

# **WG21 2021-05 Admin telecon minutes**

ISO/IEC JTC1 SC22 WG21 N4890 — 2021-05-24

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Convener: Herb Sutter  
SC22/WG21 pre-meeting telecon  
Monday 2021-05-24  
08:00 N.Am. Pacific Time

## **1 Opening and introductions**

Herb Sutter opens the meeting at 08:15 N.Am. Pacific Time

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

Aaron Ballman  
Barry Hedquist  
Bjarne Stroustrup  
Bryce Adelstein Lelbach  
Christof Meerwald  
Detlef Vollmann  
Erich Keane  
Fabio Fracassi  
Gabriel Dos Reis  
Hal Finkel  
Hana Dusíková  
Hans Boehm  
Herb Sutter  
Howard Hinnant  
Hubert Tong  
Inbal Levi  
J Daniel Garcia  
Jeff Garland  
Jeff Snyder  
JF Bastien  
John Spicer  
Jonathan Wakely  
Marco Foco  
Matus Chochlik  
Michael Hava  
Michael Wong  
Nevin Liber  
Nina Ranns  
Peter Brett  
Roger Orr  
Thomas Köppe  
Tom Honermann  
Vassil Vassilev

Ville Voutilainen  
William Miller

## **1.2 Adopt agenda**

Hubert Tong : today's intended meeting ID, which we had trouble with, is also one advertised for the plenary. We will need to amend with a new one that works.

Herb Sutter : I will amend it.

Hubert Tong : I couldn't find the June meeting in the ISO meeting application.

Herb Sutter: It should be there, I will check.

No objection to approval of agenda with the new item. Agenda adopted.

### **1.2.5 Review of Code of Conduct**

Herb Sutter reminds everyone of the code of conduct.

### **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*

Herb presents. Thank you to the project editors for their hard work.

## **2. Status reports**

### **2.0 Administrative and advisory subgroups status reports**

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

Hal Finkel presents.

AG has not had a specific meeting in some time, but we made progress on several fronts, including setting up the chat service prototype. Thank you to Tom for hard work. We're at the stage where we're going to look for feedback from committee chairs and anyone who has tried it.

Tom Honermann : do you have a tentative meeting date to discuss this further ?

Hal Finkel : no, but we will establish one

Bryce Adelstein Lelbach : we've used electronic polling for three different polling periods now and it is working quite well.

- **DG**, Direction group: Daveed Vandevoorde

Daveed Vandevoorde reports in an e-mail.

DG continues to meet every other week (with rare exceptions) to discuss the overall direction of the language, in particular with respect to some of the larger proposals out

there (topics like "networking", "pattern matching", "modules", "reflection", "Unicode support", etc.). There is currently no new revision of P2000 ("Directions for ISO C++"), but I suspect we will be updating that paper in the second half of 2021.

- **ARG**, ABI review group: Daveed Vandevor

Daveed Vandevor reports in an e-mail.

This group has no regular meetings and instead only responds to specific ABI questions it is sent.

Only one such question has been raised (and answered) this year.

- **SSRG**, Safety/security review group: Howard Hinnant

Howard Hinnant presents.

The SSRG is getting set up. We now have public and private mailing lists, and a presence on the cplusplus GitHub site. The membership has been formed, and we are open for business. We invite requests from other subgroups and study groups to review existing proposals from a safety and/or security viewpoint. We will keep a record of such requests, and our progress at <https://github.com/cplusplus/ssrg/issues>. And we will report results to [ssrg@lists.isocpp.org](mailto:ssrg@lists.isocpp.org).

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

SGs 3, 8, 9, and 11 are currently dormant and handled in the main subgroups. The active SGs are:

- **SG1**, Concurrency: Olivier Giroux

No report.

- **SG2**, Modules: David Stone

No report.

- **SG4**, Networking: Jeff Snyder

Jeff Snyder presents.

