

WG21 2018-06 Rapperswil

Record of Discussion

ISO/IEC JTC1 SC22 WG21 P1109 — 2018-12-06

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Chair John Spicer

1. Opening activities

John spicer opened the meeting at 9:00 CEST.

1.1 Opening comments, welcome from host

Peter welcomes the group and presents the information about the location of the meeting and evening activities.

Thank you to the sponsors.

John presents schedule for the meeting. Working groups will meet until Friday. Plenary is scheduled for Saturday at 8:30 am CEST. There are several evening sessions scheduled.

John presents meeting goals. The primary goals of this meeting will be:

- Work on C++20 features
- Resolve NB comments for the parallelism 2 TS

Additional, lower-priority goals include:

- Merge the foundational concepts (only) from the Ranges TS into the C++20 working draft, continuing to refine it in the IS draft and adopting its issues list into the main issues lists
- Merge the Coroutines TS into the C++20 working draft, continuing to refine it in the IS draft and adopting its issues list into the main issues lists

1.2 Meeting Guidelines

Every participant is responsible for understanding and abiding by the [INCITS Anti-trust Guidelines](#) and [Patent Policy](#) and the [ISO Code of Conduct](#).

Hal Finkel reminds participants to sign in the attendance sheet. During the meeting there will be a google form setup for P paper numbers on the meeting wiki page.

Bryce asked if the link will work outside of the meeting.
Hal said he will try do something similar.

1.3 Membership, voting rights, and procedures for the meeting

Those considering joining PL22.16 please inform the Chair, John Spicer, Vice-Chair, Hal Finkel, or IR, Barry Hedquist.

1.4 Introductions

Detlef Vollmann said those that are not on the mailing list can come see him during the meeting to speed things up.

Herb Sutter counted 15 nations present. Poland is still an O member. South Africa is mentioned, but the person is not representing South African national body. Same goes for China and Italy.

11 national bodies present : Bulgaria, Canada, Finland, France, Germany, Netherlands, Spain, Switzerland, Russia, United Kingdom and US.

Herb reminds of the voting rules.

1.5 Agenda review and approval

John presents the agenda for the meeting.
Barry Hedquist moves. Marshall Clow seconds.
The motion is unanimously approved by PL22/16.
The motion is unanimously approved by WG21.

1.6 Editor's reports, approval of working drafts

There is no document for the Library Fundamentals to approve yet.

Document	Editor's report	Prospective WD
C++20 Standard	N4749	N4750
Coroutines TS	N4737	N4736
Networking TS	N4735	N4734
Parallelism v2 TS	N4743	N4742
Reflection TS	N4747	N4746
Library Fundamentals TS	None	None

Motion to approve the editor report and working drafts.
 Marshall Clow moves, Barry Hedquist seconds.
 The motion is unanimously approved by PL22/16.
 The motion is unanimously approved by WG21.

1.7 Approval of the minutes of the previous meetings

Motion to approve the minutes from the previous meeting.
 Barry Hedquist moves, Aaron Ballman seconds.
 The motion is unanimously approved by PL22.16.
 The motion is unanimously approved by WG21.

Thank you to Jonathan and Nina for producing the minutes.

2. Liaison reports, and WG21 study group reports (see pre-meeting WG21 telecon minutes)

Already summarised in the pre-meeting minutes.

3. WG progress reports and work plans for the week (Core, Evolution, Library, Library Evolution; see pre-meeting WG21 telecon minutes)

Already summarised in the pre-meeting minutes.

John Spicer asked if any WG chairs have anything to say different to the minutes of meeting.

Marshall Clow said there will be an LWG issues processing evening session, no day settled yet. The day will be scheduled today and be visible on the meeting wiki under the evening sessions.

Titus Winters said LEWG is missing the scribe, please volunteer.

John Spicer asked if there are any joint working session.

SG1 and LEWG will have a joint session on executors. SG1 has a tentative schedule only right now.

SG12 will meet with EWG and LEWG for a paper on undefined behaviour after the plenary.

EWG and LEWG will meet to discuss string view after the plenary.

4. New business requiring action by the committee

Herb Sutter said the Parallelism ballot finished last week. Thank you to everyone who participated. No official results back yet.

5. Organize working groups and study groups, establish working procedures

Jens Maurer presents WG meeting rooms assignments.

6. WG and SG sessions

SG16 will not meet this time.

SG7 is still working on the schedule.
SG6 will not meet this time.
SG13 is not active and will not meet.

Evening session schedule is on the meeting wiki page. Evening sessions start at 7:30 pm.

Michael Wong says the Wednesday evening session will not be just about the TS , but also about the direction group work.

The WG and SG chairs must arrange for any proposals to be written up in the form of a motion, and made available by **8:00 PM** CEST Friday.

7. Review of the meeting (Saturday 8:30 AM)

John Spicer opened the meeting at 8:30am CEST.

Herb Sutter reminds the participants that ISO meetings are not public and explains the do-s and don't-s of the meeting.
Sutter explains the voting rules.

