

# **WG21 2022-07 Admin telecon minutes**

ISO/IEC JTC1 SC22 WG21 N4914— 2022-07-11  
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Convener: Herb Sutter  
SC22/WG21 pre-meeting telecon  
Monday 2022-07-11  
08:00 N.Am. Pacific Time

## **1 Opening and introductions**

Herb Sutter opens the meeting at 08:03 N.Am. Pacific Time  
Herb Sutter welcomes the participants.  
Herb Sutter displays the JTC 1 Code of Conduct slide

### **1.1 Roll call of participants**

Aaron Ballman  
Barry Revzin  
Billy Baker  
Christof Meerwald  
Erich Keane  
Fabio Fracassi  
Gabriel Dos Reis  
Guy Davidson  
Hans Boehm  
Herb Sutter  
Hubert Tong  
Inbal Levi  
JC van Winkel  
Jeff Garland  
Jens Maurer  
John Spicer  
Jonathan Wakely  
Jose Alcorta  
Jose Daniel Garcia Sanchez  
Marco Foco  
Matthias Kretz  
Matus Chochlik  
Michael Hava  
Michał Dominiak  
Mingxin Wang  
Nevin Liber  
Nina Ranns  
Peter Kulczycki  
Roger Orr  
Bill Ash  
Tom Honermann

## 1.2 Adopt agenda

No objection to approval of agenda. Agenda adopted.

## 1.3 Approve minutes from previous meeting (deferred to face- to-face meeting)

## 1.4 Review action items from previous meeting (deferred to face-to-face meeting)

## 1.5 Review of project editor and liaison assignments

[Status page](#)

Any other updates not displayed on the status page ?

None.

## 2. Status reports

### 2.0 Advisory subgroup status reports

- **AG**, Admin group: Hal Finkel

No report.

Jonathan Wakely : I was hoping for a confirmation that we'll have a mailing reasonably soon because the plenary is approaching. I will e-mail Hal about it.

Herb Sutter : Before we went to monthly mailing, our practice was to have pre and post meeting mailings. We're still transitioning. We should have a formal discussion to see if we're doing what makes sense.

John Spicer : Our requirement is that the strawpolls be available one week before the meeting. If there is a concern about a paper mentioned in the polls, make a copy of the paper on the straw poll page.

Herb Sutter : Took a poll among chairs regarding the demands for remote participation and how much effort we have to support it. The polls suggest we're focused on the local stuff when at the meeting. There will be a poll among the attendees too, but it looks like support for remote participation will be a challenge.

Most common remote participation demand for CWG, LWG and SGs is all sessions on zoom, best effort.

That's what we should aim for.

For EWG and LWG has higher demand for zoom support. We will focus available zoom hosts to these two groups.

- **DG**, Direction group: Roger Orr

Roger Orr reports.

We continue to meet regularly; recent discussion topics include:

- The Open Source Software Security Mobilization Plan
- Looking at updates to P2000
- The Kona meeting, a mix of in person and remote

- **ARG**, ABI review group: Daveed Vandevoorde, Jason Merrill

Daveed Vandevoorde reports.

There has been no activity (and no queries) since the last plenary.

- **SSRG**, Safety/security review group: Gabriel Dos Reis

Gabriel Dos Reis reports

No request or activity since I was appointed.

Prior to that: The group was asked to provide feedback on P0843, specifically on the name and functionality offered under `push_back()`. The summary of the feedback was

*"We agree that calling `push_back` on a `full static_vector` is a precondition violation, and that there should be checked and unchecked versions of this functionality. The name `push_back` should have the checked functionality."*

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## 2.1 Pipeline stage 1 groups: Specialist subgroup status reports (Sgs)

SGs 3, 8, and 11 are currently dormant and handled in the main subgroups. The active SGs are:

- **SG1**, Concurrency: Olivier Giroux, Hans Boehm

Olivier Giroux reports.

SG1 met a half-dozen times since the last plenary, the result being:

- We replied to LWG3659 and LWG3611.
- We discussed CWG2298; more work is needed but no one is working on it.
- We discussed the C++20-DIS-era paper P1801, and this time we forwarded it.
- We also discussed and forwarded P2545 and P2530, simplified reclamation features.
- We discussed another older paper, P1116, but it needs more work.

