Practical Big Data Workshop 2019

Michigan League

University of Michigan, Ann Arbor

Thursday, June 6th - Saturday, June 8th

Practical Big Data Workshop 2019

Welcome!

We are so glad that you are here for **Practical Big Data Workshop 2019**. This is such an exciting time in cancer care, with a vibrant community of physicians, physicists, data scientists, industry partners, administrators, therapists and others forming to change the landscape of cancer care so that data gathered from routine care for today's patients can be used to improve decision frameworks for tomorrow's patients. It is going to be an exciting few days of presentations seeding lively discussions and debate.

We want to thank our sponsors for making this meeting possible. Your support is what makes bringing this community together possible. The workshop would not be possible without the tremendous support we have had from the **Department of Radiation Oncology at the University of Michigan**. Many people have worked along with our producer, **Chuck Mayo**, on various aspects of the local arrangements to make your days here with us enjoyable and productive. Thank you for your help.

We want to extend a special thank you to **Marc Kessler** who has spent many, many hours on the meeting planning and putting together the social programs. Thanks also to **Kirk Brown** who has done a tremendous job coordinating arrangements, assembling the program document and doing anything needed to support the meeting. Again this year we are grateful to **Dan Polan** for the support he provides to the meeting assuring that upload process for the presentations works smoothly. We also want to thank the media team at UM; **Brian Smith, Steven Kronenberg & Steve Jordan**, who made it possible to record presentations (for those presenters who wished to use this service). Thanks to **Scott Hadley** who provided the excellent map of great local spots to hang out in the evenings. Thank you all so much for your dedication and enthusiasm for the workshop!

This is a tremendous community. Thank you to you all for your dedication and enthusiasm for coming together to share your insights and experience here at PBDW 2019.
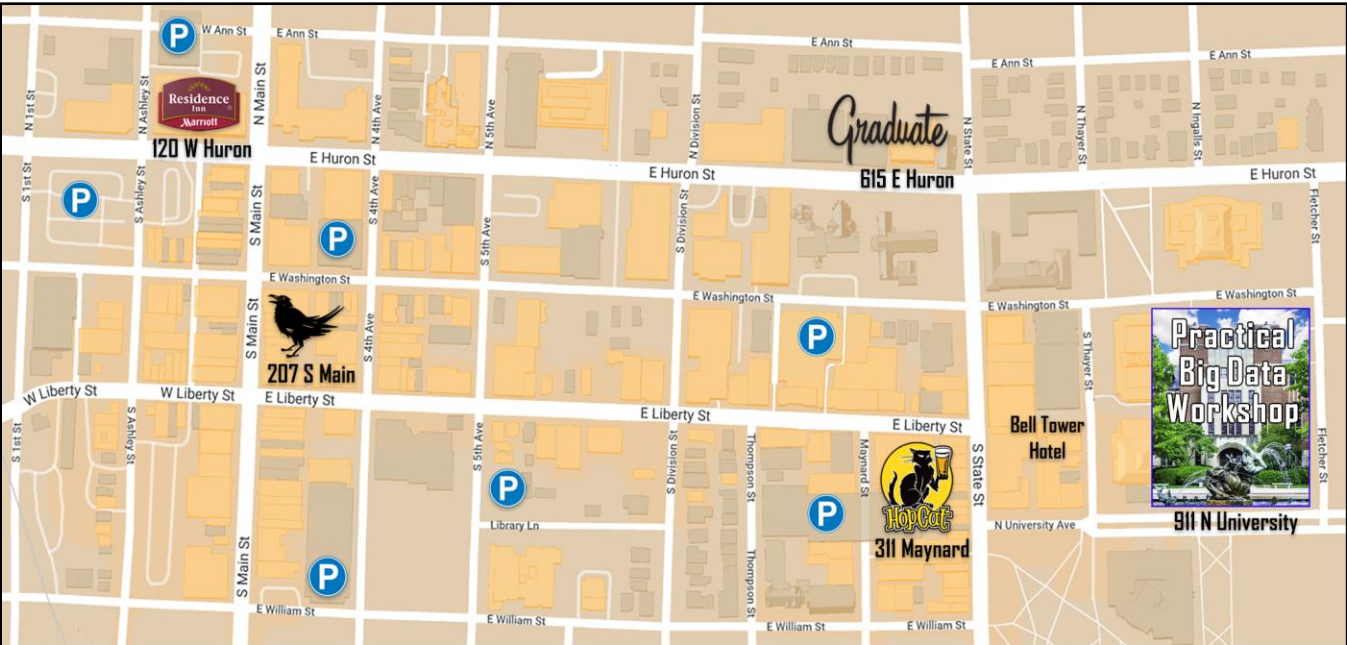
Ying Xiao & David Fuller

