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Project: JTC1.22.32
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Minutes of WG21 Meeting, March 08, 2010 (Revision 2)

Note: this document revises N3081/10-0071, correcting the text of "Other Motion 2".

1. Opening activities

Clamage called the meeting to order at 09:00 (UTC-5) on Monday, March 08, 2010.

1.1 Opening comments
1.2 Introductions

Clamage had the attendees introduce themselves.

1.3 Meeting guidelines (Anti-Trust)

Clamage reviewed the patent disclosure rules.

The following materials were displayed without any further interpretation or discussion:

http://www.incits.org/inatrust.htm

http://www.incits.org/call.htm

http://www.incits.org/pat_slides.pdf

1.4 Membership, voting rights, and procedures for the meeting

Clamage reviewed the rules for membership and voting rights. Clamage explained that the group was returning to previous voting procedures of having PL22.16 voting members vote, then taking a separate WG21 vote amongst voting national bodies, with the US international representative casting the US vote. This change was to take place after the group had previously been holding votes by counting attending members and delegates.

T. Plauger indicated her wish to have a roll call for every such vote.

Clamage explained that the group had been planning on issuing a second Committee Draft at this meeting, followed by a Final Committee Draft at a later time, based on concerns as to what the quality of the draft would be at this meeting. He went on to explain that given the work progress so far, the group expected the draft to be in good enough shape to aim for a Final Committee Draft at this meeting.

Hedquist asked whether there was documentation supporting this change in schedule from the SC22 Secretariat. Sutter confirmed that such documentation existed Discussion ensued regarding the procedure necessary to complete a Final Committee Draft in time.

Sutter explained the coordination of the ballot that would be taken for such a draft, and stated that the appropriate people involved are ready to do so. He went on to state that assuming such a draft could be produced within about two weeks after the meeting, which he stated was the goal of the committee, the balloting process could start roughly on March 31 and complete before the next meeting in Rapperswil.

Hinnant asked whether, once in FCD state, the group is allowed to fix issues not related to ballot comments, and specifically asked what the group should do if non-ballot comment related issues are found. Sutter responded that it was still acceptable and expected of the group to make fixes to the draft, whether related to a ballot comment or not.

Spicer asked whether comments attached to Yes votes in the ballot must be addressed. Sutter confirmed that this was the case.

1.5 Agenda review and approval

Clamage presented the agenda (document PL22.16/09-0204 = WG21/N3014).

Motion to approve the agenda:

Mover: Hedquist
Seconder: T. Plauger

A roll call was requested:

PL22.16 Vote (Motion to approve the agenda)	
PL22.16 Member	**Vote**

PL22.16 Vote (Motion to approve the agenda)	
PL22.16 Member	**Vote**
Apple	Yes
Bloomberg	Yes
CERT	Yes
Cisco	Yes
Dinkumware	Yes
EDG	Yes
Fermilab	Yes
Gimpel	Yes
Google	Yes
HP	Yes
IBM	Yes
Intel	Yes
Microsoft	Yes
Oracle	Yes
Perennial	Yes
Plum Hall	Yes
Red Hat	Yes
Seymour	Yes
Texas A&M	Yes
Zephyr Associates	Yes

WG21 Vote (Motion to approve the agenda)	
In favor:	8
Against:	0
Abstain:	0

Motion passed with unanimous consent.

1.6 Distribution of position papers, WG progress reports, WG work plans for the week, and other documents that were not distributed before the meeting.

Each of the Working Group chairs presented their plans for the coming week.

Core Working Group (CWG)

Adamczyk presented the working group status for the core group and reviewed the issues related to NB comments to be processed during the meeting. He also reviewed

a list of papers not directly related to NB comments that might nonetheless be reviewed during the meeting once NB comments had been processed.

Library Working Group (LWG)

Hinnant reviewed the past progress on LWG issue processing, and the project status of LWG open issues based on issues that were marked Tentatively NAD and Tentatively Ready between meetings. Hinnant summarized that there are a number of NB comment related open issues that would still need to be addressed, but noted that he did not expect this to be problematic given the nature of the remaining issues.

Evolution Working Group (EWG)

Stroustrup indicated that EWG would not be meeting this week and that there was no need for a status report.

WG21 Report

Sutter gave the WG21 report and presented the schedule set out at the June 2008 meeting in Sophia Antopolis. He pointed out that the group was only one meeting behind the original schedule, and stated that this was thanks to a great deal of effort especially over the last three months. He reviewed the major stages of the documented that have been completed and are upcoming. He noted that while JTC1 is making changes to the drafting process, these changes were not expected to have an effect on C++0x.

Sutter reviewed the current projects in progress: revising C++ (14882), the Decimal Floating Point TR (24733), and the Special Math functions (29124). Sutter pointed out that the Special Math FCD had had only editorial comments, and therefore it was possible to publish the standard without an FDIS. He stated that there were plans to do so in the absence of any proposals to the contrary.

Sutter introduced Jon Benito (from WG14) and Rex Jaeschke (SC22 chair) who were both in attendance.

Sutter explained that in the past, Sunday evening meetings would be held for purely administrative discussions that did not require the entire group to be present. He stated that this was being replaced with telephone conferences taking place six times a year, and pointed to document N3017 for the details of the first meeting. Sutter reiterated that these meetings were intended only for procedural, as opposed to technical, discussions.

T. Plauger asked who constituted the attendees of these administrative meetings. Sutter answered that officially, anyone who was traditionally at the Sunday evening meetings would be invited. He added that for the past unofficial meetings, heads of delegations were also invited.

Sutter reminded anyone that if they wished to call into these meetings, they should speak to their corresponding Head of Delegation first.

Meredith asked whether there was an intent to return to two meetings per year. Sutter responded that the six phone conferences per year were intended to match the mailing schedule. He stated that the current plan was to continue to hold three meetings in 2011, but that there was a possibility of changing this, and that there had been some interest in doing so.

Plum asked whether a US TAG meeting was being held this week to choose the delegation. Hedquist responded that such a meeting had been previously held in Santa Cruz. Plum asked where the list of delegates could be found, to which Hedquist answered that the list could be found in the TAG minutes, which have been passed on to the Secretariat. He suggested that interested parties should ask him directly for the list if they need it in the meantime.

T. Plauger asked what the definition of TAG minutes were. Hedquist responded that these minutes pertained to meetings consisting only of the TAG. T. Plauger continued, asking whether Hedquist was responsible for the production of these minutes, which Hedquist confirmed.

Plum requested that the delegation list should be posted in an accessible place, such as the project Wiki. Hedquist answered that this would require Secretariat approval, even though, as Plum pointed out, these lists were not secret. Sutter stated that in the past, Heads of Delegation had sent him lists which he then managed. Nelson noted that historically this list was part of the member list, and was removed when the voting method was changed. He noted that he could add this list back to the member list.