The SG1 queue is not empty but it is not large either, so we don't meet at every opportunity; for example we're not meeting in July.

It would not be unreasonable for authors to ask to discuss their paper(s) in Kona, it's not looking like we'll have a full schedule there.

- **SG2**, Modules: David Stone

No report.

- **SG4**, Networking: Jeff Snyder

No report

- **SG5**, Transactional memory: Hans Boehm, Jens Maurer

Herb Sutter : We recently completed a DTS and are working through the comments.

Hans Boehm : We haven't been meeting because we have been waiting for the ballot results. Thank you to Jens for drafting comment responses. The responses are now available.

- **SG6**, Numerics: Lisa Lippincott, Matthias Kretz, John McFarlane

Matthias Kretz reports.

SG6 processed the following papers:

- \* P2569R0: \* `_HAS_SUBNORM==0` implies what?
- \* D1673R9: A free function linear algebra interface based on the BLAS
- \* P2075R1: Philox as an extension of the C++ RNG engines
- \* P1708R6: Simple Statistical Functions
- \* D0543R1: Saturation arithmetic
- \* P0952R0: A new specification for `std::generate_canonical`
- \* D1708R6: Simple Statistics (last version in a mailing: P1708R5)
- \* P0870R4: A proposal for a type trait to detect narrowing conversions
- \* P2509R0: A proposal for a type trait to detect value-preserving conversions

At this point our queue of `!needs_revision` papers is basically empty. I just sent out a call for papers to the LEWG and SG6 reflectors to restart our efforts on numeric types.

Attendance consists mostly of a small core group - often too small for quorum. In order to make progress we then suggested appropriate action and asked for objections on the reflector.

- **SG7**, Compile-time programming: Hana Dusíková, Daveed Vandevoorde

Hana Dusíková reports.

No activity since the last plenary.

- **SG9**, Ranges : Inbal Levi, Casey Carter

Inbal Levi reports.

"Ranges" have met 5 times since the last plenary session: 03-14, 04-11, 05-09, 06-13, 07-11 (second Monday of each month)

Reviewed 7 papers (P2538R0, P2540R0, P1223R3, P2550R0, P1255R7, P2542R2, P2602R0), among them 6 were forwarded to LEWG.

In addition, SG9 Mailing List has been actively reviewing papers as well as suggestions and queries. I would also like to acknowledge the effort of our great papers' authors, as well as SG9 regulars who participated in LEWG and LWG, assisting with finalizing and reviewing "Ranges" wording and design. Thank you.

Detailed agenda: 2022-Telecons

Full minutes: Wg21telecons2022/SG9

For the complete ranges papers' status and a list of open tasks please visit: [Ranges Status](#)

Please, feel free to approach me or Casey with any questions.

- **SG10**, Feature test: Barry Revzin, Jonathan Wakely

Barry Revzin reports.

Nothing to update.

The standing document (which you can get to via <https://wg21.link/sd6>) has been updated for the previous plenary. Will do a run through of the papers on the straw polls page to ensure feature test compliance once we get there.

- **SG12**, Undefined and unspecified behavior, and vulnerabilities: Gabriel Dos Reis, Aaron Ballman, Michael Wong

Gabriel Dos Reis reports.

No meeting and no paper review since the last plenary.

- **SG13**, HMI and I/O: Roger Orr

Roger Orr reports.

There have been no papers targeting SG13 and so the SG has not met.

Herb Sutter : There hasn't been any activity in SG13 for a while now. Should we move SG13 to the list of quiescent study groups until we get a paper targeted for SG13 ?

Roger Orr : yes, that makes sense.

- **SG14**, Low latency: Michael Wong

Michael Wong reports.

SG14 continues to meet every month on the second Wednesday of the month at 2 PM ET. We routinely have 20-30 people calling in. We cycle through Games, Embedded, and Finance/Low latency processing proposals for C++23/26/29. We have pushed forward colony/hive and 2 linear algebra proposals. We are considering a live CPPCON sg14 meeting to test the proposed hybrid meeting setup.