Workshop Directors

Planning Committee		
Ying Xiao, PhD	David Fuller, MD, PhD	Charles Mayo, PhD
Keyvan Farahani, PhD	John Kang, MD, PhD	Issam El Naqa, PhD
Kristy Brock, PhD	Fang-Fang Yin, PhD	Bhadrasain Vikram, MD

Local Arrangements		
Kirk Brown, MBA	Gabe Dotson	Scott Hadley, PhD
Linda Hearing	Steve Jordan	Marc Kessler, PhD
Steven Kronenberg	Dan Polan	Brian Smith
Dylan Smith	Scott Wood, MBA	

Wednesday, June 5th | Welcome Gathering @ The Ravens Club

19:00 - **Pre-workshop gathering** - Food and Merriment at The Ravens Club @ 207 South Main Street
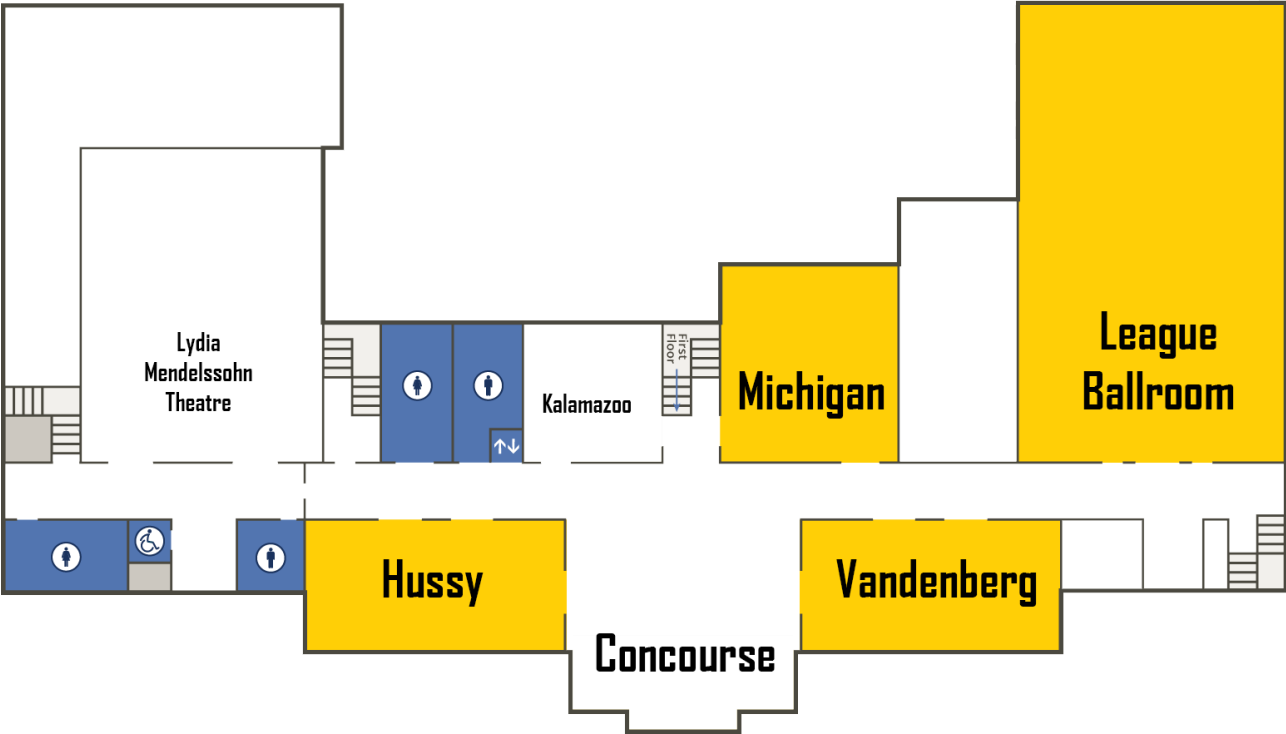
Downtown Ann Arbor & Major Workshop Venues