We expect to have an extra WG21 meeting in September in Seattle area. It would be an EWG meeting focusing on modules and an SG1/LEWG meeting focusing on executors. Possible dates are Thursday/Friday (20-21 of September) and Saturday/Sunday(22-23 of September).

Huber Tong asked if we will apply papers to the working paper in those meetings. Group agrees this is only a subgroup meeting and no papers will be voted in.

Marshall Clow says he expects an extra LWG meeting as well.

Sutter polls for the possible attendees of the EWG September meeting. There is a quorum.

Sutter polls for the Thursday/Friday vs Saturday/Sunday option. Preference for Thursday/Friday option.

Sutter polls for the SG1/LEWG September meeting. There is a quorum
Sutter polls for the Thursday/Friday vs Saturday/Sunday option. Preference for Saturday/Sunday option.

John Spicer reminds the attendees to sign the attendance sheet

WG and SG status and progress reports.

- SG5: Transactional memory (Wong)

Wong presents. SG5 meets every 2 weeks, but they are looking to reduce the frequency to one c month. Currently looking at a limited proposal related to executors and memory.

- SG6: Numerics (Crowl)

No report.

- SG7: Compile-time programming (Carruth)

Carruth presents. SG7 didn't have a chance to meet, but will meet after plenary or lunch. Currently one paper to review. There will be a high level discussion to give direction to LEWG for meta-programming paper LEWG referred to the group in this meeting.

- SG10: Feature test (Nelson)

John Spicer presents. There was on paper presented and accepted by EWG.

- SG12: Undefined and unspecified behavior (Dos Reis)

Dos Reis presents. SG12 met three times this week. They discussed P0593 and are referring it to EWG. They also looked into undefined behaviour policy in general; do we want to preserve undefined behaviour and what are the guidelines we want to live. There will be a revised version of that paper in a form of SD. There was also a joint meeting between SG12 and WG23.

Aaron Ballman presents. WG23 has documents that cover multiple languages. Original content wasn't C++ relevant content and WG23 is trying to rectify that. Buffer overflow conditions and type conversion between pointers was discussed. Ballman encourages volunteers to help WG23 with these efforts.

- SG14: Games & low latency (Wong)

Michael Wong presents. SG14 has a lot of participants in the telecom meetings. SG14 did not meet this week. A lot of work is done on the calls and the information is disseminated to the respective WG at the meeting. Current focus of the SG is exceptions handling and error handling.

Mateusz Pusz asks if there will be a face to face meeting at cppcon.

Wong says they plan to have one there.

- SG15: Tooling (Winters)

Titus Winters presents. SG15 met last night to discuss a paper about package management. Winters encourages participation on the reflector and is hoping to organise an inter meeting phone or video conference.

- SG16: Unicode (Honermann)

Corentin Jabot presents. SG16 approved one paper. SG16 meets every two weeks on a telephone conference and plans to meet in San Diego. The group has a mailing list for anyone willing to participate.

- SG1: Concurrency (Giroux)

Olivier Giroux presents. SG1 processed NB comments and a number of c++20 papers. The group talked about executors and coroutines. The response to Parallelism 2 TS is ready. Giroux presents SG1 delivery pipeline to C++20

On the topic of executors, Giroux said SG1 P0443 can't proceed until it gets reconciled with P1055.

Nico Josuttis asks for clarification of P0443 and P1055

Giroux explains that P0443 is unified executors proposal and P1055 is the next executor proposal that will be absorbed. SG1 needs an extra meeting to absorb it.

Giroux presents SG1 expectations for san Diego.

Giroux presents summary of discussion on coroutines and thread identity issues.

Sg1 had a strong poll to add a note in a `co_await` wording to emphasise thread switch risks which resulted in issue 31.

SG1 had a strong poll for normative change to `undef` switch into `unlike` execution agent which resulted in issue 32

There are no concurrency issues preventing p0064R4 from merging into IS. Geoffrey expressed agreement with this during the SG1 meeting. SG1 doesn't yet fully understand environment around coroutines.

- Evolution (Voutilainen)

Ville Voutilainen presents. EWG discussed concepts; there are two alternatives with strong support on both sides. No choice has been made. There was an adjustment made for concept requirement.

EWG reviewed P0782R1 constraining concepts overload set
EWG expects more concepts discussion in San Diego

There was no consensus to move a modules subset proposal to C++20. There was a consensus to merge parts of ATOM and current Modules TS into the TS draft. EWG will continue with the same modules bandwidth in San Diego.

EWG had a discussion about coroutines. There was no consensus to change the direction. Evolution approved the merge of Coroutines TS to IS. EWG expressed encouragement for more work on coroutines.

EWG is done with feature macros, but expects working groups to continue revising the document.

There was a lot of discussion on aggregate initialisation. EWG expects to do a holistic analysis of initialisation problems in general.

Contracts proposal has been approved with the understanding that there are remaining issues with pre/post condition on virtual function. We need to fix those issues before C++20

EWG looked into various papers on constexpr extensions.

