

Joint Simulation Subcommittee ACP80(1)

2021 Subcommittee Annual Meeting

January 5, 2021 | 12:00 – 1:30p EST Online | Part of <u>2021 TRB Annual Meeting</u>

1. Background

The Simulation Subcommittee (SimSub) is a joint subcommittee of <u>ACP80</u> and <u>ACP50</u>. SimSub is envisioned to be a modified, better focused version of the previous <u>AHB45(1)</u>: to converge and support dialogue between key industry, user-related, and research groups in the traffic simulation field as to foster partnerships, joint efforts, and improve products.

2. Meeting Objectives

- Communicate SimSub's proposed mission, role, structure, and potential activities.
- Gather meaningful feedback on the above as to enhance and formulize SimSub.
- Identify both short- and long-term SimSub activities and get SimSub up and running!

3. Attendance

At peak, there were 114 attendees. Those that signed-in (61) are listed in <u>Appendix A</u> and composed of 52% academics, 18% consultants, 13% vendors, 8% state DOT, 5% federal DOT, 2% local DOT, and 2% other.

4. Meeting Notes¹

• Welcome and Introduction

- Chris Melson (LTRC) welcomed attendees and initiated meeting.
- Chris stated that SimSub has been restructured as ACP80(1), that himself and John Shaw (InTrans) were the new Cochairs, and that SimSub was sponsored by ACP80 and ACP50².
- Attendees completed a welcome poll specifying their simulation-related, organizational, and geographical background. Poll results are in <u>Appendix B</u>.
- History of "Old" SimSub AHB45(1)
 - George List (NC State University) presented a comprehensive history of the previous SimSub, including its formation, past officers, activities, and task groups. Please see <u>attached presentation slides</u> ("SimSub History").
 - George suggested that the current SimSub should continue to: (1) provide a forum for discussion/information exchange, (2) recommend actions to sponsoring committees,

¹ Meeting notes were prepared by Chris Melson with assistance from John Shaw and Rachel James.

² Additional sponsoring committees were added after the meeting. Sponsoring committees now include: ACP20, ACP25, ACP35, ACP40, ACP50, ACP55, ACP80, AEP40, and AMS10.

(3) maintain its liaison role, (4) promote basic research on simulation models, and(5) identify user needs.

- Mohammed Hadi (Florida International University) reflected on the success of the previous SimSub, and echoed George's recommendations.
- Introduction of "New" SimSub and Focused Discussion ACP80(1)
 - John explained how the role/activities of the previous SimSub are now divided among ACP80 and its two subcommittees—as shown in Figure 1.



Figure 1. Overview of ACP80, ACP80(1), and ACP80(2).

- ACP80 will focus on maintaining, enhancing, and promoting use of the Transportation System Simulation Manual (TSSM). ACP80(2) will focus on identifying, prioritizing, and pursuing funding to address research needs (generally, but especially as it relates to TSSM).
- Attendees agreed that identifying user needs is a key role of SimSub. This includes:
 - A Strong Link to the Practitioner Community: Eric Tripi (GHD) stated that SimCap would welcome collaboration on user needs collection. Soheil Sajjadi (Arcadis) stated that the SimCap/SimSub relationship was discussed previously and shared <u>the attached presentation</u> ("SimSub SimCap Collaboration").
 - *A Collection Mechanism:* Mohammed suggested investigating how user input is collected for the HCM and inviting ACP40 to present on the topic. Tom Creasey (Caliper) welcomed this collaboration. Dave Stanek (Fehr & Peers) stated ACP40 maintains an <u>HCM website</u> which includes a forum to collect users' feedback and questions on the manual. Sanhita mentioned that the ACP80 website may also be used to collect user needs.
 - *Responding to (Coordinating) User Needs:* Attendees agreed that SimSub should also serve a coordinating role by directing user needs to the appropriate entity for resolution. Monty Abbas (Virgina Tech) mentioned we could direct the user to existing guidance, organize a topical webinar, or recommend as future research to a liaison committee. This spurred

discussion on developing a "living" library of reference material (models, guidelines, research papers, case studies, etc.) that SimSub could host.

