

CTOC Data Task Force

March-October 2020

Output to CTOC 11/14/2020

CTOC

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AICHE Staff

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Technical Work

Victor Zavala (University of Wisconsin)
J. Tabora (Bristol Myers Squibb)
Leo Chiang (Dow)
Zengyu Wang (Dow)

CTOC Data Task Force

Purpose:

- Create Strategy for effectively gathering, analyzing, and using data for continuous improvement objectives

Ask: What information do we want to gather and how will we use it?

- How would we leverage this data to enhance CTOC and D&F activities and effectiveness?
- Consider how to support the 2020 AIChE strategic goals
 - Develop a lifecycle approach to content development and delivery
 - Diversity, Equity and Inclusion – membership, divisions/forums, meetings

Review: Current sources and types of data available (How are we going to organize and use this data?)

- CDFO Survey
- Personify (membership)
- Confex (meetings)

Understand Findings

Develop Action Plan

Understanding Current Data

Confex (meetings) and Personify (membership)

- Confex – some understanding of who is attending the Spring & Annual Meetings
 - Industry/Academia, Graduate Students, Interests of those Attending
- Systems connected, cross reference of who is attending the meetings with their membership information, manual check/validation of the information
- Insights on who is presenting/chairing sessions at meetings
- Insights on invited and plenary speakers
- Ethnicity, gender and age demographics are optional

Personify – Confex Data Merge (AIChE)

Amit Gupta
Roma Lopez

Confex

- Groups/Topical
- Areas
- Sessions
- Papers

Chairs/
co-chairs

Chairs/
co-chairs

Chairs/
co-chairs

Presenting
Authors

Confex
“Person”

AIChE
Customer

Personify

- Gender & Age
- Employer & Job Title
- Industry Classification
- Job Function
- Memberships
- Conf. reg. survey data
- Other conf. regs.
- Other purchases

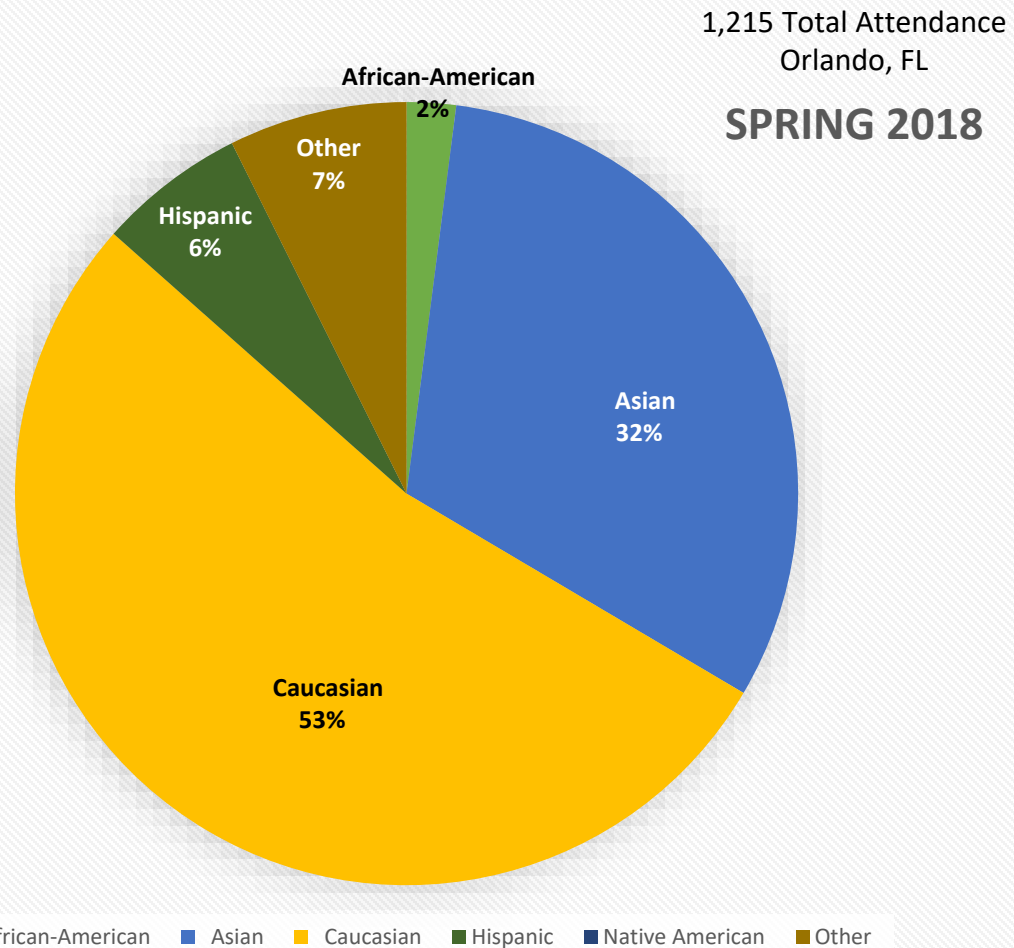
Conference Programming Data Analysis

- 2018-2020 Annual Meeting to Spring Meeting data analyzed thus far
 - Chairs & Presenting Authors in Confex matched to what we know about them in Personify
- What are the demographics & how are they changing
 - Overall for Spring and Annual Meetings
 - Division/Forum Level
- What are membership characteristics & trends (AIChE membership, D/F membership)
 - Overall for Spring and Annual Meetings
 - Division/Forum level

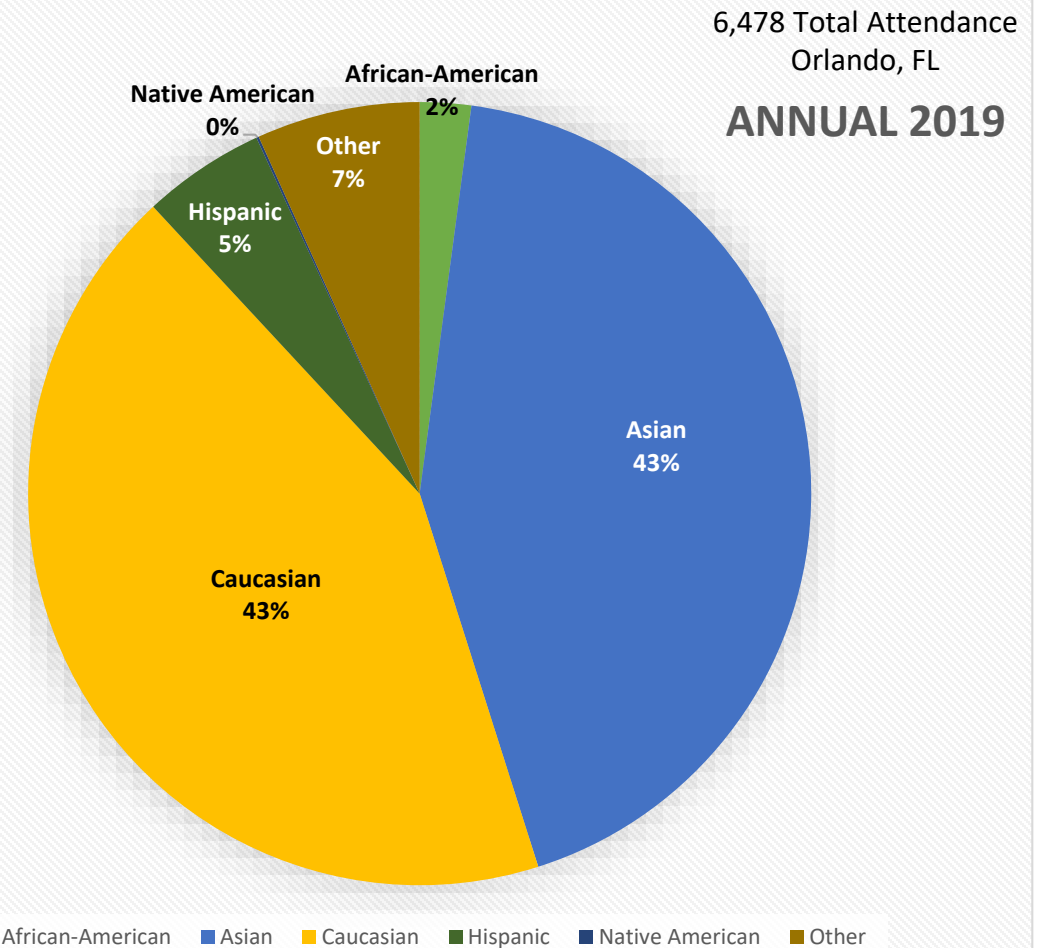
Overall Meeting Demographics **Ethnicity** Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

Represents only 32% of attendees.
68% (821) did not provide info.