EWG reviewed proposal for deducing this and provided guidance

EWG ran out of time to review all papers

- Library Evolution (Winters)

Titus Winters presents. LEWG reviewed 44 papers, 28 papers remain unreviewed. LEWG has a couple of policy changes regarding what changes can be done to the working library.

LEWG decided all compile time library design issued should go to SG7 first, unless the changes are trivial.

Alisdair Meredith asks if concepts are considered a compile time library changes. Winters says they are not.

If the paper involves text related things, it should go to SG16 before coming to LEWG.

LEWG did a lot of work on the Ranges TS. LEWG will be forwarding a lot of papers to LWG for inclusion into IS.

Papers that were discussed which LEWG would like to prioritise are text formatting paper, doing a stack trace library, adding support for generic non facility, and the idea of adding a monadic operations to `std::optional`.
Some papers were discussed at this meeting but not forwarded to LWG. There may be a study group focusing on the data persistence.
Bryce Adelstein-Lelbach says they are trying to get people interested, but there is no need for a formal group right now.

LEWG discussed oddities of span, but no consensus reached. A lot of novel arguments were brought up at this meeting. Winters polls for interest in an evening session on this in San Diego. There is quorum. Winters will schedule an evening session in San Diego.
Herb encourages attendees to bring papers on the topic.
Loïc Joly says it would be useful for the world community to get some guidelines on this topic.
Meredith asks if this should be an evening session or a regular session.
Herb says the evening session is the normal practice.
Meredith says it is not clear if evening session are optional and if the group can make decision in the evening sessions.
Voutilainen says that EWG sessions are mandatory for EWG members.

LEWG is working on library solution for safe integral conversion.
There was a discussion on exception throwing.

Spicer said there will be a statement at the next meeting to make it clear which evening session are optional and which can result in working group decisions.

Motion:

Move to create a new Standing Document "Standard Library Compatibility" with the contents of [P0921r2](#) "Standard Library Compatibility" as its initial content.

No discussion.

No objections.

Motion passes with Unanimous consent.

- Core (Miller)

Mike Miller presents. CWG focused on papers for C++20. 4 papers need further review.

CWG review Static Reflection TS..

There will be a issues processing session after the plenary.

CWG expects to have telecom meetings to handle further issues processing.

Papers pending review : adjustments to C++ memory model, parenthesised initialisation for aggregates, more from rvalue references in return statements, and conversion involving arrays of unknown bounds.

CWG Motions

Motion 1

Move to accept as Defect Reports all issues in [P1113R0](#) (Core Language Working Group "ready" Issues for the June, 2018 (Rapperswil) meeting) and apply the proposed resolutions to the C++ working paper.

No discussion.

No objections.

Motion passes.

Motion 2

Move to accept as Defect Reports all issues in [P1114R0](#) (Core Language Working Group "tentatively ready" Issues for the June, 2018 (Rapperswil) meeting) and apply the proposed resolutions to the C++ working paper. [**PROPOSED AMENDMENT**: Move to accept as Defect Reports all issues **except 2359** in [P1114R0](#) (Core Language Working Group "tentatively ready" Issues for the June, 2018 (Rapperswil) meeting) and apply the proposed resolutions **for all issues** to the C++ working paper.]

Mike Miller proposed an amendment to the motion because one of the issues is dealing with the feature that is not in c++17 . Call out that issue to say that's not a DR but should also be adopted to the working paper.

Jens updates the motion.

No objections to the amended motion.

Amended motion passes.

Motion 3

Move to apply the changes in [P0806R2](#) (Deprecate implicit capture of [this](#) via [=]) to the C++ working paper.

Josuttis asked what is the status with the & capture.

Thomas Koeppel says there is no change.

Ville Voutilainen expressed strong preference to deal with such aspirations with coding-convention-enforcing tools and coding-convention guides, as opposed to having the standard enforce a particular style of programming.

There are objections to this motion.

Sutter reminds the room of voting rules.

Sutter polls the room.

In favour : 35

Opposed : 2

Abstained : 14

There is consensus, motion passes.

Motion 4

Move to apply the changes in [P1042R1](#) ([__VA_OPT__](#) wording clarifications) to the C++ working paper.

No discussion.
No objections.
Motion passes.

Motion 5

Move to accept [P0929R2](#) (Checking for abstract class types) as a Defect Report and apply the changes therein to the C++ working paper.

No discussion.
No objections.
Motion passes.

Motion 6

Move to apply the changes in [P0732R2](#) (Class Types in Non-Type Template Parameters) to the C++ working paper.

No discussion.
No objections.
Motion passes.

Motion 7

Move to apply the changes in [P0912R2](#) (Merge Coroutines TS into C++20 working draft) to the C++ working paper.

No discussion.
There are objections to the motion.
Sutter polls the room.

In favour : 29
Opposed : 15
Abstained : 8

Sutter polls national bodies.

Hedquist polls US voting members:

In favour :20
Opposed : 6

Abstained: 7

WG21 national bodies voted in the following way :

Bulgaria abstains.