- **SG15**, Tooling: Michael Spencer, Ben Boeckel

Tom Honnerman : we're meeting regularly and are focusing on issues with modules and deployment. Recently we had a paper about error messages in the context of concepts.

- **SG16**, Unicode: Tom Honermann, Peter Brett

Tom Honermann reports.

Summaries of SG16 meetings held since the last pre-meeting admin telecon (2022-01-12 through 2022-06-08) are captured in [P2605](#) with the exception of the 2022-06-22 telecon (I have yet to publish a summary for that meeting).

SG16 has held 11 telecons since the last pre-meeting admin telecon on 2022-01-24; we continue to (mostly) sustain our twice monthly meeting cadence.

Papers discussed include:

- [P1885: Naming Text Encodings to Demystify Them](#)
  - [Github issue #634](#)

- Approved by SG16; pending LWG approval for C++23.
- [P2491: Text encodings follow-up](#)
  - [Github issue #1147](#)
  - Obsoleted by changes made in [P1885R10](#).
- [P2498: Forward compatibility of text encoding with additional encoding registries](#)
  - [Github issue #1157](#)
  - Approved by SG16; did not have consensus within LEWG.
- [P2286: Formatting Ranges](#)
  - [Github issue #977](#)
  - Approved by SG16; Tentatively Ready for plenary for C++23.
- [P2513: char8\\_t Compatibility and Portability Fixes](#)
  - [Github issue #1171](#)
  - Approved by SG16; pending EWG electronic polling as a C++20 DR.
- [P2558: Add @, \\$, and ` to the basic character set](#)
  - [Github issue #1220](#)
  - Approved by SG16; pending EWG review for C++26.
- [P2572: std::format\(\) fill character allowances](#)
  - [Github issue #1260](#)
  - Approved by SG16; pending LEWG review as a C++20 DR and resolution of [LWG3576](#) and [LWG3639](#).

SG16 and SSRG held a joint meeting on 2022-02-28 to discuss the following paper. This followed the publicity surrounding the publication of the [Trojan Source \(paper\)](#) security issues concerning malicious use of invisible or Unicode directional formatting characters in source code. Much work remains to be done in this area. The Unicode Consortium started a new Source Code Ad Hoc Group tasked with improving the Unicode Standard and/or updating or publishing new technical reports or technical specifications. Further work on these security issues is expected to follow the Unicode recommendations and guidelines that are expected to appear in future Unicode reports and standards. The most recent status report from this new group can be found [here](#). SG16 reviewed one of the groups published papers, [L2/22-072R \(Proposal for amendments to UAX#9 and UAX#31\)](#), and identified several improvements to be made to the C++ standard as a result (these improvements are tracked by SG16 [issue #74](#) and [issue #75](#); papers remain pending). SG16 will continue to follow and engage with this new group.

- [P2528 \(C++ Identifier Security using Unicode Standard Annex 39\)](#)
  - [Github issue #1192](#)

SG16 currently has [no papers ready for review](#).

Recent discussions have focused on objectives and priorities for C++26 and the intent to publish a Call For Papers. Candidates for work to prioritize have been culled from features in the popular [ICU library](#). Additional recent discussions have focused on questions to be proposed for inclusion in the 2023 C++ Developer Survey that is run annually by the Standard C++ Foundation.

We're out of papers to discuss. The intent is to publish a call for papers and reach out to different organizations to see how they do Unicode-related things at a library level.

- **SG17**, EWG incubator: Botond Ballo, Erich Keane

No report. See EWG.

- **SG18**, LEWG incubator: Billy Baker, Nevin Liber

No report. See LEWG.

- **SG19**, Machine learning: Michael Wong, Vincent Reverdy

Michael Wong reports.

SG19 continues to meet every month on the second Thursday of the month at 2 pm ET. We average 10-15 people calling in. We cycle through Stats, Graph, and RL/Differential calculus proposals for C++23/26/29.

The stats proposal has been reviewed by SG6 with minor changes. We are now also considering a Matrix proposal.

- **SG20**, Education: JC van Winkel

JC van Winkel reports.