1.7 Approval of the minutes of the previous meeting

Du Toit noted that a committee member had asked him by electronic mail to point out a small mistake in the previous minutes, namely the accidental use of "Pre-Rapperswil Mailing" in place of "Pre-Pittsburgh Mailing".

Motion to approve the minutes (document PL22.16/09-0193 = WG21/N3003):

Mover: Hedquist

Seconder: Caves

A roll call was requested:

PL22.16 Vote (Motion to approve the minutes)	
PL22.16 Member	**Vote**
Apple	Yes
CERT	Yes
Cisco	Yes
Dinkumware	Yes
EDG	Yes
Fermilab	Yes
Gimpel	Yes
Google	Yes
HP	Yes
IBM	Yes
Intel	Yes
Microsoft	Yes
Oracle	Yes
Perennial	Yes
Plum Hall	Yes
Red Hat	Yes
Seymour	Yes
Texas A&M	Yes
Zephyr Associates	Yes

WG21 Vote (Motion to approve the minutes)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

1.8 Liaison reports

Benito provided an update on the activities of WG14.

He noted that WG14 will be meeting in April in Florence, and that the group planned to set a schedule for revision. He mentioned that WG14 would like to have a

concurrent CD ballot after Florence, which would also allow publishing in 2012 or late 2011. He noted that the group had been working on this revision for a few years, and were looking to close the door to new changes. He added that part 2 of 24731 (the Bounds Checking TR) was in limbo due to a lack of interest, and that there was a possibility it might be dropped.

Plum noted that the upcoming WG14 meeting was especially critical for liaising with the C committee on specific topics. He noted that particular concerns included the memory model and threading mutex types. He stated that if crucial liaison issues were addressed in the current WG21 meeting, and brought forward to the Florence WG14 meeting, there would be good synchronization. He warned that if these issues were not addressed during the current WG21 meeting, C would be unlikely to slip their schedule for such relatively minor issues. He finished by stating that he wished to remind people involved in these issues of this matter.

Sutter noted that four teleconferences on C/C++ compatibility had been held since the last meeting. He stated that full notes from such meetings had been posted to the c++-std-compat reflector. He ask anyone discussing such issues during the week of the meeting to refer to these notes.

Meredith asked whether anyone was aware of the state of alignment of attribute syntax between the two languages. He believed there was a paper planned, but noted that it was not in the current maining.

Sutter noted that Crowl had volunteered to work on this. Crowl noted that he was not aware that he had volunteered for this.

Plum stated that the group needed to take action this week on these issues. He noted that the group might just decide that they can't handle this issue during the course of the week, but that someone might propose an alternative.

Sutter clarified that the semantics of alignment were not in question, and that the issue at hand was only a matter of how things were spelled out: as keywords, or as attributes. Vandevoorde responded stating that he thought this issue involved more than just syntactical considerations.

Miller noted that there had been a large discussion since the Santa Cruz meeting on the core reflector regarding the ability to query the alignment of types. He stated that there was other work going on in relation to setting the alignment of types in addition to these compatibility concerns.

Sutter wanted to make the group aware that, as far C/C++ compatibility was concerned, if these changes were to be aligned with C as well, time was of the essence.

Crowl asked whether, procedurally, the group could revert the edits that changed the spelling of this feature in the past. Clamage and Sutter responded that a paper was needed for such a change. Meredith added that such a change would not suffice due to pack alignment changes that interacted with this feature.

Plum opined that he thought Sutter was correct, claiming that it would be an exception to the group's procedures to do anything more than noting that there was a problem. Clamage concurred, stating that he did not want the group inventing a procedure for dealing with this specific issue, and the discussion ended.

Plum provided an update on the activities of WG23.

He noted that work was proceeding on schedule. Benito added that a JTC level 1 DTR ballot had been ongoing. Plum noted that he suspected no-one present was likely to be any more interested in this work than they had been at the previous WG21 meeting.

Plum provided an update on the activities of PL22.

He noted that PL22 corresponded to the SC22 level in ISO. He stated that the group had, in the past, had one meeting per year in Washington, whereas in the future, two meetings in early June and late July would be held. He added that if anyone had concerns about the SC22 agenda, these meetings were an appropriate forum for that discussion.

Jaeschke provided an updated on the activities of SC22. He noted a change in the Secretariat role.

1.9 Editor's report

The editor's report is document PL22.16/10-0026 = WG21/N3036. Becker reviewed the state of the document with the group.

Becker noted that the post Santa-Cruz mailing contained document N3001, which applied all changes from Santa Cruz. He stated that the most recent version was N3035, which was mostly affected by editorial NB ballot comments. He added that one editorial NB comment had not yet been applied, and another was under discussion. Other than that, he noted, all such comments had been applied.

The group voted to accept N3035 as the latest working draft to be used as a basis for work.

Motion to approve the latest Working Draft (document PL22.16/10-0025 = WG21/N3035):

Mover: Becker
Seconder: Hinnant

A roll call was requested:

PL22.16 Vote (Motion to approve the working draft)	
PL22.16 Member	**Vote**
Apple	Yes
CERT	Yes
Cisco	Yes
Dinkumware	Yes
EDG	Yes
Fermilab	Yes
Gimpel	Yes
Google	Yes
HP	Yes
IBM	Yes
Intel	Yes
Microsoft	Yes
Oracle	Yes
Perennial	Yes
Plum Hall	Yes
Red Hat	Yes
Seymour	Yes
Texas A&M	Yes
Zephyr Associates	Yes

WG21 Vote (Motion to approve the working draft)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

Becker noted that he had been applying Tentatively Ready issues from the LWG issues list to another version of the paper under the assumption that it would take less effort to remove exceptions than adding them later on. He stated he would be doing the same during the week for CWG issues. He noted that this left room for new work from this week to be applied after this meeting, and added that he would be asking for reviews as work progressed.

Meredith commended Becker for doing this. He asked whether wording drafted in this meeting should be based on the newly approved working draft, N3035, or whether the updated document referred to by Becker could be used.

T. Plauger responded that the official document should be used.

Meredith clarified that he would like to refer to the document assuming other changes had been applied already. Becker rephrased this as stating "assuming ... is applied, these are the changes".

T. Plauger noted that there needed to be a record of response that was formal. If the process became too informal, she warned, record of a National Body comment response would become foggy. P.J. Plauger added that if the line of what has been approved was blurry, it would make things difficult for implementers.

Clamage added that there was also always the possibility of such a tentative resolution failing, and therefore recommended not following this practice.

Halpern asked to clarify that it was still acceptable for motions to depend on other motions. P.J. Plauger confirmed that this was the case, and noted that in such a case, the dependent motion was usually simply withdrawn.

1.10 New business requiring actions by the committee

No new business.

2. Organize subgroups, establish working procedures.

Clamage announced that those present would be breaking up into working groups until Friday. He noted that the committee was in recess until then.