Canada opposed.

Finland in favour.

France in favour.

Germany opposed.

Netherlands in favour.

Russia in favour.

Spain in favour.

Switzerland opposed.

UK opposed.

US in favour.

There is no consensus. Motion doesn't pass.

Gor Nishanov asked the opposing national bodies to send comments with changes they would like to see.

Motion 8

Move to apply the changes in [P1025R1](#) (Update The Reference To The Unicode Standard) to the C++ working paper.

No discussion.

No objections.

Motion passes.

Motion 9

Move to apply the changes in [P0528R3](#) (The Curious Case of Padding Bits, Featuring Atomic Compare-and-Exchange) to the C++ working paper.

No discussion.

No objections.

Motion passes.

Motion 10

Move to apply the changes in [P0722R3](#) (Efficient sized delete for variable sized classes) to the C++ working paper.

No discussion.

No objections.

Motion passes.

Motion 11

Move to apply the changes in [P1064R0](#) (Allowing Virtual Function Calls in Constant Expressions) to the C++ working paper.

No discussion.
No objections.
Motion passes.

Motion 12

Move to apply the changes in [P1008R1](#) (Prohibit aggregates with user-declared constructors) to the C++ working paper.

No discussion.
There are objections in the room.
Sutter polls the room.

In favour : 28
Opposed : 2
Abstained : 19

There is consensus, motion passes.

Motion 13

Move to apply the changes in [P1120R0](#) (Consistency improvements for `<=>` and other comparison operators) to the C++ working paper.

No discussion.
No objections.
Motion passes.

Motion 14

Move to apply the changes in [P0542R5](#) (Support for contract based programming in C++) to the C++ working paper.

Voutilainen asked library working groups for a guesstimate on how this feature will be used.

Clow says LWG has no plan yet to use this feature.

Casey Carter think it can be used to silence compiler warning for signed and unsigned types.

Nathan Myers says LEWG hasn't discussed this topic.

There are objections in the room.
Sutter polls the room.

In favour : 35
Opposed : 3

Abstained: 14

There is consensus, motion passes.

Motion 15

Move to apply the changes in [P0941R2](#) (Integrating feature-test macros into the C++ WD (rev. 2)) to the C++ working paper.

No discussion.

There are objections in the room.

Sutter polls the room.

In favour : 42

Opposed : 2

Abstained : 10

There is consensus, motion passes.

Motion 16

Move to apply the changes in [P0892R2](#) (explicit(bool)) to the C++ working paper.

No discussion.

There are objections in the room.

Sutter polls the room.

In favour : 40

Opposed : 1

Abstained: 13

There is consensus, motion passes.

- **Library (Clow)**

Marshal Clow presents. LWG received 55 papers plus a number of late arrivals.

LEG processed almost 40 papers.

LWG accomplished a lot during this meeting. The group reviewed all the NB comments for the Parallelism TS.

The group worked with reflection group to get the TS ready for balloting.

LWG adopted 26 papers, but CWG moved some of them so not all will appear in the LWG motions.

If there is a quorum, LWG will have another meeting in Batavia on August 20th.

Clow asks for a show of hands who would be interested in attending this meeting

Voutilainen asks how close it would be to the modules meeting.

Clow says it would be about a month away.
Josuttis asks if the meeting would end on Friday.
Clow confirms.

Clow polls the room. There is a quorum.

LWG be doing issues processing on the reflector and plans to have a telecon too.
Clow thanks everyone who has participated and thanks the scribes for their help.

Pablo Halpern asks if the additional meeting would be an official meeting and if the group will be moving motions.

Clow says it would be an official meeting, but there wouldn't be any motions. The motions would be postponed until San Diego.

Parallelism 2 TS

Motion 1

Move to apply to the Parallelism 2 TS working paper the proposed wording in [P0964R2](#) (Finding the right set of traits for simd<T>).

No discussion.
No objections.
Motion passes.

Motion 2

Move to apply to the Parallelism 2 TS working paper the proposed wording in [P1111R0](#) (Resolutions to NB Comments on the Parallelism TS v2).

No discussion.
No objections.
Motion passes.

Motion 3

Move to apply to the Parallelism 2 TS working paper the proposed wording in [P0820R4](#) (Feedback on P0214).

No discussion.
No objections.
Motion passes.

Motion 4

Move to apply to the Parallelism 2 TS working paper the proposed wording in [P1118R0](#) (Concat and Split on simd<> objects).

Axel Naumann asks if this address an NB comment.
Bryce Adelstein-Lelbach confirms.

No objections.
Motion passes.

Motion 5

Move to appoint an review committee composed of Bryce Adelstein Lelbach, Matthias Kretz, and Marshall Clow to approve the correctness of the Technical Specification for C++ Extensions for Parallelism Version 2 working paper as modified by the motions approved at this meeting, and to direct the Convener to transmit the approved updated working paper for publication.

Michael Wong asks if there is an editor.
Sutter confirms. Jared (Hoberock) is the editor.

