

# WG21 2018-11 San Diego Minutes

ISO/IEC JTC1 SC22 WG21 N4790 — 2018-11-26

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November 5 - November 10, 2018 - San Diego, CA, USA

Chair John Spicer

## 1. Opening activities

John Spicer opened the meeting at 9:05 CEST.

### 1.1 Opening comments, welcome from host

Marshall Clow welcomes the group and presents the information about the location of the meeting.

Thank you to Qualcomm.

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

### 1.2 Meeting Guidelines

John presents.

Every participant is responsible for understanding and abiding by the following:

- [The INCITS Antitrust Guidelines](#) (PL22.16)
- [The INCITS Patent Policy](#) (PL22.16)
- [The ISO Code of Conduct](#)
- [The WG21 Practices and Procedures, and Code of Conduct](#)

Please review the guidelines. WG21 procedures and Code of Conduct documents are new and very important. We want to make sure that everybody interacts in a professional and respectful way.

If you have any questions talk to one of the officials.

## 1.3 Membership, voting rights, and procedures for the meeting

John Spicer reminds the room of the meeting procedures and voting rights.

Barry Hedquist presents. PL22.16 has the ballot process on Saturday. The Saturday vote is approval of Systematic Review for ISO/IEC TS 19217:2015 -- C++ Extensions for Concepts. If you are not here on Saturday, and you are a voting member, please send an email to John, Hal or Barry.

## 1.4 Introductions

Officers and WG chairs introduce themselves  
First time attendees introduce themselves.  
John Spicer welcomes first time attendees.

## 1.5 Agenda review and approval

John presents the agenda for the meeting. The meeting will finish no later than 2pm on Saturday, but WG may continue working.

Barry Hedquist moves. Adam Martin 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

<b>Document</b>	<b>Editor's report</b>	<b>Prospective WD</b>
C++20 Standard	<a href="#">N4779</a>	<a href="#">N4778</a>
Coroutines TS	<a href="#">N4776</a>	<a href="#">N4775</a>
Networking TS	<a href="#">N4772</a>	<a href="#">N4771</a>
Parallelism v2 TS	<a href="#">DONE</a>	<a href="#">DONE</a>

Reflection TS	<a href="#">N4767</a>	<a href="#">N4766</a>
Library Fundamentals TS	<a href="#">N4759</a>	<a href="#">N4758</a>

Motion to approve editor's reports and working drafts.  
The motion is unanimously approved by WG21.

## 1.7 Approval of the minutes of the previous meetings

Meeting	Minutes
WG21 Rapperswil	<a href="#">N4781</a>
PL22.16 Rapperswil	<a href="#">p122.16-2018-00010</a>
WG21 pre-San Diego administrative telecon	<a href="#">N4784</a>

Motion to approve the minutes of the previous meeting.  
The motion is unanimously approved by WG21.

PL22/16 motion to approve the minutes of the previous meeting.  
Marshall Clow moves, Barry Hedquist seconds.  
The motion is unanimously approved by PL22/16.  
The motion is unanimously approved by WG21.

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

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

4. New business requiring action by the committee

Herb presents new incubator groups and improved handling of papers.

Herb presents the WG21 groups.

Herb presents the meeting schedule.

4. Plans for the future (special Monday session to discuss Cologne)

Plans for the future (PL22.16)

1. Next and following meetings

- 2019-02-18/23: Kona, HI, US ([N4765](#))
- 2019-07-15/20: Cologne, Germany ([N4780](#))
- 2019-11-4/09 Belfast, Northern Ireland

Nico Josuttis presents details of the Cologne meeting.

Jens Maurer presents details of the Kona meeting.

5. WG and SG sessions

John Spicer presents : during the week, CWG and LWG will be putting out proposal that will be voted on Saturday. Those need to be finalised and made available by 8pm CEST Friday.

Jens Maurer presents meeting room schedule. The schedule can be found on the wiki.

SG5 will meet after the plenary meeting.  
SG10 will meet during the week. See John Spicer.

Jens presents evening sessions.

Jens presents meeting times and the break times.

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

John Spicer opened the meeting at 8:34am CEST.

Herb Sutter goes over the voting procedure.  
Thank you to Michael Wong for chairing SG5. Michael will be stepping down and Hans Boehm has volunteered to take over as chair of SG5.

There are two new study groups :  
SG19: Machine Learning (Michael Wong)  
SG20: Education (JC van Winkel).

WG and SG status and progress reports.

- **SG5: Transactional memory (Wong)**

Michael Wong presents.

- **SG6: Numerics (Crowl)**

Herb Sutter presents.