SG20 has met a few times, but more importantly, we have split up in EMEA-TZ-friendly and S-TZ-friendly subgroups who are meeting ~monthly for working sessions developing topics for our education curriculum guidelines. In the SG20 meetings we discuss the results of these working sessions and merge the results in our github repository. The intermediate result is here: <https://cplusplus.github.io/SG20/latest/>.

- **SG21**, Contracts: John Spicer

John Spicer reports.

We have had two telecons since the last plenary.

We have established a “Contract Support Working Paper”, which serves as the current state of the proposal, and identifies open issues that remain to be addressed. The most recent version of this is P2521R2.

We resolved a number of important open issues in our 2022-03-10 telecon.

There is currently an issue that is blocking our progress concerning the kind of side-effects that are permitted in contracts.

There remain quite a few issues regarding side-effects in contracts. Those include how many times a side-effect is permitted and/or guaranteed to occur.

The issue that is currently blocking progress concerns whether contracts should forbid certain classes of operations because allowing them might be a code-safety issue.

Gabriel Dos Reis has presented serious concerns about this issue and plans to write a paper that describes his concerns. That paper is currently expected to be in the July mailing. After that, we will have a telecon to discuss the paper and the best path in which to proceed.

- **SG22**, C/C++ liaison: Aaron Ballman, Thomas Koeppel, JeanHeyd Meneide, Richard Smith

Aaron Ballman reports.

SG22 has continued to meet regularly, but has had some struggles with making quorum once the winter ended. We have had five meetings since the last WG21 plenary and have processed 11 papers. Up until now, we've been focusing on papers for C23 and C++23, but will be switching gears to future revisions of the standards.

#### WG14 Liaison Report

WG14 has met twice since the last WG21 plenary and continues to make progress towards C23. We are still expecting to have the next revision of the standard finished by Nov 2023, so the release is still expected to be C23 despite likely being published in 2024 by ISO. WG14 will be meeting again the week of Jul 18th. This is expected to be the last

week in which changes for C23 are made, and the committee will switch to focusing on getting the CD ready. Relevant changes since the last WG21 plenary include:

N2764: `[[noreturn]]` support  
N2775: literal suffixes for bit-precise integers  
N2826: `unreachable()`  
N2829: make `assert()` user friendly in C  
N2836: Unicode syntax identifiers for C  
N2841: `void f();` now means the same thing in both C and C++  
N2927: support for the `typeof` operator  
N2934: revised the spelling of several `_`Keywords  
N2935: `true` and `false` are now predefined constants instead of macros  
N2886: removed `ATOMIC_VAR_INIT` entirely  
N2888: exact-width integer type interfaces are now mandatory

(And many others -- there were 33 papers adopted since Feb.)

The latest C working draft can be found at:

<https://www.open-std.org/jtc1/sc22/wg14/www/docs/n2912.pdf>

## 2.2 Pipeline stage 2 groups: Design subgroup status reports

- **EWG**, Core evolution: JF Bastien, David Stone, Erich Keane

JF Bastien reports.

The EWG report is at: <https://isocpp.org/files/papers/P1018R17.html>

Erich has been chairing since November since I'm now in a much less friendly timezone (JST), which means most meetings are in the middle of the night. Thank you Erich!

We took a break at the beginning of 2022, and then moved to a one-meeting-every-other-week cadence. I've heard that folks have appreciated slowing down the pace. I've also heard concerns that EWG wasn't providing as expedient feedback to papers targeting C++23. I was hoping that we'd do more review activity on the reflector, but that hasn't really picked up except in a few instances, as before the pandemic.

As we've wound down C++23 activity and are starting C++26 activity, we will continue prioritizing reflection, pattern matching, and contracts, as the respective sub-groups send us reviewed papers. Otherwise we have [42 papers on EWG's plate](#), and [19 on EWGI's plate](#).

The [EWG issues list](#) has seen little change lately:

- There are 20 issues tentatively marked as NAD, I expect to resolve them as NAD in Kona;
- 7 issues needing papers:
  - [CWG914](#) Value-initialization of array types
  - [CWG1463](#) extern "C" alias templates
  - [CWG1790](#) Ellipsis following function parameter pack
  - [CWG1962](#) Type of `__func__`
  - [CWG2228](#) Ambiguity resolution for cast to function type
  - [CWG2296](#) Are default argument instantiation failures in the "immediate context"?
  - [CWG2362](#) `__func__` should be `constexpr`
- 2 that need to be revisited:
  - [LWG2432](#) `initializer_list` assignability
  - [LWG2813](#) `std::function` should not return dangling references

I'd appreciate volunteers to tackle these!