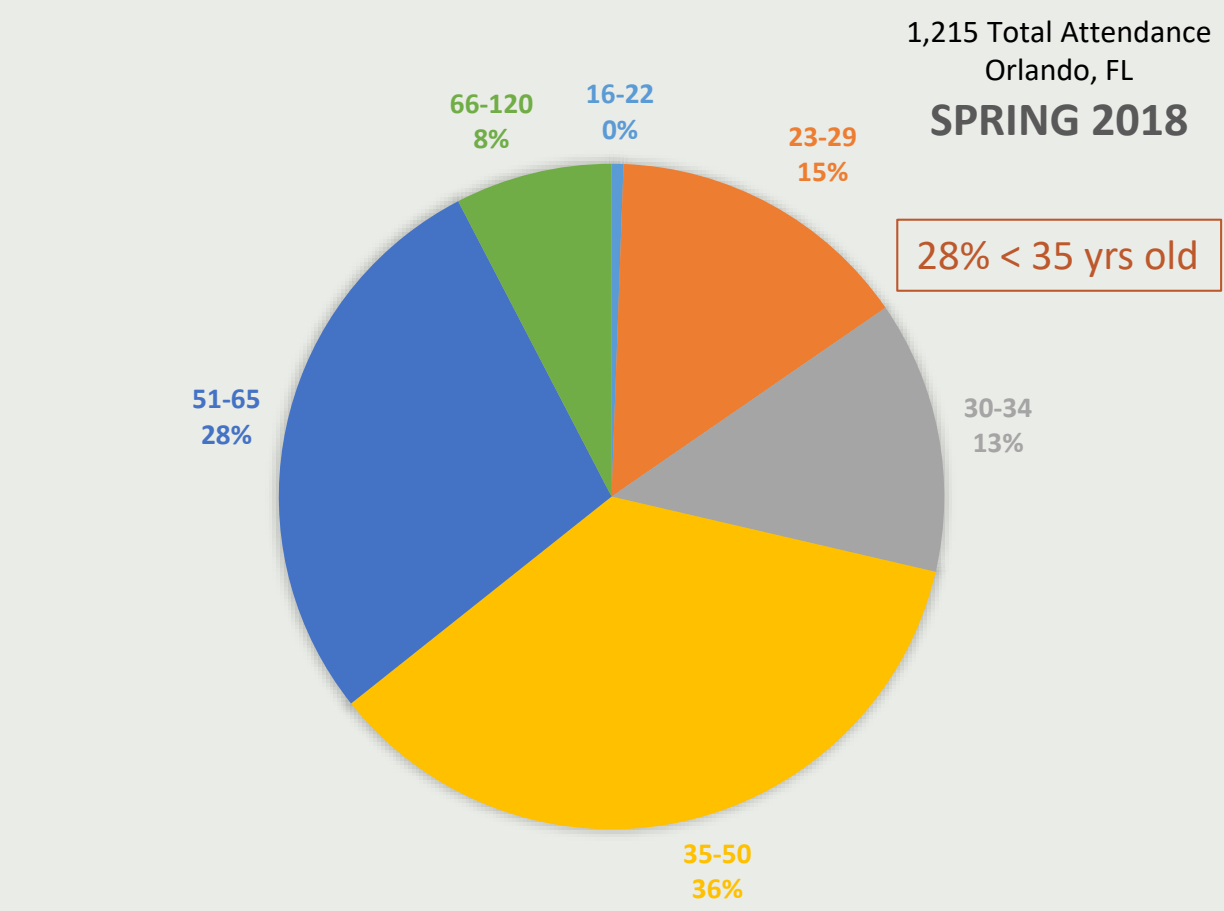
Represents only 42% of attendees.
58% (3771) did not provide info.



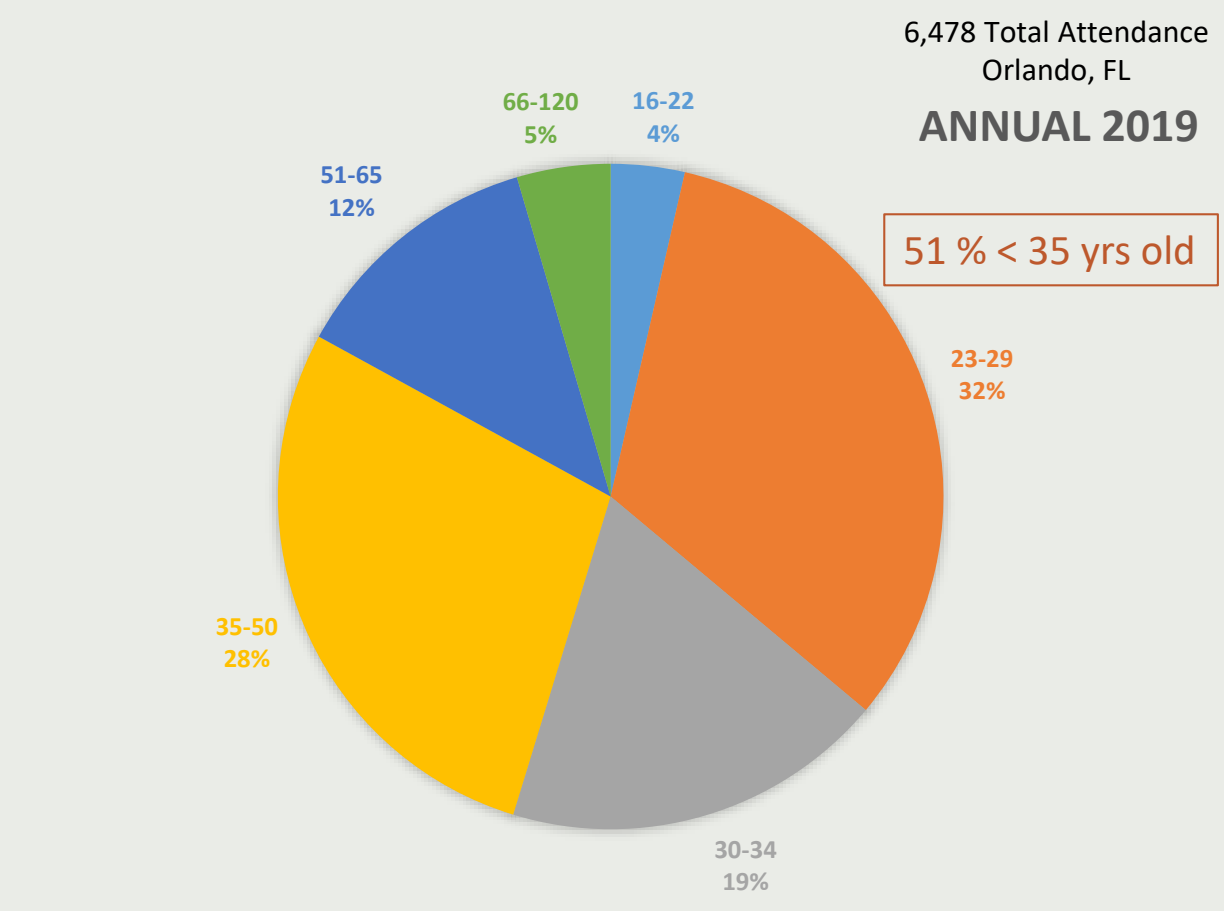
Overall Meeting Demographics **Age**
Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

Represents only 57 % of attendees.
43% (518) did not provide info.



Represents 76 % of attendees.
24 % (1584) did not provide info.