Stroustrup noted that there would be no meeting of the evolution working group. Meredith mentioned that paper N3024, related to partial construction to support

cleaning up pair, was cross-functional and needed support from both groups. T. Plauger suggested having a combined meeting, to which Meredith replied that the issue was small, and not everyone was required. P.J. Plauger interjected, stating that the issue was not so small.

Maurer mentioned that the discussion of thread locals also required core input.

Sutter suggested that if an issue involves both Core and Library, people from both groups should meet, but not call that an evolution meeting.

Clamage asked whether the group should just have one combined meeting. In response, Stroustrup suggested that a small number of people from both groups would be more appropriate.

Boehm asked where the thread-local discussions should be held. Stroustrup mentioned that this was a completely separate issue, and that he suspected the interested parties would not totally overlap. He suggested a separate meeting, possibly in the same room but at a different time.

T. Plauger asked whether Concurrency was considered part of Library. Boehm responded that in general that was the case, but that this particular issue involved both Library and Core. T. Plauger suggested that therefore relevant Core members could join the appropriate LWG session.

Meredith asked what the status of the "no-throw move construction" paper was. Stroustrup mentioned that it had been forwarded to CWG. Adamczyk stated that CWG would look at it during the week, and that it looked promising thus far, based on the response at the last meeting.

Sutter introduced Sommerlad, the host of the Rapperswil meeting, who informed the group about information available regarding the upcoming meeting. He mentioned that information had also already been sent out in a mailing, and that further related information would be sent to the reflector as well.

Brown noted that, due to the change of date of the Rapperswil meeting, he would not be able to attend, and directed anyone with questions about the Batavia meeting to ask him during the week.

The group broke up to meet in separate working group sessions.

3. WG sessions (Core, Library, Performance, Evolution).

4. WG sessions continue.

5. WG sessions continue.
6. WG sessions continue.
7. WG sessions continue.
8. General session.

Clamage invited Sutter to speak about the voting procedures. Sutter explained that the main reason for reverting to the previous voting procedures was to determine consensus and get a good sense of what would occur later when a ballot is out. He mentioned that a number of NB delegates were present, which would likely represent the NB opinions well. He added that he wished not only to determine consensus, but also whether specific NBs objected to an issue that might otherwise appear to have consensus.

Clamage invited Adamczyk to present an update from the Core working group, and reminded the group that the purpose of the afternoon's discussion was to assess consensus before the Saturday votes. Clamage explained the voting procedures in detail.

8.1 WG status and progress reports.

Core Working Group

Adamczyk noted that the first item on the CWG agenda may have been controversial when discussed on the preceding Tuesday, but that the propose had become decreasingly controversial since then. He noted that the paper generally related to issues around rvalue references. He explained that the incoming proposal had taken the "funny lvalue" approach. He mentioned that a large issue with this approach had been its changing of the meaning of "rvalue." The group did not consider the impact on the library initially.

Adamczyk explained the new approach, based on a taxonomy of "value categories", and presented its advantages over the previously proposal.

Adamczyk went on to discuss trigraphs. He noted that there was at least one NB comment on this topic. He explained that the group was mainly concerned with resolving the interactions between trigraphs and raw strings. He noted that the initial proposal related to this had several issues.

Adamczyk stated that the group had come up with a different approach. He explained that the textual changes were small, maintained C compatibility, and did not deprecate trigraphs. He mentioned that the downside of the approach was the introduction of

completely new terminology, but that implementers had stated that implementation should be feasible, and that the new way accomplished the main goal requested.

Adamczyk added that another change made was switching from square brackets to parentheses for delimiters, so that it would not be possible to write a trigraphs for these, which would help avoid confusion.

Miller noted that the NB comment specifically asked for deprecation of trigraphs, but the group instead used a different approach that addressed the primary concern behind this comment. He wished to hear BSI's opinion on the matter.

Adamczyk mentioned that IBM had serious problems with trigraph deprecation.

Meredith could not say whether the same comments would be raised again, but stated that he believed this to be a positive change in the right direction that might resolve BSI's issues.

Adamczyk added that it was worth noting that this proposal does nothing to help with "unexpected trigraphs" issues in regular strings.

Wong noted IBM's appreciation for the length to which the committee went to support IBM's customer requirements. He stated that he was especially thankful to Vandevoorde and Merrill for their work on this, and that the approach was a great way to go forward.

Dawes wished to thank the working group, stating that he felt the net offect of these changes were to make raw strings even better.

Adamczyk went on to discuss exception specifications. He noted that there were two separate issues, the "noexcept" proposal, and the deprecation of exception specifications. He mentioned that there had been a great deal of discussion on these issues, which boiled down to "what happens when you say you won't throw, and something throws anyways." In the end, the group decided to use the direction of calling terminate in such a case, and not specifying what happens to local variable cleanup. Adamczyk mentioned that this had not been completely unanimous, but that there was strong consensus. He added that there was strong consensus that this approach did not add call overhead in quality exception handling implementations, and did not restrict optimization unnecessarily.

Adamczyk added that the group was recommending deprecation of both empty and non-empty old-style exceptions specifications. He noted his understanding that LWG was not making changes in this meeting to handle this yet, which Hinnant confirmed.

Halpern asked whether the group was doing what needed to be done in order to not lose track of this issue. Adamczyk assured him that he was confident the issue would not get lost.

Adamczyk continued with a discussion of exported templates. He noted that an NB comment had asked for export to be deprecate, and that after a straw vote at the last meeting, it was clear that the committee favored deprecation over removal. He mentioned that EDG had discussed the matter, and was not only OK with deprecation, but wished to remove it entirely. Assuming that deprecation, rather than removal was voted on mostly for consideration of EDG's existing implementation, he wished to state that EDG supports removal of this feature.

Vollmar asked what the feedback from customers had been based on EDG's implementation. Adamczyk responded stating that there was no feedback from customers, including essentially no bug reports, suggesting the feature was not being used seriously.

P.J. Plauger added that, as the only library vendor who used export from EDG, Dinkumware had essentially the same to report, with very few reports about it, and most such reports originating from testers. He stated that there was no real evidence that people were using it, and that he would be happy no longer having to maintain it.

Vandevoorde noted that the decision had not been unanimous within EDG, and that his preference was to wait until a replacement was available.

Halpern asked whether "export" would remain a reserved word. Adamczyk confirmed that it would remain so.

Meredith stated he was very happy to follow EDG's lead on this, and thanked the core group.

Adamczyk moved on to the next topic, move special member functions. He explained the proposal, and noted that it was supposed to remove a high percentage of the problem, because most of the time these member functions work correctly automatically, and that "noexcept" could be used for the remaining percentage. He stated that the paper was large, but not controversial.

Brown noted he had not read the paper in detail. He asked whether assignment operators were covered in addition to default move constructors, as these were not mentioned in the reported. Adamczyk confirmed that such assignment operators were indeed covered.