Street parking in Ann Arbor uses the epark mobile app

Michigan League Room Layout

All sessions, registration, breaks and lunches take place on the 2nd floor

Main Entrance (1st floor)

Enter the Michigan League on the first floor across from fountain

Thursday, June 6th | NVIDIA Hackathon and Panel Discussions

8:00 (30)   **Registration and Continental Breakfast**

Vandenberg Room on the 2nd floor

8:30 (210)   **NVIDIA Hackathon** - led by Raghav Mani, MS - NVIDIA – Developer Relation Manager

Teaching Assistants: Zaid Siddiqui, PhD - Beaumont Hospital

Huan-Hsin Tseng, PhD - University of Michigan

Hui Lin, PhD - University of Pennsylvania

Introduction to machine learning tools including:
- Data preparation
- Engineering features
- RAPIDS libraries using CUDA-X AI to access GPU functionality
- Gradient boosting XGBoost using RAPIDS
- Clustering & Graph techniques available in RAPIDS

The NVIDIA Hackathon will be carried out using web access of Jupyter Notebooks or the Python environment. Links will be provided at the time of the hackathon.

12:00 (60)   **Lunch and Networking**

13:00 (135)   **Hands on work using RAPIDS on different data sets**

15:15 (15)   **Break**

Panel Discussions and Debate - Building Careers in Health Care Big Data, Analytics and AI

15:30 (45)   **From the perspective on industry**

NVIDIA - Sandra Chehab, CMA - Strategic Alliance Manager

Varian - Anthony Lujan, PhD - Grants Management and Collaboration Strategy

RaySearch - Dayna Bodensteiner, CMD - Director of Product Management

Elekta - Rui Lopes, MBA - Director Business Marketing

Microsoft - Rich Caruana, PhD - Senior Researcher

16:15 (45)   **From the perspective on Clinical and Academic Environments**

Physician Scientist Perspectives

Dave Fuller, MD, PhD – MD Anderson Cancer Center

Reid Thompson, MD – Oregon Health And Science University

Physicist Perspectives - Chuck Mayo, PhD – University of Michigan

NIH Perspectives on Funding - Keyvan Farahani, PhD - NCI/NIH

18:00 - Move to Post Hackathon Gathering at the Hop Cat @ 311 Maynard Street!

7:15 (40)　　**Registration and Continental Breakfast**

Michigan League Ballroom - 2nd floor

7:55 (5)　　**Welcome & Meeting Logistics**

　　　Ying Xiao, PhD - University of Pennsylvania & Dave Fuller, MD, PhD - MD Anderson

8:00 (25)　　**Treatment Planning and Image Processing in the Age of AI**

　　　Lei Xing, PhD - Stanford University

8:25 (25)　　**Curating Data for Inclusion in The Cancer Imaging Archive (TCIA)**

　　　Lawrence Tarbox, PhD - University of Arkansas – Director, Center for HPC

8:50 (45)　　**Friends Don't Let Friends Deploy Black-Box Models:**

　　　The Importance of Intelligibility in Machine Learning for Healthcare

　　　Rich Caruana, PhD – Microsoft - Principal Researcher

9:35 (35)　　**AI Transformation in Healthcare**

　　　Sandra Chehab, CMA - NVIDIA - Strategic Alliance Manager

10:10 (20)　　**Break**

10:30 (25)　　**Semantic Integration of Non-Image Data in TCIA with Biomedical Ontologies**