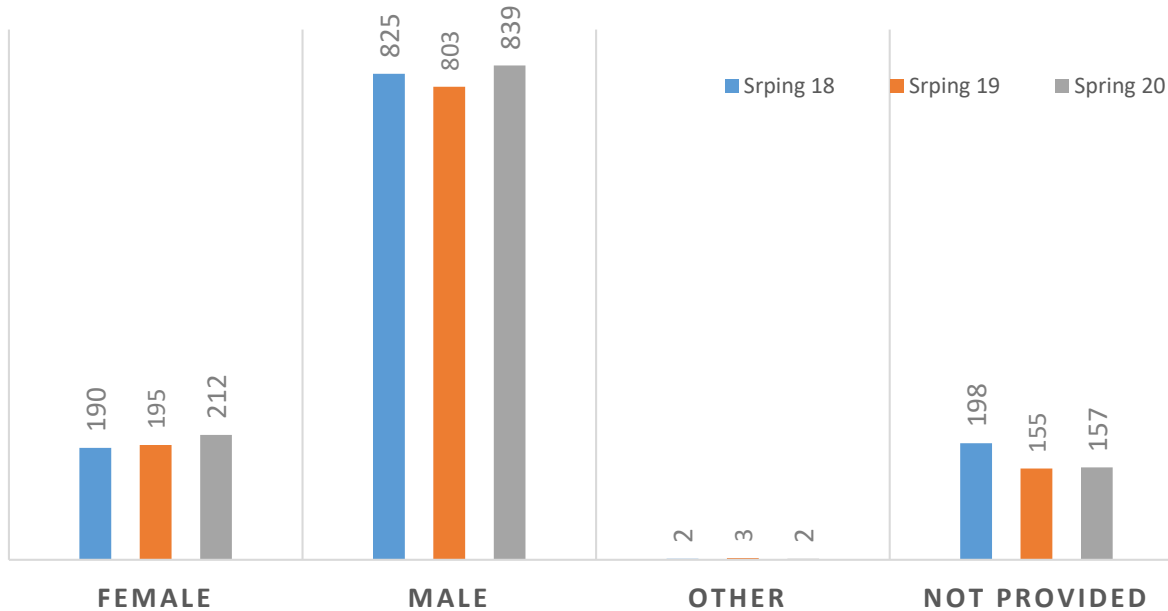


Similar sub-analysis done for CRE, MSED, FP&BE

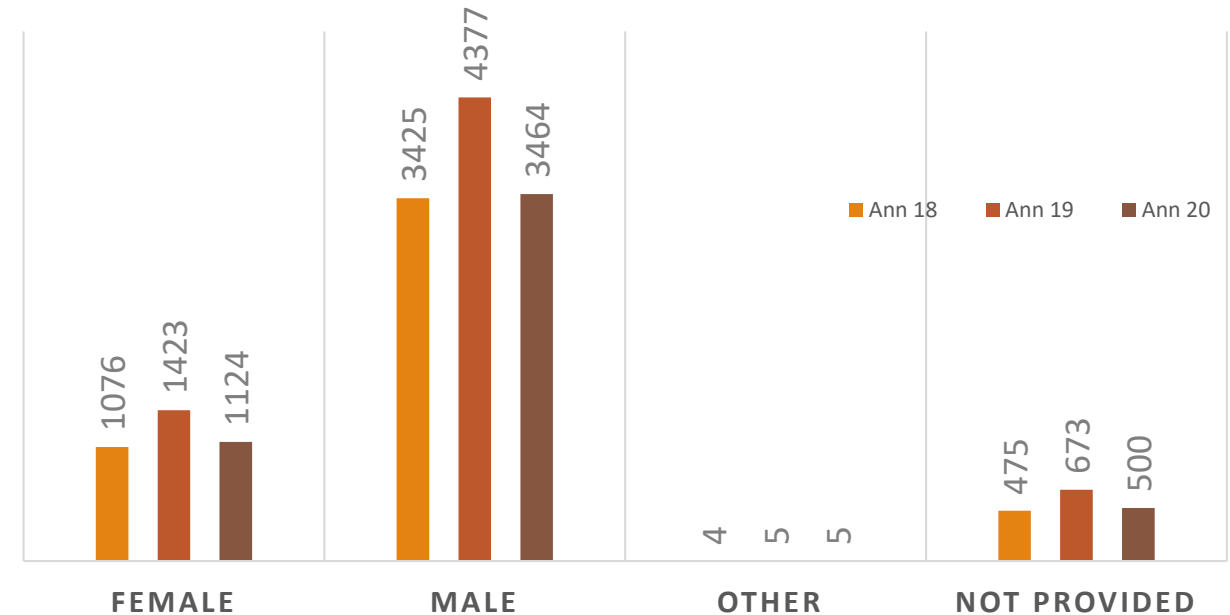
Overall Meeting Demographics Gender Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

**GENDER OF
CHAIRS/CO-CHAIRS/PRESENTING AUTHORS**



**GENDER OF
CHAIRS/CO-CHAIRS/PRESENTING AUTHORS**



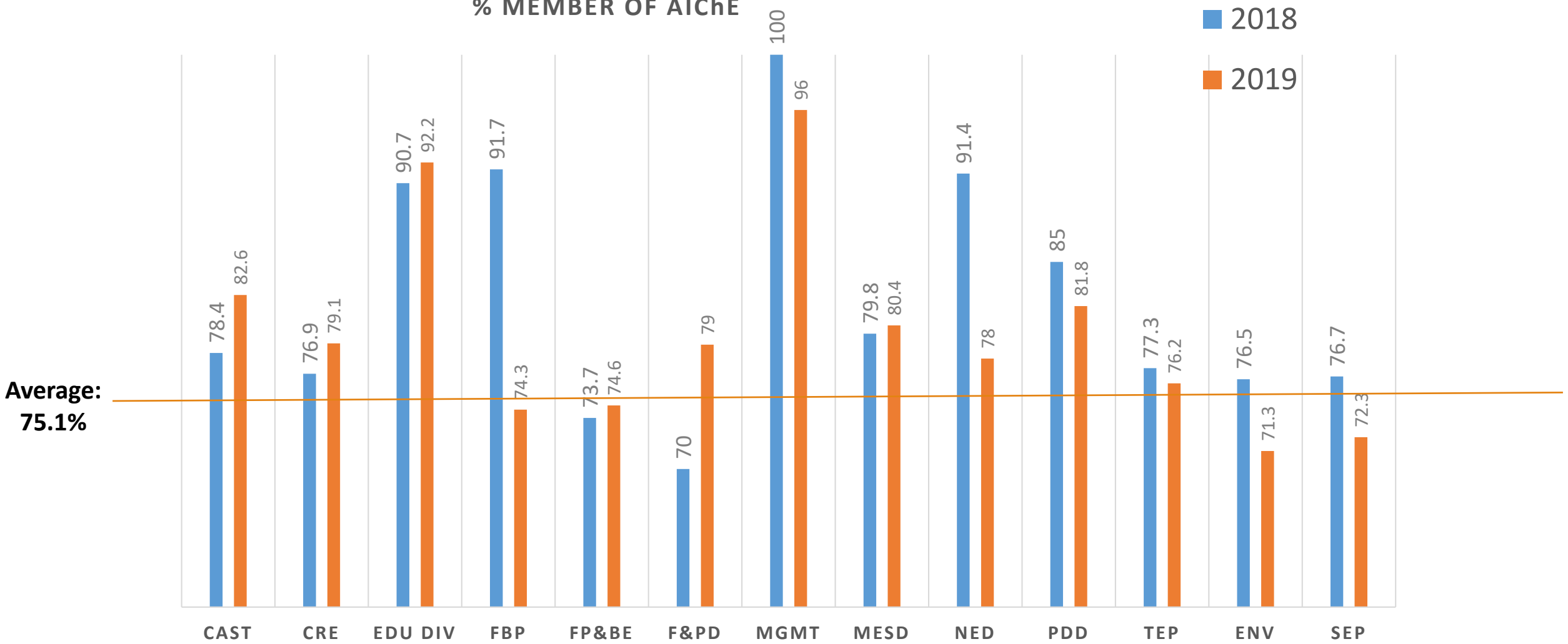
- ~14% of all attendees did not provide gender info
- ~19.4% of respondents who did provide female/male designation – Female

- ~10% of all attendees did not provide gender info
- ~24.3% of respondents who did provide female/male designation – Female