Adamczyk explained the proposal relating to lambdas converting to function pointers. He noted that this had been part of the proposal for unified function syntax, and allowed lambdas that captured nothing to be used as simple functions. He mentioned a discussion item, namely the function returned seeming a lot like what was obtained by calling operator() on the lambda. He noted that there were some differences, but it could be possible to specify one in terms of the other. In the end, the group decided to minimize standards changes and treat this as an implementation detail.

Adamczyk next discussed reference parameters on constexpr functions. He noted that this was highly useful functionality in building up the library. He said that the proposal had asked for lvalue references to const parameters, but, upon review, the group decided to allow all kinds of references, including non-const and rvalue references.

Adamczyk explained each motion.

See 11.1 below for motions voted on.

Library Working Group

Hinnant explained that the group came into the week with a handful of NB comments note yet looked at, and even more issued covered by NB comments like US-2. He was pleased to announce that LWG had a response for all the remaining direct comments, and that the "umbrella" issues would be kept Open, but be addressed with an appropriate NB response.

Hinnant explained each motion.

Regarding N3050, Hinnant called on Abrahams to explain the paper and its state. Abrahams introduced the paper, noting that it had originally been designed to solve the problems the group had gotten into where the exception safety guarantees provided by the containers for existing types would be violated. He mentioned the proposal had been talked over in evolution and core groups in Santa Cruz, with both groups being satisfied. He noted that LWG had been a bit uncomfortable, and that it had taken until the present meeting to decide whether library was happy with it. He mentioned that there had been some gripes from CWG about how the feature would be implemented over the last few days. He then noted that, at what he considered to be the last minute, the proposal was changed significantly, in a way that he found detrimental. As he result, he explained that he would vote against this. He mentioned that it would be acceptable to him if the group wanted to have an NB comment and spend some time thinking about this change.

Austern asked what, procedurally, the group's options were during the present meeting if the last minute changes were to be backed out. He noticed that this was the only paper on the floor that, if rejected, would lead to not having an FCD.

Meredith stated that this was the one paper that the UK NB would block an FCD on. He added, however, that he would take the paper either way, and would like to see it go through in some form before FCD. If it were voted down, he noted, the group would have to find a mechanism to bring it back this week. Meredith concluded stating that if the paper were not moved on during the week of the meeting, BSI would not vote for an FCD.

Vandevoorde stated that he agreed with Abrahams. He added that he was concerned that a compilers using non-invasive exception implementations would be much more affected by this change than others. He noted that such compilers would not be able to use noexcept to avoid that work with these changes.

Merrill noted that if the group wished to leave the question of which way to go open, procedurally it would be easiest to vote this paper in and have an NB comment on the question of these semantics.

Witt stated that he had always been in favor of this from the point of view that the paper was a "step towards making things better", but felt that those bounds had now been overstepped. He added that he could not vote on the paper with such a late change, no matter what the technical merits were. He suggested that moving ahead and then changing the wording with an NB comment later was not possible and would set a dangerous precedent.

Spicer commented on Vandevoorde's note regarding implementation difficulty.

Meredith stated that, as UK Head of Delegation, he needed to see this paper be accepted somehow, and that otherwise, there would be no FCD at this meeting. He noted that, from the perspective of the French national body, he would have to oppose the motion unless it came through in the present form.

Caves informed the group that his company's compiler was an example of one that had implemented the undefined behavior, and that they considered that a bug. He stated that, from a security perspective, he could not support something that has a program continuing to execute with undefined behavior.

Stroustrup stated that he had been instructed to be strongly in favor of the paper in its present form by the Netherlands member body, for security reasons.

Plum stated that he felt several different issues were being mixed together in this discussion, having heard someone make the argument that invocation of terminate is overspecification. He stated that perhaps this was true, and that the standard might say something like "whatever happens in this circumstance, the program will terminate in some fashion", and wondered whether such wording could get the group passed the impasse, while addressing the security concerns.

Abrahams stated that there was a big precedent of undefined behavior in the library when something threw unexpectedly. He felt that this was an attempt to cover this hole in an incomplete way, and that this approach would prevent a compiler from making this case a static compilation error.

Abrahams continued stating that he was trying to keep most of the technical concerns out of this discussion. He explained that, for him, this was not about implementability, but the meaning of labeling something as "noexcept." He said that the meaning of that had changed very significantly with the recent adjustments.

Sutter presented two thoughts on the subject. First, he wished to state that as much as he completely agreed with those that made claims about security flaws, it was true that undefined behavior already existed. He stated that the difference in this case was that vendors would tell developers to use this feature, and that introducing a new feature that caused undefined behavior and security problems liable to be used by non-developers was an issue. Second, he state that this change was less inventive because it was much closer to today's empty throw specifier behavior.

Crowl stated that this understanding was that the paper was proposing what the old implementations did, and that he clearly had a misunderstanding of how this proposal was moving. He encouraged people to think about what about what the rest of the world would think. He added that like others he was nervous of anything that allowed execution to continue past the noexcept call. He stated that undefined behavior was simply unacceptable, and that if someone wished to have wording weaker than calling terminate, he would need to see a specific proposal.

Stroustrup stated that noexcept existed at least in part to make code run fast. He suggested that it would be presented, with benchmarks, as a way to make programs faster. He stated that there was no better way than this to get widespread usage of a feature. He concluded that this left security-conscious people with no choice but to either ban noexcept or exceptions as a whole.

Plum wished to explore something that had been said earlier by Abrahams. He stated that, leaving aside security for a moment, a number of domain areas, such as embedded programming, required terminate to never be called, and required an

application to continue to run forever. He stated that part of such a design philosophy was to never call anything that could call terminate, and that he would not wish to see such a static analysis considered non-conforming. He suggested that the group might consider the question of whether the invocation of terminate always reflected an error, which one was permitted to flag fatally at compile time. He noted that there was an understanding that valid behavior could not be flagged as a compile time error, and would like terminate to be considered "bad behavior" that could be flagged at compile time.

Svobody asked what happens in the case of existing compilers that implement noexcept with undefined behavior. Caves responded that no destructors were called, and that an implementation would continue going up the stack ignoring destructors, looking for a handler.

Halpern stated, as a proponent of undefined behavior in this case, and agreeing with Abrahams' criticism, that undefined behavior included the possibility to terminate, and that doing so was only a Quality of Implementation issues that implementations concerned with security could address. Having said so, he added that he really wanted this proposal to go through in either form.

Gregor noted that Sutter had used the word "inventive," which might not be quite applicable. He stated that noexcept had always had this behavior before, and that a change had been made that would make the mechanism behavior more like dynamic exception specifications, but that this did not mean that the proposal had previously been inventive.

Stroustrup commented on the interaction of separate compilation and the feature under discussion.

Widman wished to hear an elaboration on Abrahams' point that this was merely an attempt to fix a small part of a much larger issue.