　　　Jonathan Bona, PhD - University of Arkansas

10:55 (35)　　**The three S's of AI: Standards, Standardization and Scalability**

　　　Chris Treml, MSE - ACR – Director, Data Science Institute

11:30 (25)　　**NCI initiatives in support of Big Data research**

　　　Keyvan Farahani, PhD - NCI/NIH - Program Director - Image-Guided Interventions

11:55 (70)　　**Lunch & Networking in the League Ballroom**

13:05 (230)　**Breakout Sessions**

　　　1. **Big Data and Artificial Intelligence Enabling Standardizations**
　　　2. **Artificial Intelligence and Machine Learning Methodologies**
　　　3. **Big Data in Imaging Applications**

17:00 (120)　**Workshop Reception**

19:00　　**Night Out in Ann Arbor!**

Breakout Session 1 - Big Data & Artificial Intelligence Enabling Standardizations

Group leaders: Charles Mayo, PhD and Reid Thompson, MD

Michigan Room - 2nd floor

13:05 (20)   **Key Data Elements, Relationships and Ontology**
Mark Phillips, PhD - University of Washington

13:25 (20)   **Imaging, Radiomics and Ontology**
Reid Thompson, MD - Oregon Health & Science University

13:45 (20)   **Promoting Standardized Radiotherapy Nomenclature
and Collection of Patient Reported Outcomes: a Pan-Canadian Approach**
Amanda Caissie, MD, PhD - St. John's / Dalhousie University

14:05 (20)   **Creating Scalable Data Centric Clinical Processes for Quality Datasets**
Charles Mayo, PhD - University of Michigan

14:25 (20)   **Break**

14:45 (20)   **Operationalizing Large Scale Aggregation of Patient Reported Outcomes**
Neil Martin, MD - Dana-Farber / Brigham & Women's Hospital

15:05 (20)   **Bridging the Gap: The need for clinical omics data integration
and standardization for rapid translation of research in the clinic**
Alberto Traverso, PhD - Princess Margaret Cancer Centre and MAASTRO Clinic

15:25 (20)   **"Big data" starts with small data - making operational data visible**
Joseph Killoran, PhD - Brigham and Women's Hospital

15:45 (20)   **Combining Clinical Big Data with Machine Learning to Improve Care Models**
Jeff Newell, MS - Varian Medical Systems - Engineering Director

16:05 (55)   **Roundtable discussion**

17:00   **Move to the Michigan League Ballroom for Workshop Reception**

Breakout Session 2 - Artificial Intelligence & Machine Learning Methodologies

Group leaders: John Kang, MD, PhD and Issam El Naqa, PhD

Vandenberg Room - 2nd floor

13:05 (20) **Intelligibility, Causality & Treatment Effects in Machine Learning from Medical Data**
    Rich Caruana, PhD - Microsoft - Senior Researcher

13:25 (20) **Bayesian Networks and Causal Inference**
    Yi Luo, PhD - University of Michigan

13:45 (20) **Deep Learning and Bayesian Machine Learning**
    Mike Dusenberry, BS - Google Research

14:05 (20) **Data Processing: Cross Validation, Bias Control, Missing Data, Limited Size and Data Heterogeneity**
    John Kang, MD, PhD - University of Rochester

14:25 (20) **Break**

14:45 (20) **Safe Implementation & Quality Assurance Considerations for AI**
    Issam El Naqa, PhD – University of Michigan