- **SG7: Compile-time programming (Carruth)**

Chandler Carruth presents.

- **SG10: Feature test (Nelson)**

John Spicer presents.

- **SG12: Undefined and unspecified behavior (Dos Reis)**

Herb reads out report by Gabriel Dos Reis.

- **SG13: HMI & I/O (Human/Machine Interface) (Roger Orr)**

Roger Orr presents.

- **SG14: Games & low latency (Wong)**

Michael Wong presents.

- **SG15: Tooling (Winters)**

Bryce Adelstein Lelbach presents.

- **SG16: Unicode (Honermann)**

Tom Honermann presents.

- **SG1: Concurrency (Giroux)**

Olivier Giroux presents.

- **SG17: EWG Incubator (JF Bastien)**

Erich Keane presents.

- **Evolution (Voutilainen)**

Ville Voutilainen presents.

- **SG18: LEWG Incubator (Bryce Adelstein Lelbach)**

Bryce Adelstein Lelbach presents.

- **Library Evolution (Winters)**

Titus Winters presents.

- **Core (Miller)**

Mike Miller presents.

## **CWG Motions**

### **Motion 1**

Move to accept as Defect Reports all issues in [P1350R0](#) (Core Language Working Group "tentatively ready" Issues for the November, 2018 (San Diego) meeting) and apply the proposed resolutions to the C++ working paper.

No objections.  
Motion passes.

### **Motion 2**

Move to apply the changes in the "Consolidated wording" section of [P0668R5](#) (Revising the C++ memory model) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 3**

Move to apply the changes in [P0982R1](#) (Weaken Release Sequences) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 4**

Move to apply the changes in [P1084R2](#) (Today's *return-type-requirements* Are Insufficient) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 5**

Move to apply the changes in [P1131R2](#) (Core Issue 2292: *simple-template-id* is ambiguous between *class-name* and *type-name*) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 6**

Move to apply the changes in [P1289R1](#) (Access control in contract conditions) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 7**

Move to apply the changes in [N4775](#) (Working Draft, C++ Extensions for Coroutines) as modified by the changes in [P1356R0](#) (Coroutine TS ready issues (25 and 27)) to the C++ working paper.

There are objections in the room.

Herb polls the room  
In favour : 34  
Opposed : 17  
Abstain : 10

Herb polls national bodies:

Bulgaria Opposed  
Canada Opposed  
Finland In favour  
France In favour  
Germany Opposed  
Netherlands In favour  
Poland Opposed  
Russia In favour  
Spain Abstain  
Switzerland Opposed  
UK Opposed  
US In favour

Motion fails

Herb : NB approval has decreased.

### **Motion 8**



Move to apply the changes in [P1002R1](#) (Try-catch blocks in constexpr functions) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 9**

Move to apply the changes in [P1327R1](#) (Allowing `dynamic_cast`, polymorphic `typeid` in Constant Expressions) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 10**

Move to apply the changes in [P1236R1](#) (Alternative Wording for [P0907R4](#) Signed Integers are Two's Complement) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 11**

Move to apply the changes in [P0482R6](#) (`char8_t`: A type for UTF-8 characters and strings (Revision 6)) to the C++ working paper.

There are objection in the room  
In favour 37  
Opposed : 1  
Abstained : 17

Motion passes.

### **Motion 12**

Move to apply the changes in [P1353R0](#) (Missing Feature Test Macros) to the C++ working paper.

No objections.  
Motion passes.

### **Motion 13**

Move to apply the changes in [P1073R3](#) (Immediate functions) to the C++ working paper.

No objections.

Motion passes.

#### **Motion 14**

Move to apply the changes in [P0595R2](#) (`std::is_constant_evaluated()`) to the C++ working paper.

No objections.  
Motion passes.

#### **Motion 15**

Move to apply the changes in [P1141R2](#) (Yet another approach for constrained declarations) to the C++ working paper.

No objections.  
Motion passes.

#### **Motion 16**

Move to apply the changes in [P1094R2](#) (Nested Inline Namespaces) to the C++ working paper.

No objections.  
Motion passes.

#### **Motion 17**

Move to apply the changes in [P1330R0](#) (Changing the active member of a union inside constexpr) to the C++ working paper.

No objections.  
Motion passes.

- **LWG (Clow)**

Marshal Clow presents.

### **LWG Motions**

#### **Concurrency TS**

##### **Motion 1**

Move to apply to the Concurrency TS working paper the proposed resolution of issue 2697 in [P1224R0](#) (C++ Standard Library Issues to be moved in San Diego).

No objections.

Motion passes.