No objections.
Motion passes.

Reflection TS

Motion 6

Move to apply to the Reflection TS working paper the proposed wording in [P0670R4](#) (Function reflection).

Daveed Vandevoorde says that during the week there was a problem with an ODR violation. Was this issue resolved ?

John Spicer confirms. The case is illformed, NDR.

There are objections in the room.
Sutter polls the room.

In favour : 40
Opposed : 1
Abstained : 12

There is consensus, motion passes.

Motion 7

Move to appoint an review committee composed of Axel Naumann, Roger Orr, and Daniel Krügler to approve the correctness of the Technical Specification for C++ Extensions Reflection working paper as modified by the motions approved at this meeting, and to direct the Convener to transmit the approved updated working paper for PDTS ballot.

No discussion.
No objections.
Motion passes.

Sutter says ISO hasn't opened a working item yet. The PDTS ballot is not going to launch right away. Once the bucket opens, we will send the request for PDTS.

Coroutines TS (to be applied only if CWG motions are not adopted)

Motion 8

Move to apply to the Coroutines TS working paper the proposed wording in the section "LWG requested edits on 2018-June-08" of [P0912R2](#) (Merge Coroutines TS into C++20 working draft)

No discussion.
No objections.
Motion passes.

Motion 9

Move to apply to the Coroutines TS working paper proposed resolution of issue #29 in [P0664R4](#) (C++ Coroutine TS Issues)

Clow says the reason for the restriction is that this is the only issue that touches on library part.

No objections.
Motion passes.

Networking TS

Motion 10

Move to apply to the Networking TS working paper the proposed resolution of issue 3071 in [P1082R0](#) (C++ Standard Library Issues to be moved in Rapperswil).

No discussion.
No objections.
Motion passes.

C++20 Issues

Motion 11

Move to apply to the C++ working paper the proposed resolutions of all of the issues except 3071 in [P1082R0](#) (C++ Standard Library Issues to be moved in Rapperswil).

No discussion.
No objections.
Motion passes.

Motion 12

Move to apply to the C++ working paper the proposed wording in [P0475R1](#) (LWG 2511: guaranteed copy elision for piecewise construction). This resolves LWG issue #2511

No discussion.
No objections.
Motion passes.

C++20

Motion 13

Move to apply to the C++ working paper the proposed wording in [P0476R2](#) (Bit-casting object representations).

No discussion.
No objections.
Motion passes.

Motion 14

Move to apply to the C++ working paper the proposed wording in [P0788R3](#) (Standard Library Specification in a Concepts and Contracts World).

Roger Orr asks if the intent is not to mandate contracts in the library implementation.
Marshall confirms.

No objections.
Motion passes.

Motion 15

Move to apply to the C++ working paper the proposed wording in [P0771R0](#) (std::function move operations should be noexcept).

Clow says there was a discussion between the author and Pablo Halpern about related work that Pablo has been investigating. The author has agreed to withdraw his motion so Pablo can finish his development. If Pablo doesn't find any issues, LWG will bring this back to the motions page.

Motion 16

Move to apply to the C++ working paper the proposed wording in [P0458R2](#) (Checking for Existence of an Element in Associative Containers).

No discussion.

No objections.
Motion passes.

Motion 17

Move to apply to the C++ working paper the proposed wording in [P0759r1](#) (fpos Requirements).

No discussion.
No objections.
Motion passes.

Motion 18

Move to apply to the C++ working paper the proposed wording in [P1023R0](#) (const-expr comparison operators for `std::array`).

No discussion.
No objections.
Motion passes.

Motion 19

Move to apply to the C++ working paper the proposed wording in [P0769R2](#) (Add shift to `<algorithm>`).

Josuttis asks if this is parallel algorithm.

Billy Baker says there are parallel overloads in this paper and this was discussed in the group.

Josuttis asks if we vote yes, will we get those overloads.

Baker confirms.

No objections.
Motion passes.

Motion 20

Move to apply to the C++ working paper the proposed wording in [P0887R1](#) (The identity metafunction).

No discussion.
No objections.
Motion passes.

Motion 21

Move to apply to the C++ working paper the proposed wording in [P0879R0](#) (Constexpr for swap and swap related functions). Also resolves LWG issue 2800.

No discussion.
No objections.
Motion passes.

Motion 22

Move to apply to the C++ working paper the proposed wording in [P0758R1](#) (Implicit conversion traits and utility functions).

No discussion.
No objections.
Motion passes.

Motion 23

Move to apply to the C++ working paper the proposed wording in [P0556r3](#) (Integral power-of-2 operations).

No discussion.
No objections.
Motion passes.

Motion 24

Move to apply to the C++ working paper the proposed wording in [P0019R8](#) (Atomic Ref).

No discussion.
No objections.
Motion passes.

Motion 25

Move to apply to the C++ working paper the proposed wording in [P0935R0](#) (Eradicating unnecessarily explicit default constructors from the standard library).