Abrahams stated that there was nothing special about the case under discussion, and that undefined behavior originated from many cases in the standard. He stated that people were told they needed to be careful, and that he would be more than happy to think about addressing the entire question of how to respond to exceptions that were thrown unexpectedly. He noted, however, that doing so was outside of the scope of this issue, and that people resented exception specifications as they were because the behavior was not the compile-time check they wanted, but instead led to undesired behavior.

Merrill responded to the question of what implementations already did, stating that turning off exception specification caused g++ to call terminated, and that noexcept would work the exact same way.

Abrahams stated that in other words, some implementations were already set for this, but others would require extra work.

Vollman wished to state that people who believe that terminate would not cause undefined behavior were probably mistaken. He asked what people did in their terminate handlers, and suggested that one simply had no idea of what could be relied on, so un typically just went on releasing the most important resources first, and then hitting undefined behavior anyways.

Sutter stated that if undefined behavior were mandated, Microsoft would just implement a call to terminate anyways, which would be valid. He noted that merely requiring undefined behavior would not help the standard or people who wished to write portable code. He noted, as an example, that Robert Seacord had already indicated he would talk about this at Black Hat if it became so.

Seacord noted that there hadn't been any connection between this and deprecating empty throw specifications. With those being deprecated, he expected the next step to be removing those features, since it would make no sense to publish a standard with deprecated features, but he suggested he may be misinformed on the topic. He stated that it seemed like there was only one way forward, based on the two NB comments, to pass this paper as it stood and file an FCD comment in the future. He questioned the sense in debating the issue with only one such narrow path available as an option.

Nelson stated he was looking for a way out of this situation. He noted that nobody was objecting to the paper in principle, but only this little detail, with a number of strong opinions on either side of the issue. He suggested changing the wording to use "implementation defined," and then perhaps addressing it in the next docket.

Spertus stated he was generally sympathetic to the comments that stated it was easiest to pass as-is and then deal with it as an NB comment. However, he was concerned that we might end up with a state where parties have stated that status quo was completely unacceptable.

Witt made it clear that he had no general disagreement with what Nelson stated, but that he thought calling it a detail was wrong. He stated that the issue was core to the paper. He added that, that having been said, he could live with "implementation defined".

Crowl stated that "implementation defined" would be acceptable as long as the program was still guaranteed to not continue "through" the noexcept.

Stroustrup stated that "implementation defined" was fine, as long as it still included not calling destructors and so forth. He stated that implementation defined behavior that allowed continuing past throw specifiers and still had language violations was simply not acceptable.

Plum wished to argue for passing the paper as it stood, and dealing with these issues later. He had a concern about "implementation defined', as the category for implementation defined was still considered valid behavior. He stated that while he wished to have the taint of undefined behavior attached to this, if a compiler could detect the behavior statically, this could not be handled with implementation defined behavior. He stated that terminate had the property that no additional code would be executed, whereas undefined behavior was clearly called out, and that there was a problem dealing with categories. He concluded that he would rather not try to solve such a problem by throwing something out at the last minute.

Meredith noted that if the proposal went back to the version including undefined behavior, he would not oppose a CD rather than an FCD.

Nelson wished to make it clear that he did not think implementation-defined behavior was anything but the least of evils open to the group. He restated that this deadlock had to be broken to get a document out.

Abrahams stated that he realized that Plum's comments were correct, and that this reminded him again of the danger of making a hasty decision like this one. He stated that it was a big change to switch between undefined behavior, implementation-defined behavior, and terminate.

Widman agreed with Plum's comment also. He stated that this made him lean towards undefined behavior, which gave an implementation the freedom to do what they wished for a given environment, with GCC and Microsoft calling terminate, and other platforms making other choices.

Crowl asked how implementation-defined behavior would not allow this.

Abrahams stated that if there was an implementation where the safe behavior would forego some optimization opportunity, this would allow such an implementation to be used.

Sutter stated that he did not see how implementation-defined behavior would help those strongly of the opinion that execution must not continue. He wished to find out whether one version should pass - no matter which. He also would like an issue to be opened on this immediately afterwards, which would automatically become an FCD NB comment. He state he did not want this dropped on the floor, but having said that, wanted to know how many people feel very strongly on the issue, and would rather have the standard delayed than not having it their way.

Hinnant deferred to Adamczyk as far as opening such an issue was concerned.

Caves stated that he was not worried about implementations, but about what the standard said. He noted that making the statement "performance is more important than security" would be a bad thing to say to a wide audience.

Spicer stated that the group could either go forward, or not go forward, with the paper in question, and that he felt it was better to go forward. He stated that no matter how the group went forward, there would be an issue to continue discussion on this. He stated that there had been strong support in the core group for the direction recommended now. In response to Abrahams' earlier statements, he noted that clearly the group needed more time, but did not think that still had that time.

Stroustrup agreed with Spicer. He stated he had a long discussion about the impact of this change on optimizability with several experts, and claimed that none of them believed this would lead to lower performance.

Austern stated that one course of action previously proposed was to pass the paper as is, and then discuss it as part of FCD comments, and was unsure what alternative there was.

Brown noted that Fermilab had felt very strongly about this for quite a long time, even authoring a paper (N1664) in 2004 that incorporated aspects of what was being discussed. He noted that of the two versions, Fermilab would prefer Abrahams' unmodified version of the paper. Setting that aside, Brown noted that he saw an unprecedented case here that he could not agree with, namely being asked to vote on a paper whose author does not support it. He stated that regardless of any technical arguments, he considered this an ethical issue.

Abrahams responded that he did not want anyone to vote on the bases of ethics against this, and urged group members to vote appropriately based on their technical opinion.

Josuttis asked whether experts could come together and present something new on Saturday. Sutter stated that this was not possible.

Nelson felt a straw poll of support for the paper in front of the group was needed.

Sutter wished to see a straw poll of the paper with both options, to see which had stronger consensus.

Plum noted that Abrahams' paper was presented, then changed. He wished first to see how many people wanted the paper reverted, then have a vote on the paper.

Sutter stated that he understood Plum's point, but nonetheless wished to gauge consensus and felt that otherwise, information was lost.

Stroustrup stated that he supported this proposal and had shepherded it through evolution since it had come in. He went on to note that he liked it, but thought it had had one major flaw, which he now believed to be fixed.

Witt stated that he had heard Vandevoorde talk of a class of implementations with performance issues. He asked whether that contradicted what Stroustrup had stated about discussions in core. Vandevoorde stated that it did.

Caves noted that it was discussed amongst compiler vendors in the core group this morning. Witt rephrased his question as whether Vandevoorde's statement contradicted the opinion arrived at during that meeting. Vandevoorde stated that they were a compiler vendor, and had been present at the discussion.

The group held straw votes to determine consensus.

Sutter stated that the straw votes clearly showed no consensus for undefined behavior, leaving only the choice of voting to approve or not approve the paper as written.