15:05(20)   **MEDomics: A Proposed Framework for Artificial Intelligence in Radiation Oncology**
    Olivier Morin, PhD - University of California San Francisco

15:25 (20) **MEDomicsLab: a computational platform for multi-omics modeling**
    Martin Vallières, PhD - McGill University and UCSF

15:45 (20) **Clinical Analytics, the Foundation of Practical Machine Learning**
    Sergii Gryshkevych, MS – RaySearch & Karl Berggren, PhD- RaySearch

16:05 (55) **Round Table Discussion**

Vandenberg

17:00   **Move to the Michigan League Ballroom for Workshop Reception**

Breakout Session 3 - Big Data in Imaging Applications

Group leaders - Keyvan Farahani, PhD and Kristy Brock, PhD

Hussey - 2nd floor

13:05 (20) **Accelerating the biological adaptive therapy paradigm with MOMENTUM**
John Christodouleas, MD, MPH – Elekta - VP of Medical Affairs and Clinical Research

13:25 (20) **SpineCloud: Image Analytics and Predictive Models for Spine Surgery Outcomes**
Jeff Siewerdsen, PhD - Johns Hopkins - Carnegie Center for Surgical Innovation

13:45 (20) **Adaptive Radiotherapy using Machine Learning**
Ke Sheng, PhD – UCLA - Associate Vice Chair of Radiation Oncology

14:05 (20) **Machine Learning Application to Diagnostic Imaging of Prostate Cancer**
Yoganand Balagurunathan, PhD - Moffitt Cancer Center

14:25 (20) **Break**

14:45 (20) **Studying Cancer Morphology with Gigapixel Images: Challenges and Approaches**
Tahsin Kurc, PhD - Stony Brook Cancer Center - Vice Chair Biomedical Informatics

15:05 (20) **Breast Cancer Imaging Radiomics**
Aimilia Gastounioti, PhD - University of Pennsylvania

15:25 (20) **QA Validation of Definitions in Radiomics Feature Ontology**
Lubomir Hadjiiski, PhD - University of Michigan

15:45(75) **Round Table Discussion**

17:00 **Move to the Michigan League Ballroom for Workshop Reception**

Saturday, June 8ᵗʰ | Main Session & Hot Topics Debate

7:15 (45) - **Continental Breakfast** - Michigan League Ballroom on the 2ʳᵈ floor

8:00 (25)   **ASTRO Perspectives on Evolving Standardization Landscape**
Randi Kudner, MFA – ASTRO - Senior Manager of Quality Improvement

8:25 (25)   **The Distributed Ecosystem:**
A Solution for Developing Privacy-Preserving Predictive Models
Carlotta Masciocchi, PhD- Università Cattolica del Sacro Cuore

8:50 (25)   **The Practical Implementation and Governance of a Big Data Research Platform and UK Network**
Gareth Price, PhD - University of Manchester

9:15 (25)   **Development of a Distributed Machine Learning Platform for Big Data Research**
Matthew Field, PhD - Cancer Institute University of New South Wales

9:40 (25)   **Distributed Learning at Scale**
Andre Dekker, PhD - MAASTRO Clinic – Scientific Director

10:05 (20)   **Break**

Highlights and Controversies from Breakouts – Presentations and Discussions & Debate

10:25 (20)   **Breakout 1 Summary - Big Data & Artificial Intelligence Enabling Standardizations**
Reid Thompson, MD - Oregon Health And Science University

10:45 (20)   **Breakout 2 Summary - Artificial Intelligence and Machine Learning Methodologies**
John Kang, MD PhD - University of Rochester