Hubert Tong says that the CERN group decided this should go forward, but they had a paper to go on top that didn't make it into the motion. Can we apply P1123 to this motion ?

Marshall Clow says that LWG discussed it, but because of some confusion, the additional paper didn't appear on the motions page. It should be here. Marshall has no objection to applying the paper.

John Spicer asks if we can move the paper at the next meeting.

Marshall says the paper is editorial guidance.

Adam Martin says he wouldn't feel comfortable voting a modified motion.

Bryce Adelstein-Lelbach says the additional paper is editorial direction and it doesn't have to be adopted as a formal motion.

Hubert Tong points out there is normative effect in P1123.

Adam Martin objects to P1123 being voted now.

John Spicer says we will not change the motion.

There are objections in the room.

Herb polls the room.

In favour : 31

Opposed : 2

Abstain : 15

There is consensus, motion passes.

Marshall Clow says the missing paper will be brought forward in San Diego.

Motion 26

Move to apply to the C++ working paper the proposed wording in [P0646R1](#) (Improving the Return Value of Erase-Like Algorithms).

Ville Voutilainen asks if this has semantic effect.

Marshall Clow doesn't believe so.

Alisdair Meredith says that if you trigger on explicit constructors, you would be impacted.

Nico Josuttis asks if we can check that the constructor and the list initialisation are explicit.

Alisdair Meredith says this is restoring C++03 behaviour.

Jeffrey Yasskin asks if this issue was discussed in the study groups

Alisdair confirms.

Adam Martin asks if the question is about `std::initializer_list` constructors.

Nico confirms; both constructors should agree on explicit.

Ville Voutilainen says this is not a breaking change that we care about.

Jonathan Wakely says the paper is a cleanup, it should always have been like this.

No objections.

Motion passes.

Motion 27

Move to apply to the C++ working paper the proposed wording in [P0619R4](#) (Reviewing Deprecated Facilities of C++17 for C++20).

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Ville Voutilainen asks what will this paper remove.

Marshall Clow says all the deprecated features in the library. The paper also states recommendation.

Ville asks if this has been implemented.

Marshall doesn't believe so.

Alisdair Meredith says the deprecated features might not go away straight away.

Tony Van Eerd says some of these features became deprecated a while ago.

Nico Josuttis states that a vendor said they can't switch to C++17 because of deprecated features.

There are objections in the room.

Herb polls the room.

In favour : 31

Opposed : 2

Abstain : 19

There is consensus, motion passes.

Motion 28

Move to apply to the C++ working paper the proposed wording in [P0898R3](#) (Standard Library Concepts).

No discussion.

No objections.

Motion passes.

- **Direction Group**

Bjarne Stroustrup presents. Direction groups had an evening session. Roger Orr has joined directing group. Direction group would like to emphasise the importance of coherence of the language and encourage people to focus on the features that are important to the community as a whole.

The group is in favour of gradual evolution. They would like to emphasise the importance of graphics.

DG is discussing an idea about education's study group.

DG recommendation is don't start a TS without articulating the aims and exit criteria of the TS.

Michael Wong said that DG report mentioned the litmus test for TS and would urge that we consider the litmus test with current TS's (reflection and parallelism).

Richard Smith said editors are proposing a change. They would like to dispose of some top level numbering. Look at D1076 on the wiki for the details about planned

editors changes. Wording paper for the next meeting should take that paper into account

Alisdair Meredith asked if we will only be reorganising the numbering; the clauses will stay the same.

Richard Smith confirmed.

8. Closing activities

8.1 Issues delayed until today

No discussion.

8.2.PL22.16 motions, if any

John Spicer presents voting rules.

Barry Hedquist counts the voting members. 28 members are present, 5 have sent in votes by email.

- 1) **Approval of SC22 N5269 - Initiating of a revision for ISO/IEC TS 19568:2017, Programming Languages -- C++ Extensions for Library Fundamentals. This is for a new work item for TS 19568, C++ Extensions for Library Fundamentals, Version 3, and was approved by WG21 with unanimous consent in Jacksonville.**

Questions and Proposed Responses:

1. Does the US National Body (USNB) approve the Initiation of a revision for ISO/IEC TS 19568:2017?

Proposed response: Yes

2. Will the USNB participate in the development of this revision project ? If yes, please provide the name(s) of the experts.

Proposed response: Yes. Marshall Clow, marshall@idio.com has agreed to participate.

Question: Do you approve of responses to the questions as stated above? (yes/no/abstain)

Hedquist clarifies that there are two items, but the voting is on the whole package. Hedquist polls the room.

In favour: 28 in the room + 5 remote.
Motion passes with unanimous consent.

2) Approval of SC22 5268 - Initiating of a revision for ISO/IEC 14882:2017 Programming Language C++

Questions and Proposed Responses:

1. Does the US National Body (USNB) approve the Initiation of a revision for ISO/IEC 14882:2017?

Proposed response: Yes

2. Will the USNB participate in the development of this revision project ? If yes, please provide the name(s) of the experts.