Sutter asked whether any national bodies would not wish to go to FCD if the motion failed. Meredith responded that this was the case for France and UK, but that they would accept a CD. Voutilanen added this was the case for Finland as well.

Regarding N3068, P.J. Plauger noted that he would vote against this, but would not try to persuade anyone to join him. Clamage asked why this was the case. P.J. Plauger responded that he did not like the process by which this was passed, or the semantics proposed. Halpern stated that discussion was probably not needed, but that he had a presentation available if necessary.

Regarding N3070, Nelson asked whether the paper evolved from the thread local context proposal. Vollman responded that it did, but no longer has the same form.

See 11.1 below for motions voted on.

Clamage then reviewed the other motions up for voting, first introducing Other Motion 1 to move to an FCD.

Vandevoorde wished to echo Abrahams' earlier concern about moving too fast. He stated that this extended beyond noexcept, noting that the group just changed rvalues and lvalues, introduced a new way of doing translation introduced only 24 hours ago, and applied some large papers as well. He expressed his desire to have some time before FCD.

Sutter stated that the group would not have time at the next two meetings for a ballot to complete until the next meeting after. He added that several people had asked for him to explain the difference between a CD and an FCD. With a CD, Sutter explained, the group was saying that the standard was incomplete and new features may still be added. By doing an FCD, he contrasted, the group was saying that unless surprises came up, the group expected to only make fixes, and that the word "Final" should really be interpreted as "possibly final," with the possibility of doing a second FCD as necessary. He finished by stating that the purpose of the FCD was to state that at this point, only two more ballots could suffice.

Vandevoorde asked Sutter to state what would happen if the FCD failed. He added that he was not arguing for another CD, just a delayed FCD. He noted that Sutter had been very effective at moving the Switzerland meeting, and that perhaps another meeting could be moved.

Sutter mentioned that he had received negative comments over moving that meeting, and that there were many issues with moving a meeting. He stated that this was an unusual thing to do, and that moving the meeting did not change whether the group would be ready for Batavia. He did not wish to assume that he could continue doing this.

Sutter responded to Vandevoorde's question about the FCD failing. He stated that if the response was roughly the same as what the group had received on the CD, another FCD would be produced. He stated that it would not be the group's choice to produce another FCD, but that they would be instructed to do so. He noted that if the FCD ballot went well, the group could still choose to do another FCD if they wished.

Vandevoorde stated that he thought he heard someone mention that another CD was needed if an FCD failed. Hedquist stated that this was not true. Sutter mentioned that it was theoretically possible, but extremely unlikely.

Sutter stated that the FCD was in hugely better shape than the previously voted-out CD. He noted that he had been watching stabilization occur, and that he doubted the FCD would have as many comments as the CD. He felt it was in better shape than the previous time an FCD was provided.

Wong noted that he wanted an FCD to go out, and agreed with all the reasons. He noted he was concerned with the rule changes at INCITS, and wished to get some certainty that the group was not heading down the wrong path.

Sutter wished to clarify that the JTC rule changes, as stated previously, would probably not affect the group. He noted that SC had told him authoritatively that they would not affect the group, whereas someone else had claimed it may. Therefore he noted the safest thing to say would be that they probably wouldn't have an effect. He also pointed out that Stephen Michell from the Standards Council of Canada had agreed that it would be best to vote out an FCD at this meeting regardless.

Clark asked if there were dates for the Madrid meeting. Sutter stated that he would cover this at the Future Meetings agenda item.

Meredith stated that he reluctantly came to favor of FCD at the current meeting, but asked what the effects would be if the JTC rule changes did affect the group?

Sutter responded that, in short, the changes are mostly just procedural. He enumerated some of the changes, including a renaming of the FCD stage to DIS to match ISO, and that it would be a JTC 1 level ballot handled in Geneva rather than being handled as an SC 22 ballot. He believe the worst possible thing that might happen would be the need to do another DIS, but that this was very unlikely to happen.

Meredith asked if comments would be made on the new DIS. Sutter responded that they would be, and that a DIS is a comment ballot just like an FCD. Hedquist stated that eevn under the new rules, a DIS would be followed by an FDIS.

P.J. Plauger stated that he really wanted an FCD to come out of this meeting for his own reasons and hopes of slowing down innovation. He noted that he resented the sudden shift, giving the group no choice to vote out an FCD. He added that had this been a commercial project, the manager would not be shipping at that point. He stated that the bug trend was not good enough, for one. He went on to state that, however, it

had always been so for this committee, and that he would "hold his breath" and vote for an FCD.

Halpern asked whether there was a specific timescale by which the group would need to produce an FDIS. Sutter stated that it was up to the group, but that there was a due date of August 2011, and that the group should be able to make that with no surprises.

Meredith asked if this date reflected a published or approved standard. Sutter responded that the FDIS would be voted out of this committee, and balloting started on that date.

Becker pointed out that in the past a review committee was appointed to look over the editor's wording to make sure it got done right, and asked if we should do so.

Sutter called for volunteers. After some discussion Sutter amended the motion to state that the committee would appoint Howard Hinnant and Steve Adamczyk to fill this role, and several group members additionally volunteered to provide feedback.

Vollman asked what could be done by the group while the FCD ballot was going on, e.g. whether issues could be discussed.

Sutter stated that the group could not have an official meeting that discussed the document being balloted. Even in face-to-face meetings, group members could work on issues, but not vote changes into the working paper.

Hinnant thanked Sutter for the answer, but wished to ask it again another way to be clear. He stated that he intended, between the close of business Saturday and the pre-meeting mailing for Rapperswil, to essentially operate as usual, discussing issues on the reflector, posting updated issues lists, etc. He asked whether he had permission to do so. Sutter confirmed that he did.

Brown asked whether members could write papers and disseminate them. Sutter confirmed that he could.

Regarding Other Motion 2, Sutter stated that normally there would be a discussion of whether to move to FDIS, but given that there were no negative votes, and only editorial comments, it was allowable to directly move to go to publication.

Brown stated that the motions page had an additional attachment, N3061, which was not the subject of the motion, but presented for reference purposes. He called this a record of response, and explained that it contained the editorial comments, and his

response to them. He noted that in almost all cases, he complied with the comments, and that a few cases had been due to misunderstandings.

8.2 Presentation and discussion of DRs ready to be voted on. Straw polls taken.

See 8.1 above for discussion. See 11.1 below for motions voted on.

9. WG sessions continue
10. WG sessions continue
11. Review of the meeting

Clamage called the meeting to order.

47 attendees were present, including 40 PL22.16 members representing 24 member organizations. 21 member organizations had voting representatives attending during the final day of the meeting.