11:05 (20)   **Breakout 3 Summary - Big Data in Image Guidance and Applications**
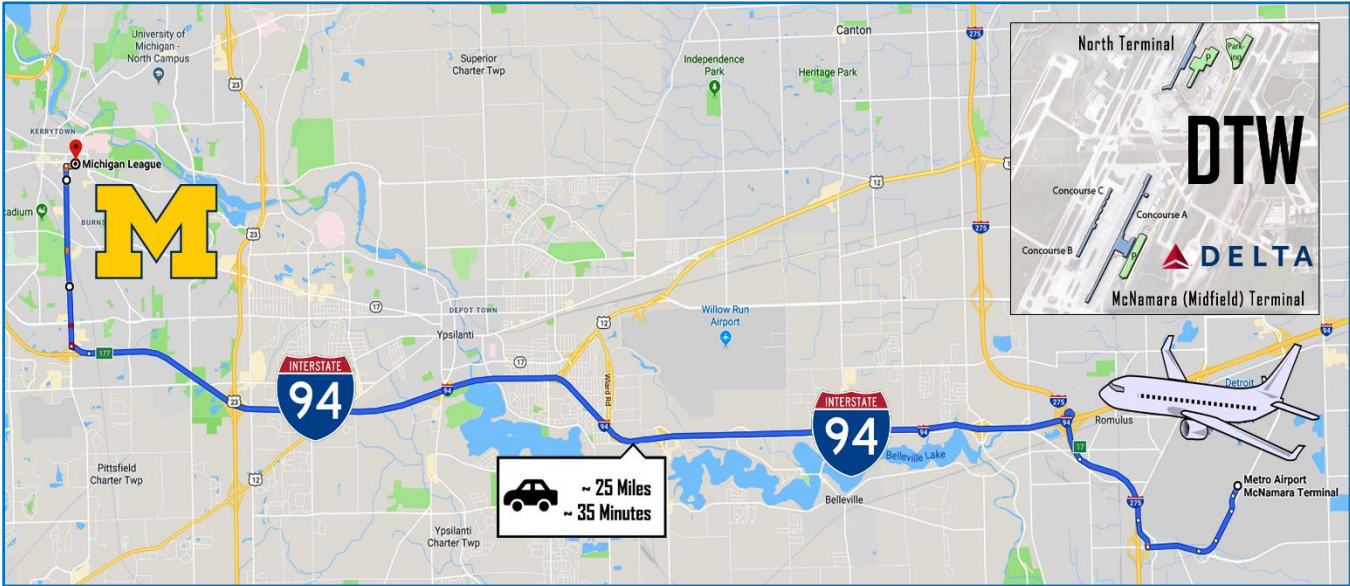Keyvan Farahani, PhD

11:25 (20)   **AAPM Integrative Efforts for Data Sciences and Standardizations**
Joe Deasy, PhD - Memorial Sloan Kettering Cancer Center

11:45 (30)   **Lunch – Grab a Box!**

12:15 (75)   **Hot Topics Debate**
Moderators Dave Fuller, MD, PhD and Ying Xiao, PhD

13:30   **Meeting Ends - Safe Travels!**

Transportation and Parking Information

The best way to reach Ann Arbor is to fly into Detroit International Airport (DTW) and use one of the taxi services, private car services or ride sharing options to reach your hotel or the Michigan League.

Click on the map above to bring up Google Maps for the route between DTW and UM!

There are two separate terminals at DTW; the **McNamara Terminal** which serves Delta Airlines, KLM and Air France and the **North Terminal** which serves most other airlines. The drive from the airport to Ann Arbor is usually about 30-40 minutes. At both terminals, ride sharing (e.g., Uber and Lyft), taxis and luxury sedan services are available. For both terminals, all ground transportation options are located **across the sky bridge** from the main terminals. Please note that areas for taxis and sedans is separate from the area for rideshare pickups!