- Attendees agreed SimSub should go beyond collecting existing needs by identifying anticipated needs and fostering new opportunities (i.e., encouraging collaboration and information sharing between liaison committees).
- It is envisioned that ACP80 would continue the best paper and lifetime achievement awards of the previous SimSub. Kaan Ozbay (NYU) suggested SimSub should continue an award as a collective community (as a collection of liaison committees versus a single committee).
- Attendees completed a poll to determine the primary roles of SimSub. These roles gained the most support: (1) collecting and organizing information about what other organizations and TRB committees are doing (selected by 77% of participants), (2) organizing webinars and workshops to disseminate technical information about best practices (70%), (3) identifying user needs (67%), and (4) identifying existing resources to address user needs (63%). Full results are shown in Appendix C.
- Chris presented the proposed SimSub liaison structure³ (Figure 2). It includes:
 - *Industry:* liaisons from relevant agencies and professional organizations;
 - *User:* representatives of broad user communities: (1) *administrators*—local and state DOT affiliates initiating simulation studies, managing related programs, carrying agency responsibility of results, etc., (2) *data providers* private vendors providing data used in model development, (3) *modelers* consultants developing models, conducting analyses, and presenting results, and (4) *vendors*—vendors of modeling software.
 - *Research:* comprehensive list of liaison TRB committees.



Figure 2. SimSub liaison structure.

³ Additional professional organizations and TRB committees were added after the meeting. Please see the most up-to-date list in <u>Appendix D</u> which includes identified liaisons (preliminary).

- Samer Hamdar (George Washington University) volunteered to be liaison for ACP50 and AMR20.
- Rob Bertini (Oregon State University) encouraged expanding collaboration across the Safety and Operations Group—including with safety and human factors.
- Dave Petrucci (FHWA) recommend adding ACS20.
- Attendees generally agreed this was an appropriate structure—as indicated by the poll results in <u>Appendix E</u>.
- Mohammed mentioned that it may not be possible for this many liaisons to provide updates during SimSub meetings. Chris mentioned SimSub will investigate ways to still provide liaison updates (perhaps via a newsletter or other electronic methods). Attendees agreed that SimSub should not start their own newsletter but coordinate with/contribute to other committee newsletters.

• Open Discussion

- Chris presented discussion topics collected via a survey sent out with the meeting agenda (12/29). Topics (comprising mainly of user needs) were not discussed in detail—but served as an exercise in collecting user needs, SimSub analyzing these needs, and recommending actions. Topics are summarized in Appendix F.
- Chris opened the floor to any liaison committees wishing to provide updates:
 - *ITE SimCap Committee:* Eric Tripi advertised the upcoming SimCap meeting (1/12). If interested in becoming involved in SimCap, please contact Eric (eric.tripi@ghd.com).
 - *ACP40:* Dave Stanek advertised the upcoming <u>ACP40</u>, <u>ACP40(1)</u>, <u>ACP40(2)</u>, <u>ACP40(3)</u>, <u>ACP40(4)</u>, <u>ACP40(5)</u>, and <u>ACP40(6)</u> meetings. Dave mentioned that the HCM simulation chapter needs updating and solicited volunteers.
 - *ACP20:* Lin Zhang (ETG) advertised the upcoming <u>ACP20(2)</u> meeting. ACP20(2) conducted a similar survey and the identified user needs match well with what was presented.

• Wrap Up

• Chris adjourned the meeting.

5. Action Items

- Chris Melson/John Shaw to develop initial set of liaisons (Jan.).
- Chris Melson/John Shaw to draft charter (or similar), more formalizing SimSub's purpose, roles, and liaison structure (Feb.).
- Chris Melson/John Shaw/Others to identify initial activities to pursue and volunteer opportunities (Feb.). May involve establishing task groups (directly tied to defined SimSub roles), and may include: (1) identifying user needs (methods, mechanisms, schedule, partners, etc.), (2) collecting and organizing resources in a "living" library, and/or (3) supporting information sharing across liaison organizations/committees.
- Chris Melson/John Shaw to organize regular meetings with liaisons (but opened to all). Expect first meeting to discuss identified activities and volunteer opportunities (Mar.).
- Please contact Chris (<u>cmelson1@lsu.edu</u>) or John (<u>jwshaw@iastate.edu</u>) with suggestions on activities or any other feedback.