## **Library Fundamentals TS**

### **Motion 2**

Move to apply to the Library Fundamentals TS working paper the proposed resolution of issues 2960 and ~~3134~~ in [P1224R0](#) (C++ Standard Library Issues to be moved in San Diego).

No objections.  
Motion passes.

### **Motion 3**

Move to apply to the Library Fundamentals TS working paper the proposed wording in [P1210R0](#) (Completing the Rebase of Library Fundamentals, Version 3, Working Draft). This also resolves LWG issue 3134.

No objections.  
Motion passes.

## **Issues**

### **Motion 4**

Move to apply to the C++ working paper the proposed resolutions of all of the issues except 2697, 2960 and 3134 in [P1224R0](#) (C++ Standard Library Issues to be moved in San Diego).

No objections.  
Motion passes.

## **Draft Standard**

### **Motion 5**

Move to apply to the C++ working paper the proposed wording in [P1123R0](#) (Editorial Guidance for merging P0019r8 and P0528r3).

No objections.  
Motion passes.

### **Motion 6**

Move to apply to the C++ working paper the proposed wording in [P0487R1](#) (Fixing operator>>(basic\_istream&, **CharT\***) (LWG 2499)).

No objections.  
Motion passes.

**Motion 7**

Move to apply to the C++ working paper the proposed wording in [P0602R4](#) (variant and optional should propagate copy/move triviality).

No objections.  
Motion passes.

**Motion 8**

Move to apply to the C++ working paper the proposed wording in [P0655R1](#) (visit<R>: Explicit Return Type for visit).

No objections.  
Motion passes.

**Motion 9**

Move to apply to the C++ working paper the proposed wording in [P0972R0](#) (<chrono> zero(), min(), and max() should be noexcept).

No objections.  
Motion passes.

**Motion 10**

Move to apply to the C++ working paper the proposed wording in [P1006R1](#) (Constexpr in std::pointer\_traits).

No objections.  
Motion passes.

**Motion 11**

Move to apply to the C++ working paper the proposed wording in [P1032R1](#) (Misc constexpr bits).

No objections.  
Motion passes.

**Motion 12**

Move to apply to the C++ working paper the proposed wording in [P1148R0](#) (Cleaning up Clause 20).

No objections.  
Motion passes.

**Motion 13**

Move to apply to the C++ working paper the proposed wording in [P0318R1](#) (unwrap\_ref\_decay and unwrap\_reference)

No objections.  
Motion passes.

**Motion 14**

Move to apply to the C++ working paper the proposed wording in [P0357R3](#) (reference\_wrapper for incomplete types)

No objections.  
Motion passes.

**Motion 15**

Move to apply to the C++ working paper the proposed wording in [P0608R3](#) (A sane variant converting constructor)

No objections.  
Motion passes.

**Motion 16**

Move to apply to the C++ working paper the proposed wording in [P0771R1](#) (std::function move constructor should be noexcept)

No objections.  
Motion passes.

**Motion 17**

Move to apply to the C++ working paper the proposed wording in [P1007R3](#) (`std::assume_aligned`)

No objections.  
Motion passes.

**Motion 18**

Move to apply to the C++ working paper the proposed wording in [P1020R1](#) (Smart pointer creation with default initialization)

No objections.  
Motion passes.

### **Motion 19**

Move to apply to the C++ working paper the proposed wording in [P1285R0](#) (Improving Completeness Requirements for Type Traits)

No objections.  
Motion passes.

### **Motion 20**

Move to apply to the C++ working paper the proposed wording in [P1248R1](#) (Remove **CommonReference** requirement from **StrictWeakOrdering** (a.k.a Fixing Relations))

No objections.  
Motion passes.

### **Motion 21**

Move to apply to the C++ working paper the proposed wording in [P0591R4](#) (Utility functions to implement uses-allocator construction)

No objections.  
Motion passes.

### **Motion 22**

Move to apply to the C++ working paper the proposed wording in [P0899R1](#) (LWG 3016 is Not a Defect)

No objections.  
Motion passes.

### **Motion 23**

Move to apply to the C++ working paper the proposed wording in [P1085R2](#) (Should Span be Regular?)

There are objections in the room.  
In favour : 30  
Opposed : 1  
Abstain : 25

Motion passes.

### **Motion 24**

Move to apply to the C++ working paper the proposed wording in [P1165R1](#) (Make stateful allocator propagation more consistent for `operator+(basic_string)`)

No objections.  
Motion passes.

### **Motion 25**

Move to apply to the C++ working paper the proposed wording in [P0896R4](#) (The One Ranges Proposal)

No objections.  
Motion passes.