11.1 Motions.

CWG Motions

CWG Motion 1:

> Move we apply the resolutions of the following issues from N3026 to the C++0X Working Paper:
>
> 408 490 493 541 561 625 638 642 701 710 722 734 740 744 760 765 777 788 793 799 808 810 811 812 817 823 828 845 847 853 869 880 886 887 891 899 904 905 906 913 922 923 927 931 932 935 942 946 953 955 956 957 959 960 961 962 963 965 966969 970 973 976 978 980 983 984 986 988 989 995 999 1000
>
> This is all issues marked "ready" or "tentatively ready," with the exception of issues 570, 633, 667, 861, 872, 919, 920, and 964 for a total of 40 issues in ready status and 33 in tentatively ready status.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 1)

In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 1)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

CWG Motion 2:

> Move we apply the resolution of the following issue from N3026 to the C++0X Working Paper:
>
> 787
>
> This is one issue marked "review".

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 2)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 2)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

CWG Motion 3:

Move we apply the following to the C++0X Working Paper:

- N3064 "Core issue 374: Explicit specialization outside a template's parent (revision 1)"
- N2993 "Expanding the meaning of variable" (addresses core issues 570 and 633)
- N3079 "Redrafting: issues 667, 861, 990, 818" (also includes resolutions for core issues 919 and 920)

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 3)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 3)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

CWG Motion 4:

Move we apply N3049 "Core issues 743 and 950: Additional decltype(...) uses (revision 1)" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 4)	
In favor:	19
Opposed:	0
Abstain:	2

WG21 Vote (CWG Motion 4)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

CWG Motion 5:

> Move we apply N3067 "Core issue 951: Various Attribute Issues (revision 1)" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 5)	
In favor:	19
Opposed:	0
Abstain:	2

WG21 Vote (CWG Motion 5)	
In favor:	7
Opposed:	0
Abstain:	1

Motion passed.

CWG Motion 6:

Move we apply N3063 "Core issue 968: Disambiguating [[(revision 1)" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 6)	
In favor:	16
Opposed:	3
Abstain:	2

WG21 Vote (CWG Motion 6)	
In favor:	7
Opposed:	0
Abstain:	1

Motion passed.

CWG Motion 7:

Move we apply N3077 "Alternative approach to Raw String issues" (includes the resolutions for core issues 789 and 872) to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 7)	
In favor:	18
Opposed:	0
Abstain:	3

WG21 Vote (CWG Motion 7)

WG21 Vote (CWG Motion 7)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

CWG Motion 8:

> Move we apply N3052 "Converting Lambdas to Function Pointers" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 8)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 8)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

CWG Motion 9:

> Move we apply N3055 "A Taxonomy of Expression Value Categories" (includes the resolution for core issue 858) to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 9)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 9)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

CWG Motion 10:

> Move we apply N3078 "Constexpr functions with reference parameters" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 10)	
In favor:	19
Opposed:	0
Abstain:	2

WG21 Vote (CWG Motion 10)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

CWG Motion 11:

Move we apply N3053 "Defining Move Special Member Functions" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 11)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (CWG Motion 11)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

CWG Motion 12:

Move we apply N3065 "Removing Export" to the C++0X Working Paper.

Mover: Adamczyk
Seconder: Hedquist

PL22.16 Vote (CWG Motion 12)	
In favor:	21
Opposed:	0
Abstain:	0

WG21 Vote (CWG Motion 12)	
In favor:	5

WG21 Vote (CWG Motion 12)	
Opposed:	0
Abstain:	3

Motion passed.

LWG Motions

LWG Motion 1:

> Move we apply the resolutions to the following issues from N3018 to the C++0X Working Paper:
>
> 296, 471, 473, 539, 556, 671, 676, 724, 727, 780, 811, 817, 835, 836, 854, 860, 861, 865, 870, 871, 872, 891, 893, 896, 900, 911, 920, 921, 929, 932, 939, 954, 957, 960, 962, 963, 967, 968, 974, 978, 983, 987, 999, 1011, 1030, 1033, 1071, 1079, 1094, 1095,1098, 1100, 1104, 1108, 1110, 1113, 1114, 1123, 1126, 1130, 1131, 1133, 1134, 1135, 1136, 1137, 1138, 1144, 1152, 1157, 1170, 1177, 1180, 1182, 1189, 1192, 1193, 1194, 1195, 1197, 1199, 1204, 1205, 1208, 1209, 1216, 1218, 1220, 1221, 1222, 1227,1231, 1237, 1241, 1245, 1247, 1250, 1254, 1255, 1256, 1257, 1261, 1262, 1264, 1267, 1270, 1271, 1276, 1277, 1280, 1284, 1285, 1286, 1287, 1288, 1293, 1298, 1299, 1303, 1306, 1309, 1312

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 1)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 1)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 2:

> Move we apply the resolutions to the following issues from N3054 to the C++0X Working Paper:
>
> 427, 430, 704, 774, 819, 885, 1034, 1089, 1097, 1159

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 2)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 2)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 3:

> Move we apply the resolutions to the following issues from N3054 to the C++0X Working Paper:
>
> 1158

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 3)	
In favor:	Unanimous
Opposed:	

PL22.16 Vote (LWG Motion 3)	
In favor:	Unanimous
Abstain:	

WG21 Vote (LWG Motion 3)	
In favor:	7
Opposed:	0
Abstain:	1

Motion passed.

LWG Motion 4:

> Move we apply N3056 Conceptless Random Number Generation in C++0X, version 2 to the C++0X Working Paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 4)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 4)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 5:

> Move we apply N3050, Allowing Move Constructors to Throw (Rev. 1) to the C++0X Working Paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 5)	
In favor:	16
Opposed:	2
Abstain:	3

WG21 Vote (LWG Motion 5)	
In favor:	7
Opposed:	0
Abstain:	1

Motion passed.

LWG Motion 6:

> Move we apply N3051, Deprecating Exception Specifications to the C++0X Working Paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 6)	
In favor:	20
Opposed:	0
Abstain:	1

WG21 Vote (LWG Motion 6)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

LWG Motion 7:

> Move we apply N3068 equality comparisons for unordered containers (rev 2) to the C++0X Working Paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 7)	
In favor:	16
Opposed:	1
Abstain:	4

WG21 Vote (LWG Motion 7)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed.

LWG Motion 8:

> Move we apply N3059, Proposal to simplify pair (rev 5.2) to the C++ 0x Working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 8)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 8)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 9:

> Move we apply N3057, Proposal to add explicit initializers for atomics to the C++ 0x Working paper for compatibility between C++ and C. (WG21-WG14 liason.)

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 9)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 9)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 10:

> Move we apply N3058, Futures and Async Cleanup (Rev.) to the C++0x Working Paper.