SG4 has met once since the last admin telecon and approved one paper, focusing on improving integration with executors. We are expecting at least one more paper in this area

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

Hans Boehm presents.

SG5 has been meeting on a monthly basis. We are slowly making progress on TM lite. It needs to go through LEWG as well.

- **SG6**, Numerics: Lisa Lippincott

No report.

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

Hana Dusíková presents.

SG7 decided P2320R0 "The Syntax of Static Reflection" will be used as a syntax design for all our future work on the reflection.

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

Barry reports in an e-mail.

Nothing to report for SG10. People have been very good about pointing out missing feature test macros in various papers during telecons.

- **SG12**, Undefined and unspecified behavior, and vulnerabilities: Gabriel Dos

Reis

Gabriel Dos Reis presents.

SG12 met only once to co-review P2234R0 with SG13.

In coming months, we plan to review again P2234, P1705.

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

Roger Orr presents.

Nothing to report, we continue to have no papers targeting SG13.

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

Michael Wong presents.

SG14 continues its normal cadence of 1 meeting a month on the second Wednesday at 1800 UTC as it has for the last 7 years skipping March and November due to DST madness. Since the shutdown, this has given us a chance to focus on each SIG at each meeting.

We continue to enjoy broad attendance of 25-30 at each meeting.

We have been progressing Colony, and 2 Linear algebra proposals through LEWG.

Due to recent requests, we have renewed a focus on low-latency topics within Finance, though it applies to many domains. This has revealed several new proposals which we are discussing in a thread.

We are doing the same with the other SIGs by enlisting them to consider new ideas/proposals.

In June, we plan to look again at the Low-cost deterministic exception for Embedded systems.

The most recent rotation schedule is:

Apr 14, 2021 02:00 PM ET/1800 UTC: Finance focus on low latency

May 12, 2021 02:00 PM ET/1800UTC: Games

June 9, 2021 02:00 PM ET/1800 UTC: Embedded

July 14, 2021 02:00 PM ET/1800 UTC: Finance/Low latency

- **SG15**, Tooling: Michael Spencer

Bryce Adelstein LeBach presents.

There has been some recent discussions on the mailing list, no meeting in the past months. We're planning to hold a meeting in the near future to discuss the topics that are coming up.

- **SG16**, Unicode: Tom Honermann

Tom Honermann presents.

SG16 continues to meet twice a month; 7 times since the last pre-meeting admin telecon on 2021-02-08. Summaries of these meetings are available at <https://github.com/sg16-;P2352> contains a subset of them and the remainder will be published in an upcoming paper.

We have continued to focus most of our efforts on core language improvements, though this period has included increased attention to library matters as we've been reviewing [P2093](#).

Papers and issues we've discussed include:

- [WG14 N2620: Restartable and Non-Restartable Functions for Efficient Character Conversions | r4](#)
  - This WG14 paper is expected to provide basic functionality on which future transcoding facilities will be built.
  - Discussion has been focused on ensuring that the provided functionality will fit anticipated requirements.
- [LWG3547: Time formatters should not be locale sensitive by default](#)
  - This LWG issue was handled as a high-priority interrupt to address an oversight in the C++20 `std::format()` support for the chrono library.
  - Discussion lead to a recommendation for LEWG to adopt [P2372](#) as the resolution to this issue.
  - Discussion has highlighted additional locale related concerns that are still being discussed in the context of [P2093](#).
- [P2372: Fixing locale handling in chrono formatters](#)
  - This paper was approved as the recommended resolution of [LWG2547](#) above.
- [P2093: Formatted output](#)
  - We initially recommended this paper for C++23, but with acknowledgment of a number of outstanding questions.
  - LEWG deferred many of those outstanding questions back to us; discussion is on-going.