Membership Characterization
Chairs/Co-Chairs/Presenting Authors

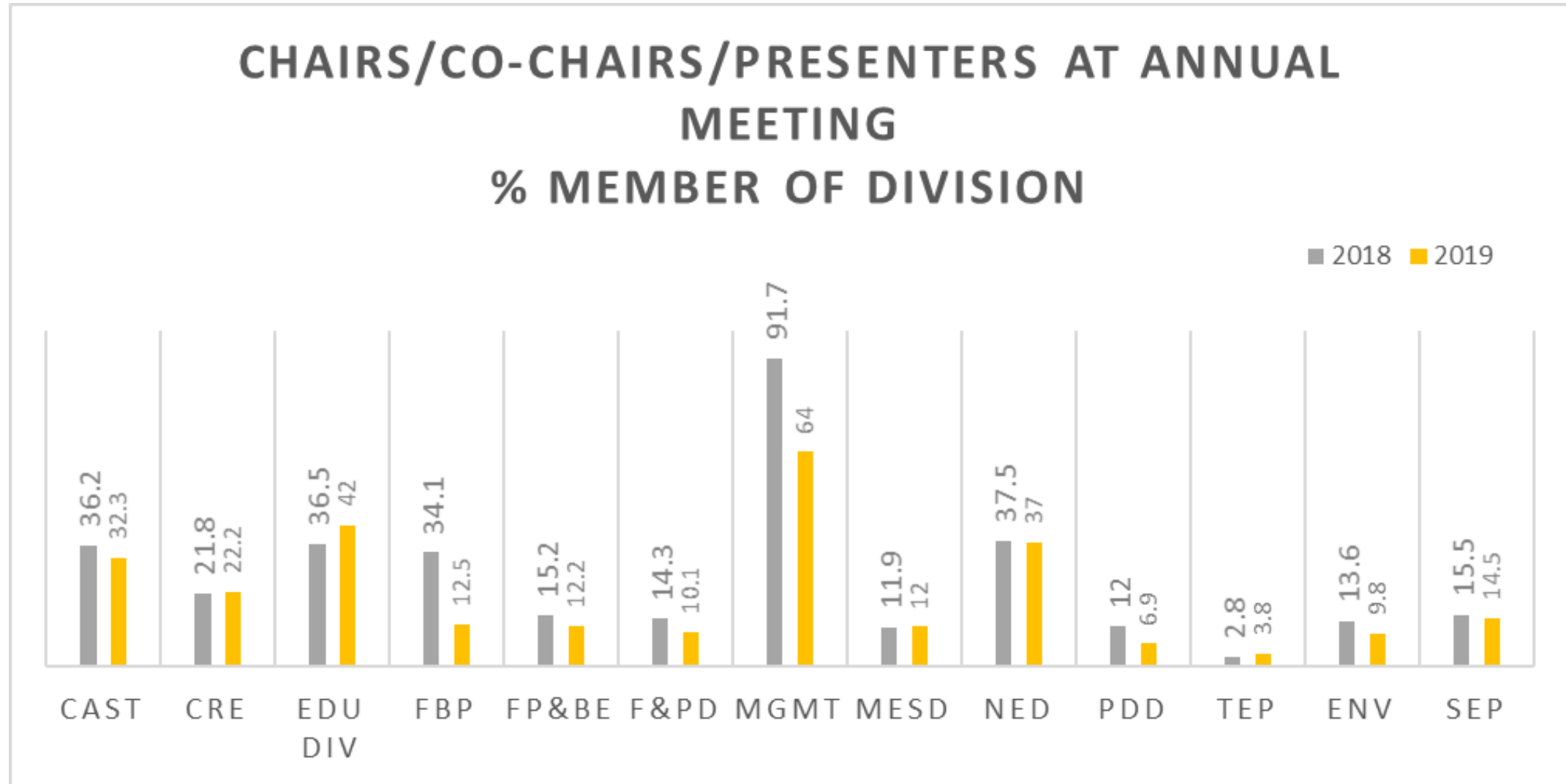
Amit Gupta
Roma Lopez

CHAIRS/CO-CHAIRS/PRESENTING AUTHORS AT ANNUAL MEETING –
% MEMBER OF AIChE



Membership Characterization
Chairs/Co-Chairs/Presenting Authors

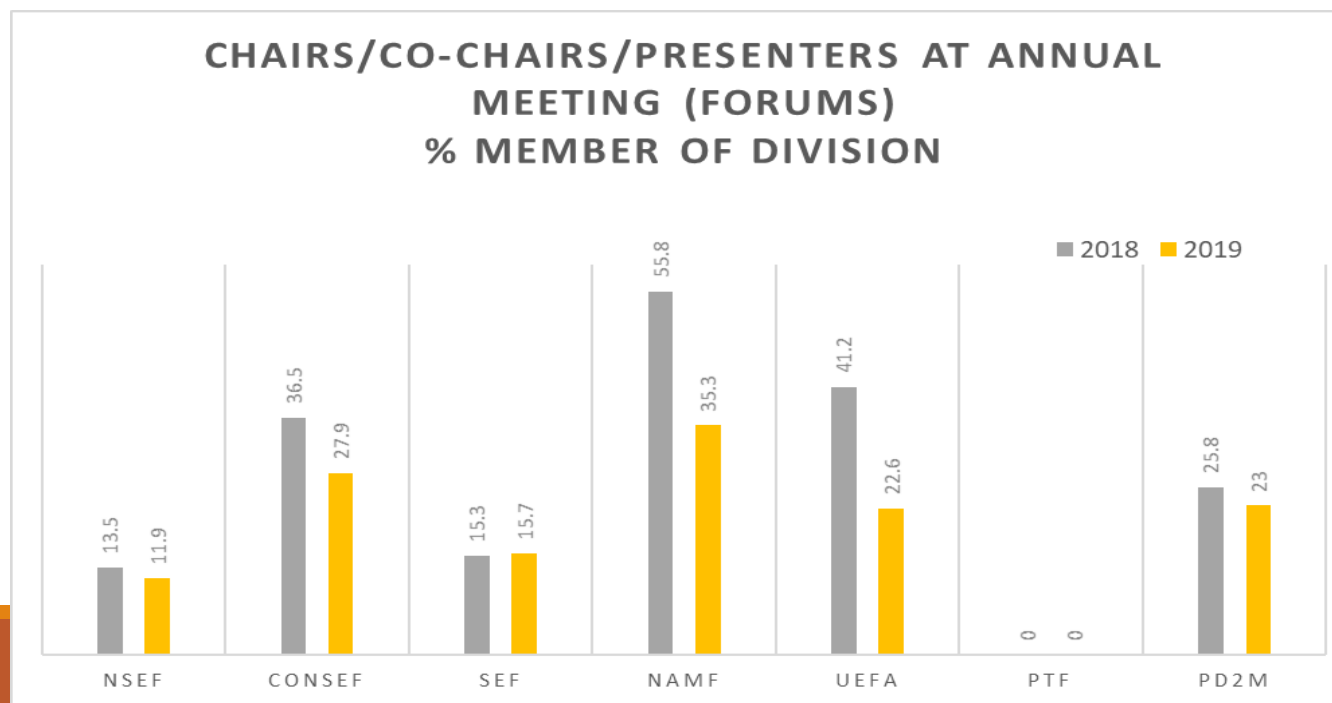
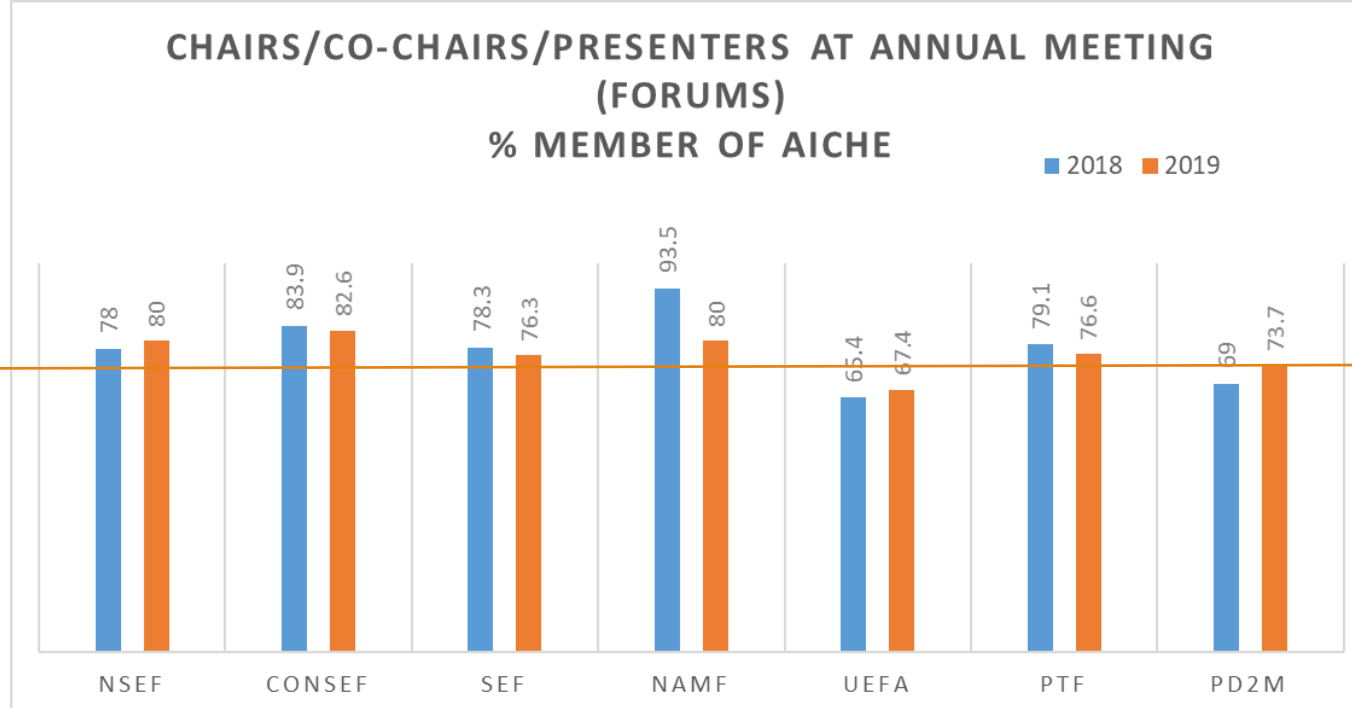
Amit Gupta
Roma Lopez



Membership Characterization

Chairs/Co-Chairs/Presenting Authors

**Average:
75.1%**



Demographics

Interest (collected during registration survey)

Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

	%ANN18	%ANN19
CRE Chairs & Presenters (824 ANN18, 1093 ANN19)		
• Catalysis & Reaction Engineering	44.2%	46.8%
• Energy	18.3%	18.3%
• Materials Engineering & Sciences	10.7%	11.3%
• Sustainable Engineering	7.6%	9.2%
• Computational Molecular Science & Engineering	8.3%	9.1%
• Nanomaterials and Nanotechnology	10.1%	8.1%
MESD Chairs & Presenters (749 ANN18, 852 ANN19)		
• Materials Engineering & Sciences	35.0%	37.3%
• Nanomaterials and Nanotechnology	19.4%	20.3%
• Nanoscale Science & Engineering	14.0%	16.9%
• Bioengineering	13.1%	13.7%
• Energy	10.1%	9.7%
• Interfacial Phenomena	7.9%	8.8%
FP&BE Chairs & Presenters (672 ANN18, 713 ANN19)		
• Bioengineering	42.1%	42.1%
• Medicine		15.0%
• Microbes at Biomedical Interfaces	7.9%	12.2%
• Pharmaceutical Development & Manufacturing	9.1%	11.1%
• Immunotherapy	7.9%	10.7%
• Nanomaterials and Nanotechnology	8.8%	10.5%

Next Steps for the Personify & Confex Data

AICHE STAFF

- Analysis of Invited/Plenary speakers as to demographics
- Planning to require mandatory Personify login for CFAs on Confex starting with Spring 2021
 - IT & Programing staff will continue to clean historical data
 - Already implemented for Spring and Annual 2021
- Continue iteration by identifying areas for deeper-dive & analyzing data
- Conclude analysis by identifying recurring reports for tracking trends
- Prioritize IT development of key recurring reports

CTOC

- Opportunities for additional analysis
 - 2020 Data set
 - Invited/Plenary speakers
- Share data with Divisions/Forums
- Potential for D/F to identify opportunities
 - Understand its membership composition at meetings
 - Review value proposition
 - Support Diversity, Equity and Inclusion efforts

Understanding Current Data

Division/Session Information (session titles, session descriptions, abstracts)

- EBPC (Leo Chiang/Zenyu Wang) and CAST Division programming chair (Victor Zavala) – efforts in text mining)

Effort	Text Mined	Goal	Technique
EBPC Annual Refresh Task Force (Chiang)	Session Description (2017 & 2018 Annuals)	<ul style="list-style-type: none">Identify overlapping sessions topics where no co-sponsorship exists	Term Frequency-Inverse Document Frequency (TF-IDF) Python
10B Programming (Zavala)	Abstract Title (Area 10B, 2019)	<ul style="list-style-type: none">Find topic commonalities and used to revise sessions of programs	Latent Dirichlet Allocation (Matlab)
New CTOC effort (Tabora)	Complete Abstracts 2020 Annual for D/F (MESD, PD2M, FPBD, NSEF, Area 10B, CRE)	<ul style="list-style-type: none">Identify topic commonalities to find technical trends and overlap	Latent Dirichlet Allocation (R)

Natural Language Processing Analysis - Jose Tabora (BMS)