### **Motion 26**

Move to apply to the C++ working paper the proposed wording in [P0356R5](#) (Simplified partial function application).

No objections.  
Motion passes.

### **Motion 27**

Move to apply to the C++ working paper the proposed wording in [P0919R3](#) (Heterogeneous lookup for unordered containers).

There are objections in the room.  
In favour : 26  
Opposed: 2  
Abstain: 25  
Motion passes

### **Motion 28**

Move to apply to the C++ working paper the proposed wording in [P1209R0](#) (Adopt Consistent Container Erasure from Library Fundamentals 2 for C++20).

No objections.  
Motion passes.

- Direction Group

Bjarne Stroustrup presents.

## 7. Closing activities

### 7.1 Issues delayed until today

### 7.2. PL22.16 motions, if any

John Spicer presents voting rules.

#### 1) **Approval of Systematic Review for ISO/IEC TS 19217:2015 -- C++ Extensions for Concepts**

Barry Hedquist moves.

Marshall Clow seconds.

In favour : 26 in the room + 3 by e-mail

Opposed : 0

Abstain : 0

Motion passes

Thank you the host and the sponsors.

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

### 7.3 Mailings

- 2018-11-26: Post-San Diego
- 2019-01-21: Pre-Kona

## 8. Adjournment

Marshall Clow moves. Barry Hedquist seconds.

Approved by unanimous consent.



Spicer adjourns the meeting at 11:01 am CEST.

## 9. Attendance

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Aaron Ballman	GammaTech Inc	
ADAM David Alan Martin	MongoDB Inc	
Agustin Berge	Louisiana State University	
Alexandru Voicu	AMD	
Alisdair Meredith	Bloomberg	
Andrew Sutton	University of Akron	
Andrew Turner	Qualcomm Inc	
Anna Gringauze	Microsoft Corporation	
Anton Polukhin	Yandex.Taxi	RU
Ashley Hedberg	Google	
Attila Feher	Bloomberg	
Barry Hedquist	Perennial	
Barry Revzin	Jump Trading	
Ben Craig	National Instruments	
Benjamin Saks	Saks & Associates	
Billy Baker	FlightSafety International	
Billy R. O'Neal III	Microsoft Corporation	
Bjarne Stroustrup	Morgan Stanley	
Blaise Watson		
Bob Steagall	KEWB Computing	
Botond Ballo	Mozilla	CA

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Brian Van Straalen	Lawrence Berkeley National Laboratory	
Bruno Lopes	Apple	
Bryce Adelstein Lebach	NVidia Corporation	
Carter Edwards	NVidia Corporation	
Casey Carter	Microsoft Corporation	
Chandler Carruth	Google	
Chanyoung Park		CA
Chris Kennelly	Google	
Chris Mysen	Google	
Christof Meerwald	Programming Research Ltd	
Christopher Earl	Lawrence Livermore National Laboratory	
Corentin Jabot		FR
Damien Lebrun-Grandie	Oak Ridge National Laboratory	
Dan Kalowsky		
Daniel Sunderland	Sandia National Laboratories	
Daveed Vandevoorde	Edison Design Group	
David Goldblatt	Facebook	
David Hollman	Sandia National Laboratories	
David Olsen	NVidia Corporation	
David Sankel	Bloomberg	
David Stone	Google	
Davis Herring	Los Alamos National Laboratory	
Detlef Vollmann	Vollmann Engineering	CH
Dietmar Kühl	Bloomberg	

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Dmitrii Kozhevnikov	Jetbrains	
Eric Fiselier	Google	
Eric Niebler	Facebook	
Erich Keane	Intel Corporation	
Fabio Fracassi		DE
Faisal Vali		
Frank Birbacher	Bloomberg	
Gabriel Dos Reis	Microsoft Corporation	
Gary Powell	Sony Interactive Entertainment	
Geoffrey Romer	Google	
Gevorg Voskanyan		
Glen Fernandes	C Plus Plus Alliance Inc	
Gor Nishanov	Microsoft Corporation	
Graham Lopez	Oak Ridge National Laboratory	
Hal Finkel	Argonne National Laboratory	
Hans Boehm	Google	
Herb Sutter	Microsoft Corporation	
Howard Hinnant	Ripple Labs	
Hubert Tong	IBM Corporation	CA
Hyrum Wright	Google	
Iain Sandoe		
J. Daniel García	University Carlos III of Madrid	ES
J.C. van Winkel		NL
James Bennett		
James Dennett	Google	