- Discussion of [LWG2547](#) above has highlighted further questions that remain unanswered.
- [P2314: Character sets and encodings](#)  
[P2297: Wording improvements for encodings and character sets](#)
  - These competing papers consumed three of the last seven meetings and presented the most challenge we've faced thus far getting consensus on competing perspectives.
  - Though it took some time to resolve details, we had strong consensus for the goals of both papers throughout; to formally define source code translation in Unicode terms (though not necessarily Unicode terminology).
- [P2295: Support for UTF-8 as a portable source file encoding](#)
  - Progress on this paper continues; I expect it will soon be approved as a recommendation for C++23.

We also dedicated a meeting to discussion of our priorities and goals for C++23. Polls taken placed the following items at the top of the list. Note that these polls considered looming deadlines, so do not necessarily reflect what we believe is most important in the long term, but rather what we believe we can aim to address in the C++23 time frame.

- [P1854: Source to Execution encoding conversion should not lead to loss of information](#)
- [P2295: Support for UTF-8 as a portable source file encoding](#)
- [std::to\\_chars/std::from\\_chars overloads for char8\\_t](#)
- [Make wide multicharacter character literals ill-formed](#)

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

No report, see EWG.

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

No report, see LEWG.

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

Michael Wong presents.

SG19 continues its normal cadence of 1 meeting a month on the second Thursday at 1800 UTC as it has for the last 3 years skipping March and November due to DST madness. Since the shutdown, this has given us a chance to focus on each paper topic at each meeting.

We have been progressing Stats paper through LEWG.

In the last meeting we reviewed the feedback for Stats that came in after paper publication of P1708 (Simple Statistical Functions ) as in P2376 (Comments on Simple Statistical Functions (p1708r4): Contracts, Exceptions and Special cases ).

We will continue rotation for the other proposals with Graph nearing completion.

The most recent rotation schedule is:

May 13, 2021 02:00 PM ET 1800 UTC Stats review

June 10, 2021 02:00 PM ET 1800 UTC Reinforcement Learning and Differential calculus

Jul 8, 2021 02:00 PM ET 1800 UTC Graph

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

JC van Winkel reports in an e-mail.

SG20 meets about once every six weeks. We are making slow though steady progress. Our work is being maintained at <https://github.com/cplusplus/> and the notes of the meetings are on the WG21 wiki.

- **SG21**, Contracts: John Spicer

John Spicer presents.

We have had one teleconference since the last plenary at which discussed P2339R0 “Contract Violation Handlers”. We had hoped (and still hope) to get to a more regular telecon schedule, but we need to determine how to best make progress between our telecons.

- **SG22**, C/C++ liaison: Aaron Ballman

Aaron Ballman presents.

We have been meeting monthly every month since February. We’re processing 2-3 papers per meeting. The number of papers coming in is greater than that and our backlog is growing. We haven't discuss whether to increase the cadence yet.

We are predominately focusing on things already added to C++23 and C23.

We swap between C++ and C papers so no language overwhelms the group.

Herb Sutter : C is smaller committee than C++, do you have a rough sense of the current load of liaison work compared to the whole committee ? Are we swamping the C committee ?

Aaron Ballman : I don't think we are in danger of swamping WG14. Sometimes we have C++ members coming to meeting hoping for help from WG14. Those requests are likely to be unmet due to the lack of work force in WG14.

Tom Honermann : What is WG14 meeting cadence ?

Aaron Ballman : it used to be 2 a year for face to face meetings. We’re now averaging 4 virtual meetings, but the same amount of meeting time. We’re questioning whether to go back to face to face meetings as we're being more productive.

Bjarne Stroustrup : what is WG14 working on and how it might affect C++?

Aaron Ballman : incorporating floating point specifications, adding 1400 new functions to C. It also adds new types for decimals and some binary float types. Potential for some interaction on that. Otherwise, adding attributes with compatible syntax to C++, defer and embed feature, a lot of small targeted stuff.

Thomas Köppe : can we call out this in the plenary ? People might want to know about this.

Aaron Ballman : sure

Ville Voutilainen : do we have a write up of C++ compatibility features?