Appendix A: Attendee List

Attendees are listed in alphabetical order by last name.

Name	Organization	Organization Type
Monty Abbas	Virginia Tech	Academic
MD Jahedul Alam	Dalhousie University	Academic
Taraneh Ardalan	University of Pittsburgh	Academic
Joe Blasi	HNTB	Consultant
Mark Brackstone	Aimsun Ltd.	Vendor
Christine Buisson	Univ. Eiffel (formerly Ifsttar)	Academic
Geline Canayon	Aimsun Ltd.	Vendor
Ryan Casburn	Kittelson	Consultant
Chris Day	Iowa State University	Academic
Sudheer Dhulipala	WSB	Consultant
Maryam Ghaffari Dolama	University of Manitoba	Academic
Yiheng Feng	Purdue University	Academic
Parry Frank	СМАР	Local government
Jinping (Jenna) Guan	MIT	Academic
Sky Guo	Texas A&M University	Academic
Mohammed Hadi	Florida International University	Academic
Samer Hamdar	George Washington University	Academic
John Hourdos	University of Minnesota	Academic
Michael Hunter	Georgia Institute of Technology	Academic
Diane Jacobs	Caltrans	State government
Rachel James	FHWA	Federal government
Randy Johnson	DKS Associates	Consultant
Michael Kyte	University of Idaho	Academic
Betsy LaRue	PTV Group	Vendor
Kerstin Lemke	BASt	Academic
Jiangchen Li	University of Alberta	Academic
Taylor Li	UT Arlington	Academic
Zichuan Li	Transurban	Vendor
Mena Lockwood	VA DOT	State government
Jochen Lohmiller	PTV Group	Vendor
Yingyan Lou	Arizona State University	Academic
Hongyu Lu	Georgia Tech	Academic
Mahmoud	Florida International University	Academic
Marilo Martin-Gasulla	PTV Group	Vendor
Behzad Bamdad Mehrabani	UC Louvain	Academic
Christopher Melson	LTRC	Academic
Nikola Mitrovic	ITS Digital Lab @ Siemens	Vendor
Venkat Nallamothu	AASHTO	Other
Keir Opie	Cambridge Systematics	Consultant

Table A-1. List of attendees.

Name	Organization	Organization Type
Puteri Paramita	University of Manitoba	Academic
Dante Perez-Bravo	Atkins	Consultant
Dave Petrucci	FHWA	Federal government
Mike Reese	NC DOT	State government
Paolo Rinelli	Aimsun	Vendor
Theresa Rohlfs	OR DOT	State government
Dhwani Shah	University of Windsor	Academic
John Shaw	Iowa State University	Academic
Jisup Shim	TU Delft	Academic
Maryam Shirinzad	Texas A&M Transportation Institute	Academic
Alexander Skabardonis	UC Berkeley	Academic
Dave Stanek	Fehr & Peers	Consultant
Raphael Stern	University of Minnesota	Academic
James Sturrock	FHWA	Federal government
Elsa Tedla	The University of Alabama	Academic
Eric Tripi	GHD	Consultant
Peter Vortisch	Karlsruhe Institute of Technology	Academic
Andrew Warren	AR DOT	State government
Scott Washburn	University of Florida	Academic
Ken Yang	AECOM	Consultant
Mark Yedlin	GPI	Consultant
Lin Zhang	Elite Transportation Group (ETG)	Consultant

Appendix B: Welcome Poll

Summary of attendees' simulation-related, organizational, and geographical background are shown in Figures B-1—B-3, respectively.

Q1. What is (are) your primary role(s) in traffic analysis and simulation? (Multiple Select, 46 Submissions)

A. Applying model outputs developed by others		
	23.9%	11
B. Implementing project-level modeling		
	32.6%	15
C. Overseeing modeling applications		
	30.4%	14
D. Developing traffic analysis/simulation software packages		
	37.0%	17
E. Researching traffic operations		
	71.7%	33
F. Other		
	6.5%	3

Figure B-1. Attendees' simulation-related experiences.

Q2. Which best describes the type of organization you work for? (Single Answer, 46 Submissions)

A. Local government		
	0.0%	0
B. State government		
	6.5%	3
C. Federal government		
	4.3%	2
D. Consulting firm		
	17.4%	8
E. University of research institution		
	58.7%	27
F. Software developer/publisher		
	10.9%	5
G. Other		
	2.2%	1

Figure B-2. Attendees' organizational affiliation.