Analyze text from 1502 Abstracts

170 sessions

4 Group Titles (Division/Forum)

[1] Food, Pharmaceutical & Bioengineering Division

[2] Materials Engineering and Sciences Division

[3] Nanoscale Science and Engineering Forum

[4] Pharmaceutical Discovery, Development and Manufacturing Forum

Paired Division according to themes to avoid **FPBE w/ PD2M** and **MESD w/NSE**

Standard text cleaning; retained ~ 7,000-11,000 terms

Use LDA to identify 12 topics for 2 related divisions

Visualize distribution of Abstracts from each session against topic

Visualize topic distribution in tsne 2-D projection



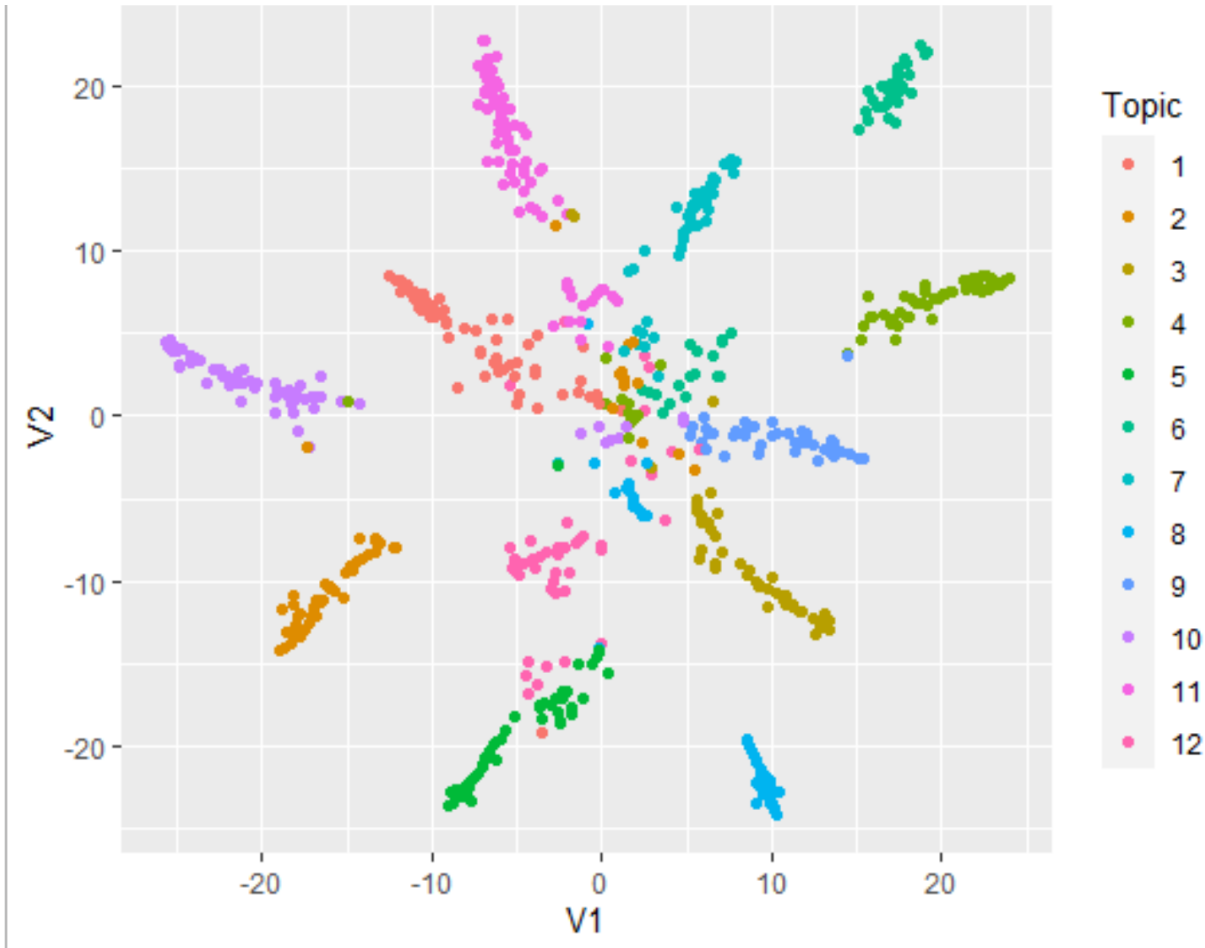
All abstracts are represented by the model as combination of these 12 Topics

Topics 2D (tSNE) Visualization – FP&BE and PD2M

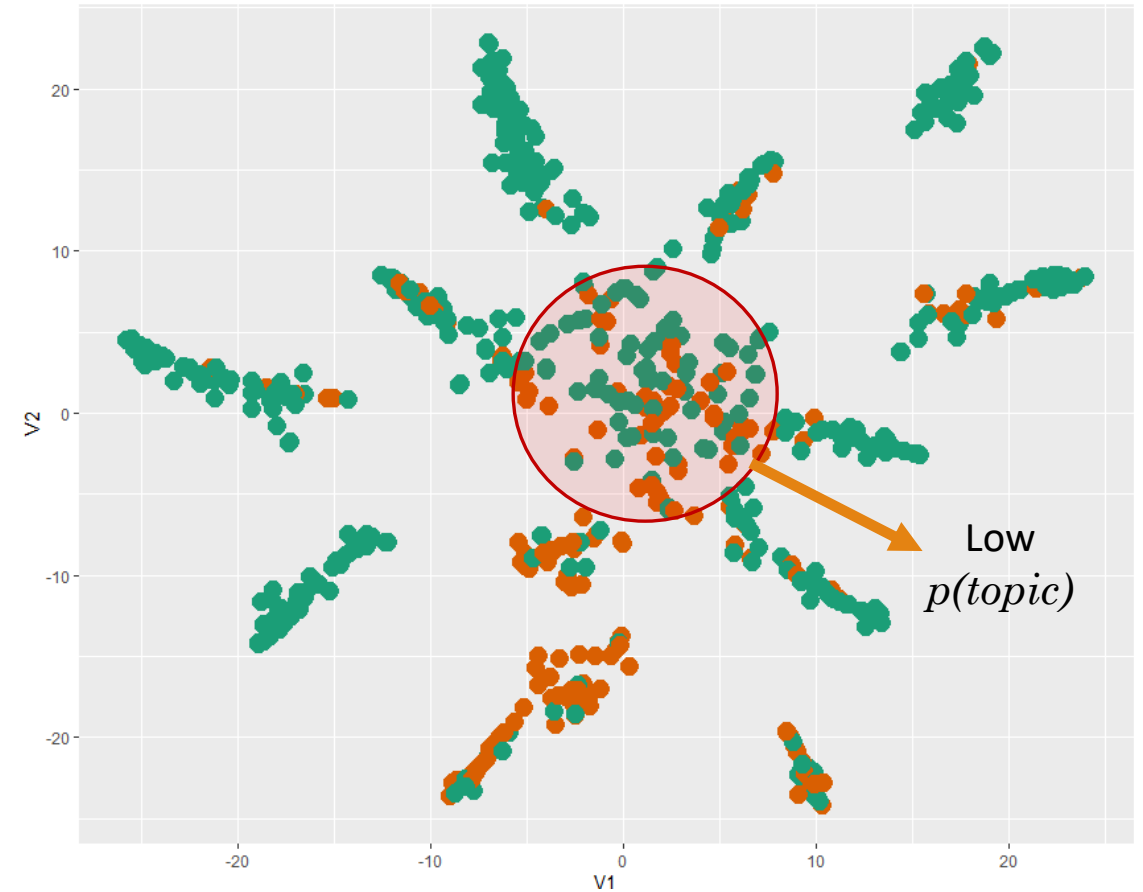
T-Distributed Stochastic Neighbor Embedding

Topics cluster in each topic according to the proportion of each topic associated with each abstract

Abstract = $p_1 \times \text{Topic}_1 + p_2 \times \text{Topic}_2 \dots$



Fd Ph Bio



PD2M

- Abstracts are clustered by Topic in tSNE projection
- Abstract with low tSNE score (center) have poor discrimination
- Only a few topics have strong classifications $p(topic)$ across both divisions

Topics v (trimmed) Session Title

Food Pharma Bio

PD2M



Jittered Data

~4 Topics predominate in each D/F Some. The remaining 4 Topics have significant overlap across D/F

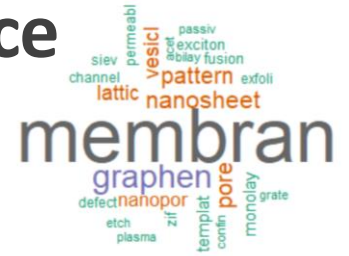


All abstracts are represented by the model as combination of these 12 Topics

A scatter plot showing the relationship between V1 and V2 for different channel types. The x-axis is labeled 'V1' and ranges from -40 to 20. The y-axis is labeled 'V2' and ranges from -20 to 30. The legend indicates four channel types: 'in' (blue), 'gross' (orange), 'nts' (green), and 'gold' (red). The plot shows several distinct clusters of points, with 'nts' points being the most numerous and spread out, and 'gold' points being the least numerous and more concentrated in specific clusters.