Name	Representing	NB
James Touton	Blizzard	
Jared Hoberock	NVidia Corporation	
Jason Carey	MongoDB Inc	
Jason Merrill	Red Hat Inc	
Jason Rice		
Jean-Francois Bastien	Apple	CA
Jean-Paul Rigault	Université de Nice S.A.	FR
JeanHeyd Meneide		
Jeff Chapman		
Jeff Snyder	PDT Partners	GB
Jeffrey Mendeksohn	Bloomberg	
Jennifer Yao	Microsoft Corporation	
Jens Maurer	Edison Design Group	
Jerry Coffin		
John Lakos	Bloomberg	
John Spicer	Edison Design Group	
Jon Kalb	C Plus Plus Alliance Inc	
Jonathan Brian Coe		GB
Jonathan Caves	Microsoft Corporation	
Jonathan Wakely	Red Hat Inc	GB
Jorg Brown		
Juan Alday	GreenWireSoft	
Kelly Walker	Stellar Science	
Kirk Shoop	Facebook	
Lars Gullik Bjønnes	Cisco Systems Inc	

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Lawrence Crawl	Perennial	
Lee Howes	Facebook	
Lewis Baker	Facebook	
Li-Ta Lo	Los Alamos National Laboratory	
Lisa Lippincott	Tanium	
Louis Dionne	Apple	CA
Maged Michael	Facebook	
Mark Hoemmen	Sandia National Laboratories	
Mark Zeren	VMware Inc	
Marshall Clow	C Plus Plus Alliance Inc	
Mateusz Pusz	EPAM Systems Inc	PL
Mathias Stearn	MongoDB Inc	
Matt Calabrese	Google	
Matthew Woehlke	Kitware, Inc	
Matthias Kretz	GSI	DE
Mauro Bianco	CSCS	CH
Michael Caisse		
Michael Garland	NVidia Corporation	
Michael McLaughlin	Bob Taco Industries	
Michael Park		
Michael Spencer	Sony Interactive Entertainment	
Michael Spertus	Symantec	
Michael Wong	Codeplay	CA
Michael Young		
Michał Dominiak	NVidia Corporation	PL

Name	Representing	NB
Mihail Mihailov		
Minas Charalambides	UIUC	
Muerte Isabella	Target	
Nathan Burgers		
Nathan Myers	Maystreet	
Nathan Sidwell	Facebook	
Nathaniel Goodspeed	Linden Research, Inc	
Neal Meyer	Amazon Corporate LLC	
Nevin Liber	Ocient	
Nicolai Josuttis		DE
Nicolas Lesser		
Nina Dinka Ranns	Edison Design Group	
Oleg Zhylin		
Olivier Giroux	NVidia Corporation	
P.J. Plauger	Dinkumware Ltd	
Pablo Halpern	Intel Corporation	
Paul McKenney	IBM Corporation	
Phil Nash	Jetbrains	
Rene Rivera	C Plus Plus Alliance Inc	
Richard Smith	Google	
Robert Douglas	RKR Capital	
Robert Romey		
Robert Simpson	Qualcomm Inc	
Roger Orr		GB
Ronan Keryell	Xilinx	

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Ryan McDougall	Zoox Inc	CA
S.W. Holeman II		
Sebastian Büttner		
Sergei Murzin	Bloomberg	
Shuo Feng Liu	IBM Corporation	CA
Sifang Li	Hummingbird Code	
Siu Chi Chan	AMD	
Stephan Lavavej	Microsoft Corporation	
Stéphanie Even	SILKAN	
Stephen Schurr	Ripple Labs	
Tana Plauger	Dinkumware Ltd	
Thomas Köppe	Google	
Thomas Rodgers	Red Hat Inc	
Thomas Scogland	Lawrence Livermore National Laboratory	
Tim Northover	Apple	
Tim Shen	Google	
Timur Doumler	Jetbrains	GB
Titus Winters	Google	
Tom Honermann	Synopsys Inc	
Tomasz Kamiński	Sabre	PL
Tony Van Eerd	Christie Digital	CA
Tyler Sutton	Lock3 Software	
Victor Zverovich	Facebook	
Ville Voutilainen	Plum Hall Inc	FI
Vincent Falco	C Plus Plus Alliance Inc	

<b>Name</b>	<b>Representing</b>	<b>NB</b>
Vincent Reverdy	Paris Observatory	
Walter Brown	Brown	
Wesley Maness	Schonfeld Tools LLC	
Will Deacon	ARM Ltd	GB
William Miller	Edison Design Group	
William Seymour	Seymour	
Wyatt Childers		
Zach Laine	Cadence	
Zhihao Yuan	DePaul University	