Q3. In which geographical areas do you primarily work? (Single Answer, 46 Submissions)

A. United States

	76.1%	35
B. Canada		
	4.3%	2
C. European Union (EU-27)		
	17.4%	8
D. United Kingdom		
	2.2%	1
E. Elsewhere in Europe		
	0.0%	0
F. Australia/New Zealand		
	0.0%	0
G. Elsewhere on Earth		
	0.0%	0

Figure B-3. Attendees' primary geographical area.

Appendix C: Envisioned Roles of SimSub

Figure C-1 shows potential roles of SimSub attendees considered important and recommended pursuing.

Q1. Which roles do you envision as important for ACP80(1), the new SimSub? (Multiple Select, 30 Submissions)

A. Collecting and organizing information about what other organizations and TRB committees are doing that is related to traffic modeling

	76.7%	23
B. Expanding awareness/promoting use of TSSM (or other research p	products)	
	50.0%	15
C. Identifying user needs (especially users of research products)		
	66.7%	20
D. Identifying existing resources to address user needs (or to improve products)	research	
	63.3%	19
E. Fostering partnerships between key industry, user, and research gr mechanism for collaboration)	oups (providin	g a
	46.7%	14
F. Organizing webinars and workshops to encourage awareness of trageneral	affic modeling i	n
	43.3%	13
G. Organizing webinars and workshops to disseminate technical inform practices in traffic modeling	mation about b	est
	70.0%	21

Figure C-1. Attendees' selection of the primary roles of SimSub.

Appendix D: List of Liaisons (Preliminary!!)

Table D-1 lists potential "industry" liaisons (those from relevant external agencies and professional organizations).

Organization	Identified Liaison	Affiliation
AASHTO		
Committee on Transportation System Operations	Venkat Nallamothu ¹	AASHTO
Committee on Traffic Engineering	Neil Boudreau ¹	MA DOT
ASCE		
Connected & Autonomous Vehicles Impacts Committee	2	
Street and Highway Operations Committee	2	
FHWA	Jim Sturrock ³	FHWA
IEEE		
Intelligent Transportation Systems Society	<u></u> 2	
ITE		
Management and Operations	Douglas Noble ¹	ITE
SimCap Committee	Eric Tripi	GHD

Table D-1. Industry-related liaisons.

¹Not yet confirmed; ²Not yet identified; ³Member of ACP80

Table D-2 lists potential "representatives" of broad user communities. "Administrators" comprise of state DOTs that have contributed to TPF-5(176) and TPF-5(458). They represent a core group of engaged DOTs with traffic simulation activities/programs, identified champions, and who are motivated to improve the state-of-the-practice. Data providers include the most utilized providers of traffic-related data. Although not specific to traffic simulation, data provided by these companies are becoming common data sources for model development. Table D-2 also includes a semicomprehensive list of vendors of traffic simulation software, open-source simulators, and emerging AV-related simulators.

Table D-2. User-related "representatives".

Organization	Identified Liaison
Administrators	
CA DOT	Diane Jacobs ^{1,3}
CO DOT	Charles Meyer ¹
FL DOT	Thomas Hill ^{1,3}
LA DOT	Jody Colvin ¹
GA DOT	2
MA DOT	Jim Danila ¹
MD DOT	Subrat Mahapatra ¹
MI DOT	Jason Firman ¹
MO DOT	Ray Shank ¹
NC DOT	Jim Dunlop ^{1,3}
NJ DOT	Wasif Mirza ¹
NV DOT	Hoang Hong ¹
NY DOT	Uchenna Madu ¹
OH DOT	2
TX DOT	2
VA DOT	Sanhita Lahiri ^{1,3}
WA DOT	LisaRene Schiperoort ^{1,3}
WI DOT	Vicki Haskell ^{1,3}

Organization	Identified Liaison	
Data Providers		
Streetlight Data	Jim Hubbell ¹	
INRIX	2	
HERE	2	
WAZE	2	
TomTom	2	
AirSage	2	
Vendors		
Aimsun, Inc.	Jordi Cases ^{1,3}	
PTV Vissim	Jochen Lohmiller ^{1,3}	
INRO	Michael Mahut ^{1,3}	
Caliper Corporation	Daniel Morgan ^{1,3}	
McTrans	Behzad Aghdashi ¹	
Citilabs	2	
Metropia	Yi-Chang Chiu ¹	
Trafficware	2	
DTALite	Xuesong Zhou ¹	
Sidra	2	
Paramics	2	
CARLA	2	
Apollo	<u></u> 2	

¹Not yet confirmed; ²Not yet identified; ³Member of ACP80

Table D-3 lists proposed liaison TRB committees and their respective SimSub liaison.