[illegible]

Select top 25 documents in each topic to evaluate cross-relevance



Typically ~ 80-100 abstracts/topic

Evaluate which division and sessions have strong association by topic e.g Topic 8

	Topic	Sessio	STitle	Group	PTitle
398	8	45745	Biomaterials for Drug Delivery: New Approaches	Materials Engineering and Sciences Division	Engineering Nano-Bio Interface to Overcome Biological Barriers for Precision Nanomedicine
273	8	43729	Biomaterials: Graduate Student Award Session	Materials Engineering and Sciences Division	Graduate Student Award Session: Driving Encapsulated Biological Reactions with DNA-Functionalized Vesicles
269	8	45571	Biomimetic Materials	Materials Engineering and Sciences Division	Driving Encapsulated Biological Reactions with DNA-Functionalized Vesicles
220	8	45571	Biomimetic Materials	Materials Engineering and Sciences Division	Co-Translational Membrane Protein Folding into Supported Hybrid Polymer-Lipid Membrane Maintains Protein
32	8	45571	Biomimetic Materials	Materials Engineering and Sciences Division	Phase Coexistence in Hybrid Lipid/Block Copolymer Biomembranes
134	8	45590	Carbon Nanomaterials: Adsorption, Separations, and Transport Processes	Nanoscale Science and Engineering Forum	Molecular-Dynamics Analysis of the Mechanical Behavior of Graphene Nanomeshes
408	8	45590	Carbon Nanomaterials: Adsorption, Separations, and Transport Processes	Nanoscale Science and Engineering Forum	Laser Induced Graphene on Polysulfone Membrane for H ₂ /CO ₂ Gas Separation
387	8	45591	Carbon Nanomaterials: Dispersion, Surface Structure, and Biointeraction	Nanoscale Science and Engineering Forum	Interactions of Graphene Oxide Nanosheets with Blood-Related Entities and Their Implications for Hematological
477	8	45589	Carbon Nanomaterials: Synthesis, Functionalization, Assembly, and Application	Nanoscale Science and Engineering Forum	Local Curvature Enables Spatially-Defined Properties in Graphene
139	8	45693	Carbon Nanomaterials: Synthesis, Functionalization, Assembly, and Application	Nanoscale Science and Engineering Forum	Molecular-Dynamics Analysis of the Thermomechanical Behavior of Nanodiamond Superstructures in Interlayer
872	8	43742	Division Plenary: Materials Engineering & Sciences Division (Invited Talks)	Materials Engineering and Sciences Division	Vapor-Phase Synthesis and Modification of Metal-Organic Framework Membranes
693	8	43725	Excellence in Graduate Student Research (Area 08A)	Materials Engineering and Sciences Division	Water-Wire Networks: New Avenue for Engineering Polymer Membranes Using Bioinspired Artificial Water Cha
745	8	43721	Graduate Student Award: Electronic and Photonic Materials	Materials Engineering and Sciences Division	Excitonic Fine Structure in Two-Dimensional Transition Metal Dichalcogenides
223	8	43755	MOF, COF, and Porous Polymer Materials I: Synthesis	Materials Engineering and Sciences Division	Nanoporous Metal Soap Films Prepared By Interfacial Polymerization and Melt Processing for Gas Separation
416	8	43769	MOF, COF, and Porous Polymer Materials II: Applications	Materials Engineering and Sciences Division	Zeolitic Imidazolate Framework Membranes on Silicate-Seeded Substrates for Propylene/Propane Separation
757	8	43769	MOF, COF, and Porous Polymer Materials II: Applications	Materials Engineering and Sciences Division	Hierarchical Metal-Organic Frameworks Networks for Enhanced Gas Separation Performance and Plasticization
489	8	45695	Patterning and Assembly at the Nanoscale	Nanoscale Science and Engineering Forum	Enhanced Heat Transfer on the Teflon Nanopore Surface Fabricated Using Anodized Alumina Templates.
731	8	43757	Polymer Crystallization and Semi-Crystalline Polymers	Materials Engineering and Sciences Division	Biomimetic Crystal Growth for Programmable Separation and Chiroptical Properties
359	8	43767	Poster Session: Materials Engineering & Sciences (08E - Electronic and Photonic Materials)	Materials Engineering and Sciences Division	Chemical Composition, Structure Morphology, Contaminant Cleaning and Laser-Induced-Damage Threshold in
528	8	43767	Poster Session: Materials Engineering & Sciences (08E - Electronic and Photonic Materials)	Materials Engineering and Sciences Division	Controlling Colloidal Crystal Growth Using Surface Relief Patterns
621	8	44215	Poster Session: Nanoscale Science and Engineering	Nanoscale Science and Engineering Forum	Improving the Pattern Transfer Process Using AAO Templates on Hydrophobic Substrates
234	8	44215	Poster Session: Nanoscale Science and Engineering	Nanoscale Science and Engineering Forum	Biothermal Analysis of Interactions between Delocalized Lipophilic Cation (DLC) and Composite Lipid Bilayer
409	8	43740	Smart Composite Materials	Materials Engineering and Sciences Division	6FDA-DAM/ZIF-7 Mixed-Matrix Membranes: Exploring in-Situ Formation of ZIF-7 Phases in Confined Polymer ar
329	8	43775	Synthesis and Application of Inorganic Materials I: Synthesis	Materials Engineering and Sciences Division	Synthesis of Sodalite Precursor Nanosheets and Facile Assembly for Hydrogen Purification
193	8	43719	Synthesis and Application of Inorganic Materials II: Application/Separation	Materials Engineering and Sciences Division	Synthesis of Crystalline Atom-Thick g-C ₃ N ₄ Nanosheets and Application in High-Temperature Hydrogen Purifica
209	8	43719	Synthesis and Application of Inorganic Materials II: Application/Separation	Materials Engineering and Sciences Division	Ultrathin Gas-Sieving Carbon Molecular Sieve Membranes with Modulated Pore-Size Distribution By Room-Tem
747	8	43719	Synthesis and Application of Inorganic Materials II: Application/Separation	Materials Engineering and Sciences Division	Multi-Scale Detection and Implication of 1D MEL Defects in 2D MFI Zeolite Nanosheets
688	8	43748	Transport Phenomena in Polymer Systems	Materials Engineering and Sciences Division	Mechanisms of Selectivity in Zwitterionic Amphiphilic Copolymer Membranes
212	8	43773	Two-Dimensional Materials and Thin Films	Materials Engineering and Sciences Division	Engineering Gas-Sieving Nanopores in Graphene with Sub-Å Resolution
767	8	43773	Two-Dimensional Materials and Thin Films	Materials Engineering and Sciences Division	Nanoporous Atomically Thin Membranes

Summary

- LDA provides a rapid process to establish similarity between sessions across divisions
- Specific abstracts may be associated with different sessions (depending on strength of association)
- For the paired division only a few topics are strongly cross represented
- Documents for each topic can be aggregated by strength of classification

Next Steps

- CTOC piloted Natural Language Processing methodology using abstracts submitted to identify areas of synergy between divisions and forums.
 - Use to help Division/Forums understand technical trends in its area and identify synergies/overlap with others
 - Develop code into a potential tool for D/F programming chairs to match abstracts to sessions (end 1Q21)
- AIChE Meeting Data (personify/confex merge)
 - More analysis on data set still being generated (2020 meeting)
 - What is being done to understand other AIChE meetings?
 - Regional Student Conference Meetings
 - Other Smaller Niche AIChE Conferences
- Need new members to continue its effort
 - Completion of CTOC terms for Jean Tom and Virginia Sommer (new lead and member needed)
 - Recommend 6 month extension of CTOC Data Task Force (June 2021)

Background Data

Demographics

Gender

Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

	Female	Male	Other	Not Provided	Total	% Female*
SPR18	190	825	2	198 (16.3%)	1215	18.7%
SPR19	195	803	3	155 (13.4%)	1156	19.5%
SPR20	212	839	2	157 (12.9%)	1210	20.1%
ANN18	1076	3425	4	475 (9.5%)	4980	23.9%
ANN19	1423	4377	5	673 (10.4%)	6478	24.5%
ANN20	1124	3464	5	500 (9.8%)	5093	24.5%

*reflects those who provided classification

	Female	Male	Not Provided	Total	% Female
CRE					
ANN18	143	613	68	824	18.9%
ANN19	208	794	91	1093	20.8%
ANN20	158	606	78	842	20.7%
MES					
ANN18	182	514	53	749	26.1%
ANN19	213	565	74	852	27.4%
ANN20	190	505	64	759	27.3%
FP&BE					
ANN18	195	424	53	672	31.5%
ANN19	206	441	66	713	31.8%
ANN20	171	374	51	596	31.4%

Membership

AIChE Membership

Chairs/Co-Chairs/Presenting Authors

Amit Gupta
Roma Lopez

	AIChE Member	Non-member	Total	% AIChE Member
SPR18	637	578	1215	52.4%
SPR19	618	538	1156	53.5%
SPR20	532	678	1210	44.0%
ANN18	3720	1260	4980	74.7%
ANN19	4888	1590	6478	75.5%
ANN20	1787	3306	5093	35.1%

* Membership during year of conference

Annual Meeting	# Chairs/Authors	# AIChE Member	# Division Member	# Other Div/Forum Member	% AIChE Member	% Div Mbr (of AIChE Mbrs)
CRE						
2018	824	634	138	116	76.9%	21.8%
2019	1093	865	192	153	79.1%	22.2%
2020	842	287	135	108	34.1%	47.0%
MESD						
2018	749	598	71	107	79.8%	11.9%
2019	852	685	82	123	80.4%	12.0%
2020	759	286	68	88	37.7%	23.8%
FP&BE						
2018	672	495	75	74	73.7%	15.2%
2019	713	532	65	62	74.6%	12.2%
2020	596	205	63	56	34.4%	30.7%

Membership

Membership by Group

Chairs/Co-Chairs/Presenting Authors

Membership analysis for Divisions at ANN expanded to include all others divisions