Mover: Hinnant

Seconder: Hedquist

PL22.16 Vote (LWG Motion 10)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 10)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 11:

> Move that we apply N3070, Handling Detached Threads and thread_local Variables to the C++0x Working Paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 11)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 11)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 12:

Move that we apply N3069 Various Threads Issues in the Library to the C++0x working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 12)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 12)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 13:

Move that we apply N3072 Harmonizing Effects and Returns Elements in Clause 21 to the C++0x working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 13)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 13)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 14:

Move that we apply N3066 Iterators in C++0x to the C++0x working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 14)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 14)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 15:

Move that we apply N3048 Defining Swappable Requirements to the C++0x working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 15)

In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 15)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

LWG Motion 16:

> Move that we apply N3073 Specifying Pointer-Like Requirements (Revision 1) to the C++0x working paper.

Mover: Hinnant
Seconder: Hedquist

PL22.16 Vote (LWG Motion 16)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (LWG Motion 16)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent.

Other Motions

Other Motion 1:

Move we request the Convener to advance the Working Paper as amended by the foregoing motions to Final Committee Draft (FCD) Status, forward that draft to SC22 for FCD Ballot, and appoint a review committee consisting of Steve Adamczyk and Howard Hinnant to approve the Project Editor's updates to the Working Paper.

Mover: Halpern
Seconder: Hedquist

A roll call was requested:

PL22.16 Vote (Other Motion 1)	
PL22.16 Member	**Vote**
Apple	Yes
Bloomberg	Yes
BoostPro Computing	Yes
CERT	Yes
Dinkumware	Yes
EDG	Yes
Fermilab	Yes
Gimpel	Yes
Google	Yes
HP	Yes
IBM	Yes
Intel	Yes
Microsoft	Yes
Oracle	Yes
Perennial	Yes
Plum Hall	Yes
Red Hat	Yes
Seymour	Yes
Symantec	Yes
Texas A&M	Yes
Zephyr Associates	Yes

WG21 Vote (Other Motion 1)	
In favor:	8
Opposed:	0

WG21 Vote (Other Motion 1)	
Abstain:	0

Motion passed with unanimous consent. Applause ensued.

Clamage thanked all those involved for a lot of very hard work.

Other Motion 2:

> Move we request the Convener to request the SC22 Secretariat to submit N3060 "Extensions to the C++ Library to Support Mathematical Special Functions" to ITTF for publication as an International Standard.

Mover: Brown
Seconder: P.J. Plauger

PL22.16 Vote (Other Motion 2)	
In favor:	Unanimous
Opposed:	
Abstain:	

WG21 Vote (Other Motion 2)	
In favor:	8
Opposed:	0
Abstain:	0

Motion passed with unanimous consent. Applause ensued.

Clamage extended his appreciate to those who worked on this project, notably Brown and P.J. Plauger.

Additional Motions

Brown moved to thank the host. Halpern seconded. Applause ensued.

Brown moved to extend a round of thanks to the committee chairs for their Yeomen's work, and to the scribes who he stated had taken some of the best minutes he had ever seen. Austern seconded. Applause ensued.

Clamage extended thanks to Becker for his excellent work as Project Editor. Applause ensued.

11.2 Review of action items, decisions made, and documents adopted by the committee

None.

11.3 Issues delayed until Saturday

None.

12. Plans for the future

12.1 Next and following meetings

Clamage reviewed the upcoming meetings. The following meetings were:

> Aug 2-7, 2010 Rapperswil, Switzerland: HSR Hochschule für Technik
> Nov 8-13, 2010 Batavia, IL, USA: Fermilab

12.2 Mailings

Nelson reported the following mailing deadlines:

post-meeting mailing	2010-03-26
pre-Rapperswil mailing	2010-07-09

13. Adjournment

Motion to adjourn

Mover: P.J. Plauger
Seconder: Hedquist

Unanimous consent.

Attendance

Company/Organization	Representative	Mon	Tue	Wed	Thu	Fri	Sat
Apple Computer	Howard E. Hinnant	V	V	V	V	V	V
Apple Computer	Doug Gregor	A	A	A	A	A	A
Bloomberg	John Lakos	V	V	V	V	A	
Bloomberg	Alisdair Meredith	A	A	A	A	V	V
Bloomberg	Dietmar Kuehl	A	A	A	A	A	
BoostPro Computing	David Abrahams	V	V	V	V	V	V
CERT	David Svoboda	V	V	V	V	V	V
CERT	Robert Seacord	A	A	A	A		
Cisco Systems	Martin Sebor	V	V	V	V		
Dawes	Beman G. Dawes	A	A	A	A	A	A
Dinkumware	P. J. Plauger	V	V	V	V	V	V
Dinkumware	Tana Plauger	A	A	A	A	A	A
Edison Design Group	J. Stephen Adamczyk	V	V	V	V	V	V
Edison Design Group	Jens Maurer	A	A	A	A	A	A
Edison Design Group	William M. Miller	A	A	A	A	A	A
Edison Design Group	John H. Spicer	A	A	A	A	A	A
Edison Design Group	Daveed Vandevoorde	A	A	A	A	A	A
Fermi Nat. Accelerator Lab	Walter E. Brown	V	V	V	V	V	V
Gimpel Software	James Widman	V	V	V	V	V	V
Gimpel Software	James Gimpel	A	A	A			
Google	Matthew Austern	V	V	V	V	V	V
Google	Lawrence Crowl	A	A	A	A	A	A
Hewlett-Packard	Hans Boehm	V	V	V	V	V	V
IBM	Paul E. McKenney		A	A	A		
IBM	Michael Wong	V	V	V	V	V	V
Intel	Clark Nelson	V	V	V	V	V	V
Intel	Pablo Halpern	A	A	A	A	A	A
Intel	Stefanus Du Toit	A	A	A	A	A	A
Microsoft	Jonathan Caves	V	V	V	V	V	V

Company/Organization	Representative	Mon	Tue	Wed	Thu	Fri	Sat
Microsoft	Herb Sutter	A		A	A	A	A
Oracle	Paolo Carlini	V	V	V	V	V	V
Oracle	Stephen D. Clamage	A	A	A	A	A	A
Perennial	Barry Hedquist	V	V	V	V	V	V
Plum Hall	Thomas Plum	V	V	V	V	V	V
Red Hat	Jason Merrill	V	V	V	V	V	V
Roundhouse Consulting	Pete Becker	A	A	A	A	A	A
Seymour	Bill Seymour	V	V	V	V	V	V
Symantec	Mike Spertus	V		V	V		
Texas A&M	Bjarne Stroustrup	V	V	V	V	V	V
Zephyr Associates	Thomas Witt	V	V	V	V	V	V
PL22.16 Non-members							
HSR	Peter Sommerlad	N	N	N	N	N	N
Ixonos Plc.	Ville Voutilainen	N	N	N	N	N	N
University Carlos III	J. Daniel Garcia	N	N	N	N	N	N
Vollmann Engineering	Detlef Vollmann	N	N	N	N	N	N
	Nicolai Josuttis	N	N	N	N	N	N
SC22 Chair	Rex Jaeschke	N					
WG14	John Benito	N					