Proposed response: Yes. John Spicer, jhs@edg.com, has agreed to participate.

Question: Do you approve of responses to the questions as stated above? (yes/no/abstain)

Hedquist polls the room.

In favour: 28 in the room + 5 remote.
Motion passes with unanimous consent.

3) Approval of a Motion to request SC22 open a US initiated New Work Item for ISO/IEC Technical Specification on Reflection. A draft document for this proposed NWIP is posted on the INCITS PL22.16 web site under Documents, pl22.16-2018-00008. The ISO Form 4 is pl22.16-2018-00009.

We are making a recommendation to the INCITS EB to approve a US initiated proposal for a TS on Reflection. We are not voting on the draft TS.

Motion: PL22.16 approves the US initiated NP for ISO/IEC Technical Specification, C++ Language, Extensions for Reflection for submission to the Executive Board. (move/second).

Marshal Clow moves. Aaron Ballman seconds.

Hedquist polls the room.

In favour: 28 in the room + 5 remote.
Motion passes with unanimous consent.

9. Plans for the future

9.1 Next and following meetings

2018-11-05/10: San Diego, CA ([N4715](#))

Marshal Clow said the meeting details are in N4715. Looking forward to seeing everyone there.

2019-02-18/23: Kona, HI, US ([N4762](#))

Herb Sutter said there may be a meeting room off site during the meeting in Kona.

There is a possible meeting in Cologne in summer of 2019.

Nico Josuttis said he is looking for sponsors to help with the Cologne meeting. The meeting is likely to be 15-19 June 2019.

Nevin Liber asked if it is in the same hotel as the previous LWG meeting

Nico Josuttis said it's a different location.

Sutter presents.

There will be a meeting in Belfast, 4-9 of November 2019.

Travel ban may affect people coming to the US, but also people returning to the US. That's not a worry at the moment.

Due to individuals struggling to get a US visa, the committee may have more non US meetings.

Sutter thanks the editors, the editing teams and the scribes.

Thank you to Geoffrey Romer for LFST2 editing.

The committee will from now on have a project editor and an editing team

With a lead for each project.

Project editor for LFST3 is Thomas Koepp. Thank you to Thomas.

San Diego is the last meeting for c++20 proposals.

EWG plans to approve the last c++20 papers that need library response.

LWG will be progressing papers on how to react to new language features.

Sutter presents the delivery plan.

CD ballot start is planned for September.

Major work items:

- contracts, coroutines and ranges are planned for c++20

- modules are still in progress

- reflection (TS in c++20), executors (TS in c++20), networking, future.then, and async2 are planned for c++23

Hubert Tong asks about coroutines.

Sutter says the national bodies expressed the desire to see coroutines in C++20, despite the votes in this particular meeting. Sutter is not aware that this position has changed.

Nico Josuttis urges everyone to take the time until San Diego to resolve existing issues in coroutines.

Walter Brown presents.

Thank you the host and the sponsors.

Thank you to everyone that participated and those who helped us participate.

9.2 Mailings

2018-06-25: Post-Rapperswil

2018-10-08: Pre-San Diego

10. Adjournment

Hal Finkel moves. Barry Hedquist seconds.

Spicer adjourns the meeting at 11:40 am CEST.

11. Attendance

The column "WG21" designates official PL22.16 or WG21 status ("P", "A", "E", "M")
The column "PL22.16" indicates organizations eligible to vote by "V", and advisory membership by "A".

Company / Organization	Representative		
AMD	Siu Chi Chan	A	V
AMD	Alexandru Voicu	A	
Amazon Corporate LLC	John McFarlane	A	V
Apple	Tim Northover	A	V
Argonne National Laboratory	Hal Finkel	P	V
Bloomberg	John Lakos	P	V
Bloomberg	Dietmar Kühl	A	
Bloomberg	Alisdair Meredith	A	
Bloomberg	David Sankel	A	
Bloomberg	Frank Birbacher		
Bloomberg	Jeffrey Mendeksohn		
Bloomberg	Vittorio Romeo		
Brown	Walter Brown	E	
C Plus Plus Alliance Inc	Andrzej Krzemieński	A	
Cisco Systems Inc	Lars Gullik Bjønnes	P	V
EPAM Systems Inc	Mateusz Pusz	P	V
Edison Design Group	John Spicer	P	V
Edison Design Group	Jens Maurer	A	
Edison Design Group	William Miller	A	
Edison Design Group	Daveed Vandevoorde	A	
Edison Design Group	Nina Dinka Ranns	A	
Facebook	Eric Niebler	A	V
Facebook	David Goldblatt		
Facebook	Nathan Sidwell		
Facebook	Victor Zverovich		
Google	Chandler Carruth	P	V
Google	Hans Boehm	A	
Google	James Dennett	A	
Google	Geoffrey Romer	A	
Google	Richard Smith	A	
Google	Titus Winters	A	
Google	Jeffrey Yasskin	A	
Google	Chris Kennelly		
Google	Thomas Koeppe		
Google	David Stone		
GammaTech Inc	Aaron Ballman	P	V
GreenWireSoft	Juan Alday	P	V
IBM Corporation	Paul McKenney	P	V
Intel Corporation	Pablo Halpern	A	V
Intel Corporation	Erich Keane	A	
Jump Trading	Barry Revzin	P	
LTK Engineering Services	Alan Talbot	P	V