	# Chairs/ Authors	# AIChE Mbr	# Division Mbr	# Other Div/Forum Mbr	% AIChE Member	% Div Mbr (of AIChE Mbrs)	% Other Div/Forum Mbr
CAST							
ANN18	426	334	121	58	78.4%	36.2%	17.4%
ANN19	517	427	138	57	82.6%	32.3%	13.3%
ANN20	466	214	117	59	45.9%	54.7%	27.6%
EdDiv							
ANN18	151	137	50	59	90.7%	36.5%	43.1%
ANN19	129	119	50	51	92.2%	42.0%	42.9%
ANN20	137	97	42	34	70.8%	43.3%	35.1%
FBP							
ANN18	48	44	15	15	91.7%	34.1%	34.1%
ANN19	140	104	13	27	74.3%	12.5%	26.0%
ANN20	130	47	13	19	36.2%	27.7%	40.4%
F&PD							
ANN18	100	70	10	24	70.0%	14.3%	34.3%
ANN19	138	109	11	29	79.0%	10.1%	26.6%
ANN20	179	74	13	32	41.3%	17.6%	43.2%

Membership

Membership by Group

Chairs/Co-Chairs/Presenting Authors

Membership analysis for Divisions at ANN expanded to include all others divisions

	# Chairs/ Authors	# AIChE Mbr	# Division Mbr	# Other Div/Forum Mbr	% AIChE Member	% Div Mbr (of AIChE Mbrs)	% Other Div/Forum Mbr
MGMT							
ANN18	12	12	11	6	100.0%	91.7%	50.0%
ANN19	26	25	16	14	96.2%	64.0%	56.0%
ANN20	15	14	5	8	93.3%	35.7%	57.1%
NED							
ANN18	35	32	12	7	91.4%	37.5%	21.9%
ANN19	59	46	17	15	78.0%	37.0%	32.6%
ANN20	24	11	6	7	45.8%	54.5%	63.6%
PDD							
ANN18	206	175	21	65	85.0%	12.0%	37.1%
ANN19	424	347	24	126	81.8%	6.9%	36.3%
ANN20	544	257	30	128	47.2%	11.7%	49.8%
TEP							
ANN18	141	109	3	26	77.3%	2.8%	23.9%
ANN19	172	131	5	28	76.2%	3.8%	21.4%
ANN20	180	64	5	29	35.6%	7.8%	45.3%

Membership

Membership by Group

Chairs/Co-Chairs/Presenting Authors

Membership analysis for Divisions at ANN expanded to include all others divisions

	# Chairs/ Authors	# AIChE Mbr	# Division Mbr	# Other Div/Forum Mbr	% AIChE Member	% Div Mbr (of AIChE Mbrs)	% Other Div/Forum Mbr
ENV							
ANN18	221	169	23	47	76.5%	13.6%	27.8%
ANN19	258	184	18	53	71.3%	9.8%	28.8%
ANN20	267	129	28	65	48.3%	21.7%	50.4%
SEP							
ANN18	557	427	66	96	76.7%	15.5%	22.5%
ANN19	705	510	74	100	72.3%	14.5%	19.6%
ANN20	612	226	69	93	36.9%	30.5%	41.2%

Demographics

Division Programming by Gender

Chairs/Co-Chairs/Presenting Authors

	Female	Male	Other	Not Provided	Total	% Female
CRE						
ANN18	143	613		68	824	18.9%
ANN19	208	794		91	1093	20.8%
ANN20	158	606		78	842	20.7%
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ANN18	182	514		53	749	26.1%
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ANN18	195	424		53	672	31.5%
ANN19	206	441		66	713	31.8%
ANN20	171	374		51	596	31.4%

	Female	Male	Other	Not Provided	Total	% Female
CAST						
ANN18	61	326		39	426	15.8%
ANN19	78	399		40	517	16.4%
ANN20	77	349		40	466	18.1%
EdDiv						
ANN18	45	96		10	151	31.9%
ANN19	46	78		5	129	37.1%
ANN20	49	80		8	137	38.0%
FBP						
ANN18	7	40		1	48	14.9%
ANN19	24	106	1	9	140	18.3%
ANN20	31	90		9	130	25.6%
F&PD						
ANN18	19	72	1	8	100	20.7%
ANN19	23	105	1	9	138	17.8%
ANN20	24	132	2	21	179	15.2%

Demographics

Division Programming by Gender

Chairs/Co-Chairs/Presenting Authors

	Female	Male	Other	Not Provided	Total	% Female
MGMT						
ANN18	4	7		1	12	36.4%
ANN19	10	15		1	26	40.0%
ANN20	6	9			15	40.0%
NED						
ANN18	3	31		1	35	8.8%
ANN19	10	44		5	59	18.5%
ANN20	2	19		3	24	9.5%
PDD						
ANN18	27	163	1	15	206	14.1%
ANN19	86	295		43	424	22.6%
ANN20	100	394	2	48	544	20.2%

	Female	Male	Other	Not Provided	Total	% Female
TEP						
ANN18	28	99		14	141	22.0%
ANN19	37	123		12	172	23.1%
ANN20	38	126		16	180	23.2%
ENV						
ANN18	41	156		24	221	20.8%
ANN19	65	167		26	258	28.0%
ANN20	51	187		29	267	21.4%
SEP						
ANN18	93	392	1	71	557	19.1%
ANN19	130	488	1	86	705	21.0%
ANN20	108	440	1	63	612	19.7%

Demographics

Division Programming by Age Bracket

Chairs/Co-Chairs/Presenting Authors

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
CRE										
ANN18	14	244	124	209	75	28		130	824	55.0%
ANN19	18	289	169	251	93	47	2	224	1093	54.9%
ANN20	10	196	123	220	75	40	1	177	842	49.5%
MES										
ANN18	15	168	122	207	73	21	2	141	749	50.3%
ANN19	24	216	137	225	69	22	1	158	852	54.4%
ANN20	33	153	96	233	84	25	1	134	759	45.2%
FP&BE										
ANN18	12	181	90	207	57	22	1	102	672	49.7%
ANN19	25	188	88	199	65	10	1	137	713	52.3%
ANN20	23	127	84	176	56	17	1	112	596	48.4%

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
CAST										
ANN18	2	116	49	88	51	19	1	100	426	51.4%
ANN19	8	142	57	95	55	14	1	145	517	55.8%
ANN20	6	111	56	90	54	21	1	127	466	51.2%
EdDiv										
ANN18	1	14	9	49	38	17		23	151	18.8%
ANN19	5	12	10	44	26	4		28	129	26.7%
ANN20	2	13	13	47	29	5		28	137	25.7%
FBP										
ANN18		9	4	8	13			14	48	38.2%
ANN19	3	23	18	39	17	3		37	140	42.7%
ANN20	2	18	16	25	15	6		48	130	43.9%
F&PD										
ANN18		11	9	25	11	10		34	100	30.3%
ANN19	3	17	18	33	16	8		43	138	40.0%
ANN20	2	26	10	40	30	10		61	179	32.2%

Demographics

Division Programming by Age Bracket

Chairs/Co-Chairs/Presenting Authors

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
MGMT										
ANN18		1		1	3	3		4	12	12.5%
ANN19		1	4	2	6	2		11	26	33.3%
ANN20			2	3	1	2		7	15	25.0%
NED										
ANN18		3	3	5	12	2		10	35	24.0%
ANN19	4	8	6	8	10	5		18	59	43.9%
ANN20		1	1	8	7	2		5	24	10.5%
PDD										
ANN18	1	30	23	50	35	10		57	206	36.2%
ANN19	3	64	46	102	46	16		147	424	40.8%
ANN20	9	87	58	127	81	18	1	163	544	40.5%

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
TEP										
ANN18	1	28	10	39	24	4		35	141	36.8%
ANN19	3	37	24	40	12	4	1	51	172	53.3%
ANN20	4	34	28	37	17	8	2	50	180	51.6%
ENV										
ANN18	3	36	28	44	28	13	2	67	221	44.1%
ANN19	6	47	22	58	25	14	1	85	258	43.6%
ANN20	7	27	23	60	37	16		97	267	33.5%
SEP										
ANN18	5	107	76	138	69	25	2	135	557	44.8%
ANN19	10	124	92	174	75	34	2	194	705	44.4%
ANN20	5	92	77	161	92	37	1	147	612	37.5%

Demographics

Division Programming by Ethnicity

Chairs/Co-Chairs/Presenting Authors

	Afr. Amer	Asian	Cauc	Hisp	Native Amer	Othe r	Not Provid ed	Grand Total	% not provided	% cauc	%asian
CRE											
ANN18	8	175	127	23	1	15	475	824	58%	36%	50%
ANN19	8	250	175	26	2	24	608	1093	56%	36%	52%
ANN20	8	168	125	15	2	15	509	842	60%	38%	50%
MES											
ANN18	6	136	115	12	2	17	461	749	62%	40%	47%
ANN19	12	185	126	17		17	495	852	58%	35%	52%
ANN20	10	125	122	16	1	15	470	759	62%	42%	43%
FP&BE											
ANN18	7	93	124	13		16	419	672	62%	49%	37%
ANN19	10	121	127	17	1	20	417	713	58%	43%	41%
ANN20	5	83	91	11	2	13	391	596	66%	44%	40%

	Afr Amer	Asian	Cauc	Hisp	Native Amer	Othe r	Not Provid ed	Grand Total	% not provided	% cauc	%asia n
CAST											
ANN18	4	65	46	9		15	287	426	67%	33%	47%
ANN19	4	92	68	14		21	318	517	62%	34%	46%
ANN20	4	77	62	10	1	19	293	466	63%	36%	45%
EdDiv											
ANN18	2	5	29	2		2	111	151	74%	73%	13%
ANN19	2	9	31	3		2	82	129	64%	66%	19%
ANN20		9	23	9		3	93	137	68%	52%	20%
FBP											
ANN18	1	9	3	1		1	33	48	69%	20%	60%
ANN19		30	14	2		4	90	140	64%	28%	60%
ANN20	3	25	17	1		4	80	130	62%	34%	50%
F&PD											
ANN18	1	23	17	6		1	52	100	52%	35%	48%
ANN19	2	24	24	5		4	79	138	57%	41%	41%
ANN20		40	20	3		6	110	179	61%	29%	58%

