people who, if all C and C++ meetings were co-located, would consider attending both. About eight raised their hands, including at least three NBs.

Plum presented a resolution:

> *In view of the number of new features in CD 9899 ("C9X") which are orthogonal to the C++ features in FDIS 14882, WG21 requests that SC22 affirm that WG21 (C++) will not necessarily be required to adopt C9X features in future revisions of C++.*

There was discussion about wording details. Stroustrup said he was interested in the aspect of having two ways to do the same thing. Benito said that he supports this and would present it to the C committee and hopes to be able to support Plum at the SC22 plenary. There was discussion about whether the C89 standard would still be referenceable by the C++ standard once C9X is passed. Plum noted that once C9X is passed, university courses, like the embedded systems market, may choose to use C with some C++ features rather than using and/or waiting for C9X compilers; this resolution bears on that.

The wording was not amended. The vote was taken:

Moved by Plum. Seconded by Dawes.
> **J16: lots in favour, 0 opposed, 1 abstained**
> **WG21: 7 in favour, 0 opposed, 0 abstained**

Motion approved.

2.10 Future directions for C++

This topic has been discussed throughout. Further discussion was deferred.

3. Review of the meeting

3.1 Formal motions

The question for the straw vote was:

> *What is the sentiment in favour of having WG21 request a new work item to pursue a Technical Report addressing C++ space/time performance issues and techniques, including but not limited to the requirements of embedded systems?*
>
> **J16: lots in favour, 1 opposed, 4 abstained**

It is the sense of the committee that we pursue this.

3.2 Review of action items, decisions made, and documents approved by the committee

(No discussion.)

4. Plans for the future

4.1 Next meeting

Plum said that he has received email confirmation that the October meeting dates are October 7-9, 1998.

4.2 Mailings

Miller said there are two mailings. The deadline for the post-meeting mailing for this meeting is March 27, 1998. The deadline for the pre-meeting mailing for the October meeting is Tuesday, August 11, 1998. Miller will send out email reminders.

4.3 Following meetings

Plum said that O'Riordan confirmed that 1999 is fine for a Dublin meeting, due to be the week of April 11-16, 1999. The following meeting will be October 20-26, 1999 in Hawaii.

Dawes moved to thank the host. Motion passed by acclamation. Lextrait thanked ILOG.

Dawes moved to adjourn. Seconded by Miller. Motion passed by acclamation.

(WG21) Wednesday, March 11, 1998, 14:45 - 15:00

4. Review and approve resolutions and issues

Motion to approve all the votes taken during the informal session.

Moved by Clark. Seconded by Josuttis.
WG21: 7 in favour, 0 opposed, 0 abstained

Motion approved.

5. Closing process

5.1 Select chair for next meeting

Plum to be chair.

5.2 Establish next agenda

Plum was asked to make an agenda much like this one.

5.3 Future meetings

Clark noted that the next J16 meeting will begin on a Wednesday. Plum said that the next WG21 meeting will be Tuesday, October 6, 1998, hosted by Silicon Graphics.

5.4 Future mailings

Handled in J16.

5.5 Assign document numbers

(No discussion.)

5.6 Review action items

Plum said that we are going to discuss the DR procedures on the -admin reflector. Those interested should ask Koenig to add them to the -admin reflector.

Plum said that the convenor should coordinate a new project proposal according to the straw vote to create a new subgroup.

Plum said that the convenor should convey the J16 motion that WG21 not be required to adopt C9X features.

5.7 Any other business

(No discussion.)

5.8 Thanks to host

Plum thanked the hosts. There was applause.

5.9 Adjournment

Motion to adjourn.

Moved by Clark. Seconded by Josuttis.
WG21: 7 in favour, 0 opposed, 0 abstained

Motion approved.

J16 Attendance

Name	Organization	Mo	Tu	We	Th	Fr
William M. Miller	Software Emancipation Tech.	V	V	V		
Reg Charney	Charney & Day Inc.	V	V	V		
Robert Klarer	IBM	V	V	V		
Tana Plauger	Dinkumware Ltd.	A	A	A		
Michael Spencer	Programming Research	V	V	V		
Laim Fitzpatrick	Programming Research	A	A	A		
Brendan Kehoe	Cygnus Solutions	V	V	V		
Mike Stump	Charney & Day Inc.	A	A	A		
Gregory Comeau	Comeau Computing	V	V	V		
Lawrence W. Jones, Jr.	RWD Technologies	V	V	V		
Clark Nelson	Intel	V	V	V		
Gyuszi Suto	Intel	A	A	A		
Bill Gibbons	Self	V	V	V		
Beman Dawes	Self	V	V	V		
Steve Clamage	Sun Microsystems Inc.	A	A	A		
David Vandevoorde	Hewlett-Packard Company	V	V	V		
Herb Sutter	Current Network Technologies Corp.	V	V	V		
Pete Becker	Dinkumware, Ltd.	A	A	A		
P.J. Plauger	Dinkumware, Ltd.	V	V	V		
John Benito	Perennial	V	V	V		
Neal Gafter	Sun Microsystems	V	V	V		
Andrew Koenig	AT&T	V	V	V		
Max Munch	Lexhash Inc.	A	A	A		
B. Stroustrup	AT&T	A	A	A		
F. Glassborow	Richfords	V	V	V		
T. Wilcox	Rational Software	V	V	V		
Tom Plum	Plum Hall	V	V	V		
Jack Reeves	Self	A	A			