Committee	Identified Liaison	Affiliation
A0030C: City Transportation Issues	<u></u> 2	
ACS20: Safety Performance Analysis	<u>2</u>	
ACP10: TSMO	2	
ACP20: Freeway Operations	Lin Zhang	ETG
ACP25: Traffic Signal Systems	Taylor Li Yiheng Feng	UT-Arlington Purdue
ACP30: Vehicle-Highway Automation	Jiaqi Ma	UCLA
ACP35: Managed Lanes	MD Sakoat Hossan	Kittelson
ACP40: Highway Capacity and Quality of Service	Dave Stanek	Fehr and Peers
ACP50: Traffic Flow Theory and Characteristics	Kaan Ozbay Samer Hamdar	NYU GWU
ACP55: Traffic Control Devices	Praveen Edara	U. of Missouri
ACP70: Highway Traffic Monitoring	Mena Lockwood Russel Lewis	VA DOT WI DOT
AEP40: Transportation Network Modeling	Xuesong Zhou	ASU
AKD10: Performance Effect on Geometric Design	Mike Reese	NC DOT
AKR50: Road Weather	<u>2</u>	
AMR20: Disaster Response, Emergency Evacuation	Samer Hamdar	GWU
AMS10: Air Quality and Greenhouse Gas Mitigation	Georges Bou Saab Babu Veeregowda Kanok Boriboonsomsin	Arcadis HNTB UC-Riverside
AT015: Freight Planning and Logistics	Sushant Sharma	TTI

Table D-3. TRB committee liaisons.

²Not yet identified

Appendix E: Feedback on Proposed Liaison Structure

Figure E-1 shows attendees' general feedback on the presented SimSub liaison structure.

Q1. As presented, the ACP80(1) liaison list and structure: (Single Answer, 14 Submissions)

A. Included too many stakeholders (should be more focused)		
	14.3%	2
B. Is generally well-organized and included the main, necessary partne	ers	
	71.4%	10
C. Included the main, necessary partners but should be re-organized		
	14.3%	2
D. Is missing key partners		
	0.0%	0

Figure E-1. Attendees' feedback on proposed liaison structure.

Appendix F: Topics (User Needs) Collected from Survey

Table F-1 lists responses from a survey soliciting discussion topics at the SimSub meeting. Responses mainly comprised of user needs (in some form) and are organized by like category.

Table 1 1. Toples (user needs) concered nom survey.
Calibration/Validation
Calibration, validation, the difference between calibration and validation, model overfitting, data for calibration and validation
Best practices in calibrating traffic simulation models
Calibration of simulation models in no data environment
Customized calibration criteria
Data set sharing to support calibration and validation
Model validation criteria
My understanding is that all commercial traffic simulations are not calibrated for acceleration profiles. When I use VSP analysis I can calculate emissions but since the accelerations are not based on driver behavior the emissions calculation is meaningless. We program millions of CMAQ based on simulation output, and reasonable accelerations would help us fund the best projects.
Connected and Automated Vehicle (CAV) Modeling
Safety and mobility impacts assessment of emerging technologies through simulation
Latest developments on integration of CAV to microsimulation software/methodologies
Traffic simulation using connected and automated vehicles – what's their future? Which models are best? How to design better models?
Other
Simulation guidelines, multimodal simulation (interaction among vehicles, rail, bicycles, etc.)
Discussion on application/best practices/success stories of implementation of latest FHWA Traffic Analysis Toolbox Vol. 3. Also, best practices for use/application and integration of macro/meso/microscopic modeling.
Use of simulated performance measures to augment safety-related analysis

Table F-1. Topics (user needs) collected from survey.