- **LEWG**, Library evolution: Bryce Adelstein Lelbach, Fabio Fracassi, Ben Craig

Fabio Fracassi reports.

We're winding down C++23 work. We have a few issues that came back from LWG. We still have an electronic poll in flight which closes at the end of this week. Most papers are known and on LWG plate. We have prioritized them already. LWG knows they are coming and will work through them in order that works for them, maybe in time for plenary. We don't expect LWG to get through all of the papers, some papers will not make it into C++23. Authors have been informed already. We will pick those papers up for C++26

We started working on C++26. This includes senders and receivers, and several bigger papers from SG6, notably linear algebra, where we need more people to help review them and get them ready.

Jonathan Wakely : polls close after the deadline for the straw poll papers. That is not very helpful.

Fabio Fracassi : we can put them up preemptively, and we can strike them if they don't pass.

Jonathan Wakely : it would be helpful if we can close polls before the deadline for the straw poll papers in the future.

Herb : we don't want to surprise people with polls they are not prepared for. Making a decision whether we have a consensus on an already known paper can be fine.

## 2.3 Pipeline stage 3 groups: Wording subgroup status reports

- **CWG**, Core wording: Jens Maurer

Jens Maurer reports

Core Language Working Group report for the 2022-07-25 plenary

CWG has been meeting via Zoom teleconference for two hours every two weeks, processing papers and issues. The final teleconference before the upcoming plenary is on Friday, 2022-07-15, where additional papers or issues may be approved for plenary.

We have approved a total of 15 papers for the upcoming plenary, with three more expected as EWG electronic polling concludes. In three other papers, core language changes were approved and the papers were forwarded to LWG for action.

Furthermore, 11 issues are in "ready" status.

The NB ballot for DTS 12907 "Extensions to C++ for Transactional Memory Version 2" has concluded; the proposed comment resolution is in

<https://wiki.edg.com/pub/Wg21telecons2022/Teleconference2022-07-15/d2617r0.html> to be reviewed by CWG.

An unofficial preview of the CWG straw polls is here:

<https://wiki.edg.com/bin/view/Wg21telecons2022/StagingForPlenaryStrawPolls>

Notes regarding specific straw polls:

Paper P2493R0 (Missing feature test macros for C++20 core papers) was approved at the February, 2022, plenary, but was not designated as a Defect Report at that time. Such designation is now proposed. No wording changes result from this poll.

Core issue 2507 (Default arguments for operator[]) has been separated from the other issue motions, because it affects functionality added after C++20 and thus is not a Defect Report.

Core issue 2538 (Can standard attributes be syntactically ignored?) has been separated from the other issue motions to allow for an independent poll.

After the plenary, CWG will continue reviewing issues and will likely process these two papers, considered defect-level fixes, for C++23:

- P2615 Meaningful exports (addresses CWG2443)
- P2348 Whitespaces Wording Revamp

There are three additional papers that have been approved by EWG since the above report was made and Core issue 2538 did not gain consensus in EWG.

I'm trying to get the ballot resolution for Transactional Memory DTS in for the July meeting. This requires necessary wording changes to be reviewed this week.

Herb Sutter : Is it correct that CWG has been able to get through all EWG papers approved for C++23 ?

Jens Maurer : Yes, I know of no outstanding C++23 design-relevant papers that would still need core review. The last two papers mentioned are likely to be editorial clean up fixes or can be addressed through the NB comment cycle.

Hubert Tong/Jens Maurer : there are a couple of EWG-approved papers that CWG has reviewed and provided feedback for, but the authors have not come back with an update yet.

- **LWG**, Library wording: Jonathan Wakely, Jeff Garland, Dietmar Kuehl

Jonathan Wakely reports.