Demographics

Division Programming by Ethnicity

Chairs/Co-Chairs/Presenting Authors

	Afr Amer	Asian	Cauc	Hisp	Nativ e Amer	Other	Not Provi ded	Gran d Total	% not provide d	% cauc	%asian
MGMT											
ANN18		1	4			1	6	12	50%	67%	17%
ANN19	1	1	8	1		1	14	26	54%	67%	8%
ANN20	1	1	6				7	15	47%	75%	13%
NED											
ANN18		3	7				25	35	71%	70%	30%
ANN19		4	13			1	41	59	69%	72%	22%
ANN20		1	3				20	24	83%	75%	25%
PDD											
ANN18	2	27	27	3		6	141	206	68%	42%	42%
ANN19	1	59	51	10		15	288	424	68%	38%	43%
ANN20	5	81	74	5		14	365	544	67%	41%	45%

	Afr Amer	Asian	Cauc	Hisp	Nativ e Amer	Other	Not Provi ded	Gran d Total	% not provide d	% cauc	%asian
TEP											
ANN18	1	24	19	6		5	86	141	61%	35%	44%
ANN19	2	30	24	5		8	103	172	60%	35%	43%
ANN20		39	20	3	1	7	110	180	61%	29%	56%
ENV											
ANN18	1	45	22	7		6	140	221	63%	27%	56%
ANN19	2	58	27	10		8	153	258	59%	26%	55%
ANN20	3	43	32	6	1	12	170	267	64%	33%	44%
SEP											
ANN18	3	118	52	9		19	356	557	64%	26%	59%
ANN19	5	149	85	17		21	428	705	61%	31%	54%
ANN20	4	105	73	12		17	401	612	66%	35%	50%

Membership

Membership by Group (Forums)

Chairs/Co-Chairs/Presenting Authors

	# Chairs/Authors	# AIChE Mbr	# Forum Mbr	# Other Div/Forum Mbr	% AIChE Member	% Forum Mbr (of AIChE Mbrs)	% Other Div/Forum (of AIChE Mbrs)
NSEF							
ANN18	332	259	35	54	78.0%	13.5%	20.8%
ANN19	325	260	31	43	80.0%	11.9%	16.5%
ANN20	213	88	18	32	41.3%	20.5%	36.4%
COMSEF							
ANN18	242	203	74	47	83.9%	36.5%	23.2%
ANN19	334	276	77	70	82.6%	27.9%	25.4%
ANN20	309	144	56	59	46.6%	38.9%	41.0%
SEF							
ANN18	300	235	36	89	78.3%	15.3%	37.9%
ANN19	317	242	38	82	76.3%	15.7%	33.9%
ANN20	376	159	35	84	42.3%	22.0%	52.8%
NAMF							
ANN18	46	43	24	12	93.5%	55.8%	27.9%
ANN19	85	68	24	15	80.0%	35.3%	22.1%
ANN20	67	23	15	9	34.3%	65.2%	39.1%

Membership

Membership by Group (Forums)

Chairs/Co-Chairs/Presenting Authors

	# Chairs/Authors	# AIChE Mbr	# Forum Mbr	# Other Div/Forum Mbr	% AIChE Member	% Forum Mbr (of AIChE Mbrs)	% Other Div/Forum (of AIChE Mbrs)
UEFA							
ANN18	26	17	7	4	65.4%	41.2%	23.5%
ANN19	46	31	7	4	67.4%	22.6%	12.9%
ANN20	21	8	4	4	38.1%	50.0%	50.0%
PTF							
ANN18	330	261	0	106	79.1%	0.0%	40.6%
ANN19	419	321	0	103	76.6%	0.0%	32.1%
ANN20	326	147	0	80	45.1%	0.0%	54.4%
CEL							
ANN18	4	4	3	3	100.0%	75.0%	75.0%
ANN19	5	5	5	3	100.0%	100.0%	60.0%
ANN20	3	3	3	3	100.0%	100.0%	100.0%
PD2M							
ANN18	281	194	50	70	69.0%	25.8%	36.1%
ANN19	354	261	60	75	73.7%	23.0%	28.7%
ANN20	274	109	51	56	39.8%	46.8%	51.4%

Demographics

Forum Programming by Gender

Chairs/Co-Chairs/Presenting Authors

	Female	Male	Other	Not Provided	Total	% Female
NSEF						
ANN18	96	211		25	332	31.3%
ANN19	91	212		22	325	30.0%
ANN20	58	139		16	213	29.4%
COMSEF						
ANN18	45	183		14	242	19.7%
ANN19	66	242		26	334	21.4%
ANN20	62	227		20	309	21.5%
SEF						
ANN18	64	203	3	30	300	23.7%
ANN19	71	215	1	30	317	24.7%
ANN20	68	263	1	44	376	20.5%
NAMF						
ANN18	6	39		1	46	13.3%
ANN19	6	73		6	85	7.6%
ANN20	8	51		8	67	13.6%

	Female	Male	Other	Not Provided	Total	% Female
UEFA						
ANN18	1	21		4	26	4.5%
ANN19	8	33		5	46	19.5%
ANN20	1	19		1	21	5.0%
PTF						
ANN18	51	253		26	330	16.8%
ANN19	84	303		32	419	21.7%
ANN20	50	252		24	326	16.6%
ChEL						
ANN18	1	3			4	25.0%
ANN19	1	3		1	5	25.0%
ANN20	1	2			3	33.3%
PD2M						
ANN18	58	194		29	281	23.0%
ANN19	61	252		41	354	19.5%
ANN20	47	198		29	274	19.2%

Demographics

Forum Programming by Age Bracket

Chairs/Co-Chairs/Presenting Authors

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
NSEF										
ANN18	4	79	56	95	32	11		55	332	50.2%
ANN19	9	88	46	76	32	3		71	325	56.3%
ANN20	4	45	26	64	14	5		55	213	47.5%
COMSEF										
ANN18	1	57	34	62	30	11		47	242	47.2%
ANN19	9	84	42	85	26	11	1	76	334	52.5%
ANN20	5	59	57	83	28	8	2	67	309	50.4%
SEF										
ANN18		43	29	82	41	14	2	89	300	34.4%
ANN19	7	49	33	72	38	13	1	104	317	42.0%
ANN20	4	47	28	81	34	19	1	162	376	37.1%
NAMF										
ANN18		5	5	18	7	3		8	46	26.3%
ANN19	5	9	10	23	15	5		18	85	35.8%
ANN20		5	12	15	10	6		19	67	35.4%

	16-22	23-29	30-34	35-50	51-65	66-120	Invalid	Not Provided	Total	% < 35
UEFA										
ANN18		3	3	9	6			5	26	28.6%
ANN19		7	7	14	7			11	46	40.0%
ANN20		1	3	10	3			4	21	23.5%
PTF										
ANN18	4	46	41	83	37	16		103	330	40.1%
ANN19	13	82	45	90	59	17	1	112	419	45.8%
ANN20	5	47	39	78	42	21	2	92	326	39.2%
ChEL										
ANN18			1	3					4	25.0%
ANN19			2	1				2	5	66.7%
ANN20			1	1				1	3	50.0%
PD2M										
ANN18	3	42	48	80	27	8	2	71	281	44.7%
ANN19	3	66	47	87	40	10	1	100	354	45.8%
ANN20	2	49	42	69	28	9		75	274	46.7%

Demographics

Forum Programming by Ethnicity

Chairs/Co-Chairs/Presenting Authors

	Afr Amer	Asian	Cauc	Hisp	Nativ e Amer	Other	Not Prov	Gran d Total	% not provid ed	% cauc	%asia n
NSEF											
ANN18	1	58	39	8		6	220	332	66%	35%	52%
ANN19	2	66	55	12		10	180	325	55%	38%	46%
ANN20	2	40	28	6		4	133	213	62%	35%	50%
COMSEF											
ANN18	4	34	43	6		8	147	242	61%	45%	36%
ANN19	3	55	82	6		10	178	334	53%	53%	35%
ANN20	2	50	55	8		3	191	309	62%	47%	42%
SEF											
ANN18	2	35	37	7		8	211	300	70%	42%	39%
ANN19	2	43	39	9		7	217	317	68%	39%	43%
ANN20	2	57	40	13		13	251	376	67%	32%	46%
NAMF											
ANN18		8	11				27	46	59%	58%	42%
ANN19		10	24	1		2	48	85	56%	65%	27%
ANN20		8	14	3		1	41	67	61%	54%	31%

	Afr Amer	Asian	Cauc	Hisp	Nativ e Amer	Other	Not Prov	Gran d Total	% not provid ed	% cauc	%asia n
UEFA											
ANN18		2	2			2	20	26	77%	33%	33%
ANN19		10	2				34	46	74%	17%	83%
ANN20	1	5	2			1	12	21	57%	22%	56%
PTF											
ANN18	1	56	37	6		12	218	330	66%	33%	50%
ANN19	3	70	64	7		15	260	419	62%	40%	44%
ANN20	4	57	60	7		13	185	326	57%	43%	40%
ChEL											
ANN18			1				3	4	75%	100%	0%
ANN19			2				3	5	60%	100%	0%
ANN20			1				2	3	67%	100%	0%
PD2M											
ANN18		26	61	5		7	182	281	65%	62%	26%
ANN19	1	37	78	9		14	215	354	61%	56%	27%
ANN20	2	27	57	6		14	168	274	61%	54%	25%