Aaron Ballman : WG14 draft has a list of every paper that has been applied to the working draft. I'll try and make something for the plenary.

Bjarne Stroustrup : I'm a bit worried about the changes. New types and functions should scare us even if there are no problems

Aaron Ballman: that's exactly why we have this group. We still need to process the work done before the joint study group started

Michael Wong : thank you Aaron for taking this on. It's a tough balance between C and C++

Ville Voutilainen: I do sense the disturbance in what C has been and what it might become. Not all facilities may be compatible with C++ and i have participated in some WG14 meetings to voice my opinion. We need more people actively monitoring what is going on on the other side or we might end up in all sorts of trouble

Aaron Ballman : There's a lot of feature work now. We don't know if we will stabilize at C23 or if it will be more feature releases going forward

Bjarne Stroustrup : if the two languages get different features for roughly the same thing, we will get chaos in the community

Aaron Ballman : More participation is better

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

- **EWG**, Core evolution: JF Bastien

JF Bastien presents. EWG and EWGI included.

Report can be seen in P1018

Ville Voutilainen: I want to call deducing this proposal (P0847). It is a sizeable language extension. It's something that people should take a look at it if they haven't already

JF Bastien : we have seen it for a while, even during f2f meetings.

Ville Voutilainen: it stands out as a medium sized extension to the language.

JF Bastien : agreed.

- **LEWG**, Library evolution: Bryce Adelstein Lelbach

Bryce Adelstein Lelbach reports. LEWG and LEWGI included

Report can be seen in P2400

Gabriel Dos Reis: We have to be careful about saying things have not shipped before making changes that impact the previous release.

Bryce Adelstein Lelbach : we spoke to the implementers and we were told in this particular case it will not be a problem. If an implementer is uncomfortable with some changes, they can email the reflector or tell us in any other way to not do this and we will take it into account

Ville Voutilainen : we do try and keep vendors in the loop when breaking changes come up for discussion

Peter Brett : we dealt with NB comments and we did not do that based on implementation experience. All these bugs that we have found might have surfaced if we had the implementation experience.

Bryce Adelstein Lelbach : the amount of field experience we want to see is very different to how it was 4 or 5 years ago, and i believe that's because we shipped a lot of library fea-

tures and found a lot of late problems. We are in the process of improving and the bar is higher now. We have more experience with what happens if we don't make sure that we see field experience.

I don't like doing back-ports, and we hope not to do it again. This is a special case and we have to be careful.

Jonathan Wakely : I don't think lack of implementation was an issue just for NB comments, we general have a lack of implementation issues. Having a reference implementation and then getting a spec is not the same as making a specification and then implementing it. Implementation experience will always find more issues.

Ville : a lot of the issues with Ranges came from user experience

Bjarne Stroustrup : could you summarize what kind of changes to Ranges are being proposed, and what are the user groups it is meant to serve ?

Bryce Adelstein Lelbach : providing the hooks and the machinery to write your own range adapters and factories. We don't have that machinery in C++20. The second set is adding family of range adapters and factories that we didn't included in C++20 that are useful and powerful.

Herb Sutter : P2214 contains section 6 with a three stage plan of what to add to Ranges.

Bryce Adelstein Lelbach : There is a monthly telecon of Ranges authors to preload the LEWG discussions.

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

- **CWG**, Core wording: Mike Miller

Mike Miller presents.

CWG has met via Zoom teleconference three times since February and will hold a fourth tomorrow, 2021-05-25. We have reviewed eleven papers forwarded to us by EWG and will be presenting nine of them for polling at the June plenary. We will also present one paper that had been previously approved by CWG but that contained some changes to the library clauses, which has now also been approved by LWG.

We currently have five issues in "ready" status to be polled at the June plenary. The meeting tomorrow is dedicated to issue processing, so we expect to have some number of additional "ready" issues before the plenary.