LWG has been meeting via Zoom teleconference every week and we extended the meetings to two hours for the weeks approaching the CD deadline. We've spent all telecon time processing the long list of papers forwarded by LEWG, so all issue processing has taken place on the mailing list. We've also looked at a few Core papers that touch library wording (and they looked at some library papers).

The Straw Polls page will be updated any day now with the plenary motions. So far we've approved 35 papers and we have one more telecon on July 15th where we hope to approve at least two more papers. The highlights are `<mdspan>` (which is P0009 which tells you how long it's been in the works), `<flat_set>` and `<flat_map>`, new view adaptors (`as_rvalue`, `as_const`, `stride`, `cartesian_product`) and algorithms (`fold`, `contains`, `find_last`), further enhancements to `std::format`, `std::generator` (i.e. the library utility for coroutines), and standard library modules.

60 new library issues have been filed and prioritized since the last plenary; nearly half of those should be resolved at this plenary, along with several older issues. Some of those were resolved with the assistance of LEWG and SG1. Please take a look at the Tentatively Ready issues before this Friday, 15th July, so that we can remove any controversial or problematic ones from the straw polls before we vote. Please also consider voting in any Tentatively Ready polls taking place this week, so that those issues can also be resolved at this plenary.

The draft list of papers is at <https://isocpp.org/files/papers/D2618R0.html> but I expect to add a few more following reflector polls.

Our regular LWG attendees have been tirelessly reviewing and improving papers, even joining a telecon after surgery! I'm extremely grateful to everybody who's helped us get so many papers ready for plenary, and to Jeff for keeping everything scheduled and on target. We've also had a second LWG group every week doing extra reviews to save time in the main telecon, many thanks to Dietmar for running those. Without those extra sessions several papers just would not have made the cut. After the plenary LWG will be taking some well-earned time off.

The backlog of unreviewed papers for C++23 is smaller than it was for C++20, with many of those being approved by LEWG post-design freeze. Some of those are fixes to C++23 features that will probably be raised as NB comments to be applied to the CD. Meanwhile half a dozen papers for Concurrency TS v2 need processing and another half dozen items for C++26 (including `std::execution`) are already in our backlog. We expect to do some work on these items prior to the Kona meeting.

## 2.4 SC22 report

Herb Sutter presents.

There are a few procedural changes done regarding the balloting process. I'm not aware of any major changes that we haven't discussed already.

SC22 plenary is coming up in September. It was meant to be a hybrid meeting, but it is still only virtual.

## 2.5 SC22/WG14 (C) report (covered in 2.1 / SG22)

# 3. New business

## 3.1 Review of priorities and target dates

- [Status page](#)
- [P1000](#)

Herb Sutter presents.

We are at a deadline for feature approvals. July is our deadline for merging the wording into the WD that we will send out for CD comment ballot.

## 3.2 Any other business

Tom Honnerman : does the recent disbanding of the CoC team impact the scope of the work needed on Mattermost ? Perhaps moderation features.

Herb : my expectation was that this is qualitatively like our email reflectors which have moderation controls too. How do Mattermost moderation features compare to email reflectors ?

Tom : there may be options to limit creation of certain chat rooms. I have a reference for letting people use the server the way they want to use it, and to handle CoC concerns like we normally would

Herb : I appreciate you asking the question. As a general observation, we're all professionals and we're expected to be. If we're not, we'll address such problems.

Bill Ash: we should remind people that the only conversations should be of technical nature.

Nevin Liber : regarding survey about locations of future meetings, there may be countries where we might not be allowed to travel.

Herb Sutter : The survey was for information purposes only. ISO does have rules that prohibit meetings in certain ISO countries. If you have any concerns send them to me and Bill Ash.

## **4.1 Review and approve resolutions and issues**

No discussion

## **4.2 Review action items**

Herb Sutter to move SG13 to quiescence.

## **5. Closing process**

### **5.1 Establish next agenda**

Herb : I propose the same agenda with the minor changes discussed.. Any objections ?

No objections.

Proposal accepted.

### **5.2 Future meetings (deferred to full meeting)**

### **5.3 Future mailings (deferred to full meeting)**

### **5.4 Adjourn**

Any objections to adjournment?

None.

Meeting adjourned at 09:03 N.Am. Pacific Time