Company / Organization	Representative		
Lawrence Livermore National Laboratory	Christopher Earl	A	V
Linden Research, Inc	Nathaniel Goodspeed	P	V
Los Alamos National Laboratory	Li-Ta Lo	P	V
Louisiana State University	Hartmut Kaiser	P	V
Microsoft Corporation	Jonathan Caves	P	V
Microsoft Corporation	Casey Carter	A	
Microsoft Corporation	Gor Nishanov	A	
Microsoft Corporation	Gabriel Dos Reis	A	
Microsoft Corporation	Herb Sutter	A	
Microsoft Corporation	Billy R. O'Neal III		
MongoDB Inc	ADAM David Alan Martin	P	V
MongoDB Inc	Mathias Stearn	A	
Morgan Stanley	Bjarne Stroustrup	P	V
NVIDIA Corporation	Olivier Giroux	A	V
NVIDIA Corporation	Jared Hoberock	A	
NVIDIA Corporation	Bryce Adelstein-Lelbach	A	
NVIDIA Corporation	Carter Edwards		
NVIDIA Corporation	Marco Foco		
Oak Ridge National Laboratory	Graham Lopez	A	V
Ocient	Nevin Liber	P	V
Oracle	Paolo Carlini	P	V
Perennial	Barry Hedquist	P	V
Programming Research Ltd	Richard Corden	P	
Programming Research Ltd	Christof Meerwald	A	
Qualcomm Inc	Marshall Clow	P	V
Red Hat Inc	Jason Merrill	P	V
Red Hat Inc	Torvald Riegel	A	
Ripple Labs	Stephen Schurr	A	V
Saks & Associates	Benjamin Saks	P	V
Sandia National Laboratories	Daniel Sunderland	P	V
Sandia National Laboratories	Christian Trott	A	
Sandia National Laboratories	David Hollman		
Schonfeld Tools LLC	Romeo Ahohe	A	V
Stellar Science	Daniel Davis	A	V
Symantec	Michael Spertus	P	V
University of Akron	Andrew Sutton	P	V

Other WG21 members			
BDS	BG	Vasil Vasilev	M
Christie Digital	CA	Tony Van Eerd	M
Codeplay	CA	Michael Wong	M
IBM Corporation	CA	Shuo Feng Liu	M
IBM Corporation	CA	Hubert Tong	M
Mozilla	CA	Botond Ballo	M
CSCS	CH	Mauro Bianco	M
CERN	CH	Axel Naumann	M
HSR	CH	Peter Sommerlad	M
Vollmann Engineering	CH	Detlef Vollmann	M
	DE	Fabio Fracassi	M
	DE	Nicolai Josuttis	M
GSI	DE	Matthias Kretz	M
University Carlos III of Madrid	ES	J. Daniel García	M
CryptoTec	FI	Mikael Kilpeläinen	M
Plum Hall Inc	FI	Ville Voutilainen	M
	FR	Corentin Jabot	M
	FR	Loïc Joly	M
Université de Nice S.A.	FR	Jean-Paul Rigault	M
	GB	Chris Kohlhoff	M
	GB	Roger Orr	M
Graphcore	GB	Jon Chesterfield	M
Jetbrains	GB	Timur Doumler	M
Red Hat Inc	GB	Jonathan Wakely	M
	NL	J.C. van Winkel	M
	NO	Espen Harlinn	M
Nokia	PL	Michał Dominiak	M
	RU	Anton Polukhin	M
Yandex	RU	Aleksandr Fokin	M

Participating non-members	
ARM Ltd	Mikhail Maltsev
Auto-Intern GmbH	Odin Holmes
AVAST	Hana Dusíková
Blizzard	James Touton
BMW AG	Andreas Weis
Bruker Daltonik GmbH	Daniel Krügler
Cascade GmbH	Volker Doerr
Codeplay	Gordon Brown
Freie Universität Berlin	Hannes Hauswedell
KDAB Group	Marc Mutz
KLT Associates, Inc	John Kolbusz
Maystreet	Nathan Myers
Paris Observatory	Vincent Reverdy
SILKAN	Stéphanie Even
Sony Computer Entertainment	Michael Spencer
Xilinx	Ronan Keryell
	Pal Balog
	Eugenio Bargiacchi
	Peter Bindels
	Sebastian Büttner
	Niall Douglas
	Andreas Fertig
	Felix Hellman
	Erik S. V. Jansson
	Federico Kircheis
	Boris Kolpackov
	Chris Kormanyos
	Nicolas Lesser
	JeanHeyd Meneide
	Michal Sudwoj
	Faisal Vali
	Gevorg Voskanyan
	Mingxin Wang