- **LWG**, Library wording: Jonathan Wakely

Jonathan Wakely presents.

LWG has continued to hold a telecon nearly every Friday, often due to the backup chairs filling in when I've been unavailable. We've processed a large number of papers during telecons, and made good progress with issue resolution on the reflector. Most of the papers we've dealt with have been small or medium; we're not sure how to deal with large

papers in our 100% remote world (something the size of the One Ranges proposal, for example).

We have two polls for features to be added to the second Concurrency TS, which doesn't exist yet so we also need WG21 polls to request a new work item and an initial working paper.

I need to prepare a paper listing the issues to be resolved at this plenary. There are currently 29 issues in Tentatively Ready status, which I will move to Voting status for the plenary.

There are 17 papers up for polling to add to C++23, and five of those are intended to be considered defect reports against C++20 (those ones have their own section in the straw polls). Historically, LWG has not done DRs, because implementations tend to back-port the resolutions for most library issues where it makes sense, so effectively all library issues are "DRs", at the implementers' discretion. This time we have quite a few "defects" in C++20 that are too large to be handled via the issues list, so they are being fixed by proposals. The fixes are breaking changes though, and rather than expect implementations to ship the flawed C++20 features and the fixed (but incompatible) C++23 versions, we are proposing that the fixes are treated as DRs against C++20. At this time, there are no non-experimental implementations of these features shipped, so this is our last chance to get them fixed before the defects ship.

Three of the C++20 DR papers are still undergoing electronic polling by LEWG, but it's expected they will be approved for forwarding to LWG (and LWG has already approved them!) If any of those polls fail, they will be removed from the straw polls page before the deadline.

Jonathan Wakely : Herb, can you please check the polls look good ?

Herb Sutter: the polls look good to me, but I'll double check. What is the current plan for Library Fundamentals TS v3 ?

Bryce Adelstein Lelbach : unlikely that we will do one. We haven't discussed it in LEWG. I have been meaning to write a paper on this. We have a working draft, but doesn't have much in it and there is nothing targeting it. We have to have a discussion on why this is happening and form a policy.

Thomas Köppe : Does LWG have something for it ?

Jonathan Wakely: I can't think of anything.

Bjarne Stroustrup: from DG, TS should be there to answer questions, and you should have a TS only if you have a question that can be succinctly expressed.

Ville Voutilainen : regarding LWG queue, there was a queue, but it has been flushed. If we drop a TS, we need to figure how to incorporate it somewhere else. The question to answer is : did we have a real implementation of these things.

Bryce Adelstein Lelbach : We are not lowering the bar by not having the TS, we are raising the bar.

## **2.4 SC22 report (other than C liaison, covered above in SG22)**

Last year SC22 had their own meeting ban that extended beyond ISO plan. There is a new version of JTC1 directives. Inclusive terminology has been widened. ISO is doubling down on the approach that if your IS doesn't pass you can just publish it as a TS.

Bryce Adelstein Lelbach : ISO and SC22 may start allowing f2f meetings, but I suspect it's going to come with a whole list of requirements. There may be a different level of access.

## **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**

#### **3.2 Any other business**

Bryce Adelstein Lelbach : Is there an N number paper for the June meeting ?

John Spicer : yes, it is on the wiki page.

### **4. Review**

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

No discussion

#### **4.2 Review action items**

Herb Sutter : update SSRG group chair in the agenda

Herb Sutter : update meeting link for plenary meeting

Herb Sutter : check ISO meeting application

Hal Finkel : setup a meeting for AG

Aaron Ballman : present WG14 report and compatibility features in the plenary

Herb Sutter : fix LEWG paper number on the status page

Herb Sutter : double check LWG polls

## **5. Closing process**

### **5.1 Establish next agenda**

Herb : I propose the same agenda with SSRG chair update. Any objections ?

No objections.

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

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

### **5.4 Adjourn**

Meeting adjourned at 09:55 N. Am.