Once across the sky bridge, follow signs to **Ground Transportation**

McNamara Terminal –Located on **Level 4** of the garage

North Terminal – Located on **Level 1** of the garage

Metro Cab: (734) 997-6500 | Metro Sedans: (800) 456-1701 | Golden Limo (800) 456-1701

Once across the sky bridge follow the signs to **Rideshare** (different location than Taxis and Sedans)

McNamara Terminal –Located on **Level 4** of the garage

North Terminal – Located on **Level 1** of the garage

Scott Hadley's Local Ann Arbor Guide

☕ ☀ Coffee ☀ ☕

Comet Best coffee and croissant!	**Espresso Royale** Scott's other office	**Avalon Cafe** Coffee, bread, other baked goods
Sweetwater's Get the lemon ginger tea	**RoosRoast** Lobster Butter Love!!	**Zingerman's** Super good baked goods

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Krazy Jim's Blimpy Burger Consult internet for correct ordering procedure … or else	**Blank Slate Creamery** Ice cream to die for! Long lines for a reason	**Zingerman's** World Famous Gourmet deli & sandwiches
Biercamp The pulled pork is amazing, but the beef brisket is a must eat.	**Tios** Climb Mt. Nacheesmo Hot sources galore!	**Fleetwood Diner** Hippy hash at 3am! Intoxication preferred.

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Earthen Jar OMG so good	**Blue Nile** Eat with your hands!	**Lunch Room** Modern Vegan	**Detroit St. Filling Station** Other Modern Vegan

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Frita Batidos Chorizo burger! Rum in a bag?	**Knight's Steakhouse** Linen, Steak, Seafood, Wine	**Sava's** Rad Onc lunch favorite
Red Hawk Scott's first haunt	**Slurping Turtle** Too many noodles to choose	**Hopcat** HUGE beer list, good bar food
TK WU Best Chinese in town	**Totoro** Quiet place for sushi	**Tomukun Noodle Bar** More than just noodles
Mani Osteria Loved the day it opened	**Vinology** These guys pair!	**Aventura** Tapas, fun, loud
Ruth's Chris Yea it's a chain, but great	**Chop House** Steaks & Drinks	**Blue Tractor** House made beer & BBQ
Pacific Rim Best seafood in town	**Raven's Club** Marc's haunt	**Gratzi** Best Italian in town
Grange Locally sourced, excellent food	**Isalita** Small plates, great drinks	**Black Pearl** Martinis, Oysters, Fish Tacos

🍸 🍺 🍷 🍺 Party Time 🍺 🍷 🍺 🍸

Arbor Brewing Scott's favorite	**Bill's Beer Garden** Outdoor beer and benches	**Beer Grotto** Just really good beers
Ann Arbor Distilling House made spirits & drinks	**Jolly Pumpkin** Known for sours	**Mash** Speakeasy-style bar
Grizzly Peak Trusty Ol' GP	**Bar 327 Braun Court** So hipster, so good!	**Old German** Ironically the newest place
The Last Word Classic bar	**Ashley's** Chuck's pick	**Raven's Club** Marc's haunt

Click on the map to access the on-line version

Miss Kim · Zingerman's Delicatesse… · Zingerman's Next Door C… · Bar 327 Braun Court · Detroit Street Filling … · Residence Inn by Downt… · Graduate Hotel · The Last Word · Blue Tractor BBQ & Brew… · Blue Nile Restaurant · Rackham · Sweetwaters Coffee & Te… · RoosRoast Liberty · Isalita · Sava's · Fletcher Parking (UofM) · Blank Slate Creamery · Jerusalem Garden · Thayer Structure (UofM) · The Chop House Ann Arbo… · Earthen Jar · Bell Tower · Michigan League · Maynard Parking (City $… · Espresso Royale · Ashley's

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Photo Uploads

Please help us collect photos from the sessions and social events @ PBDW 2019!

We have made it possible for you to upload the photos you take at the meeting

to Dropbox ... and .... you don't' even need to have a Dropbox account!

Just **click** on the one of the happy people in the picture below!

This will take to a webpage that will let you simply *drag and drop* your photos!

... its really that easy!

PBDW 2019 is requesting

Pictures

Only PBDW 2019 will see these files unless they choose to share them.

No picture is too serious; no picture is too silly! Express yourself!