

# Behavioral Mapping to Understand Collaboration

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Interim Managing Director, *Center for Transforming Pediatric Healthcare Delivery*

# SimTigrate Design Lab

## *Creating and Communicating Healthcare Value*

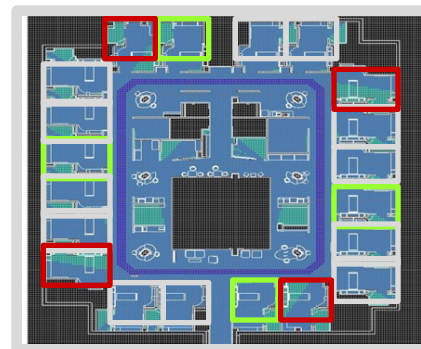
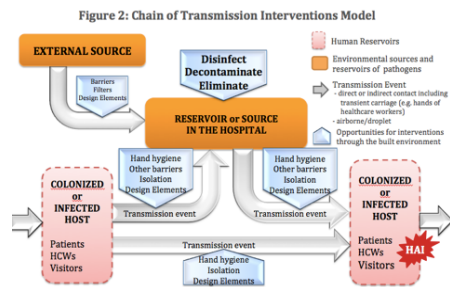
*Director, Craig Zimring*

Analyze Problems

Conduct Research

Speed up learning and  
innovation through  
simulation

Develop Guidance



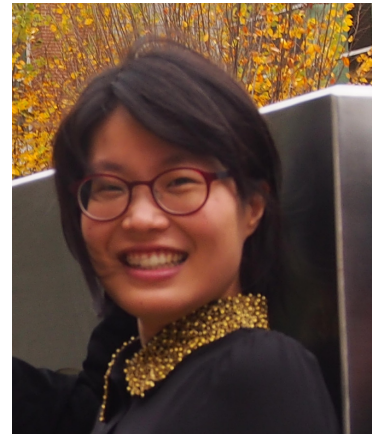
US Army Medical Command, Assistant Chief of Staff, Facilities  
US Army Health Facility Planning Agency

**Army MEDICINE**  
G9 Facilities  
Corporate CONOPS  
Patient Centered Medical Home

In partnership with  
Georgia Institute of Technology, SimTigrate Design Lab  
Martin, Blanck & Associates

# Special Thanks to....

- COA's Research Faculty Development Grant program
- Lisa Lim, PhD student
- Matt Swarts, Research Faculty



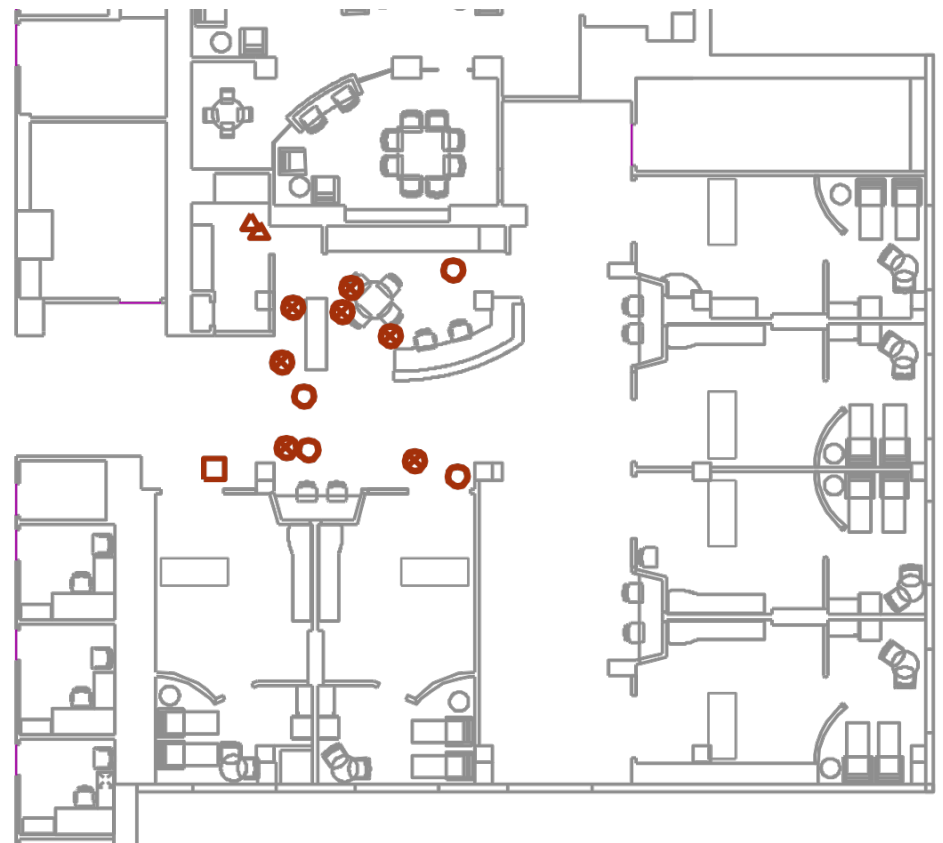
Lisa Lim



Matt Swarts

# Behavior Mapping

- A spatial record of activity
- Perspective can vary
  - Fixed view: all activity occurring in one defined space
  - Mobile view: activity that is encountered along a standard route through a space
  - Individual view: shadowing a single person to record their movement and activity through a space

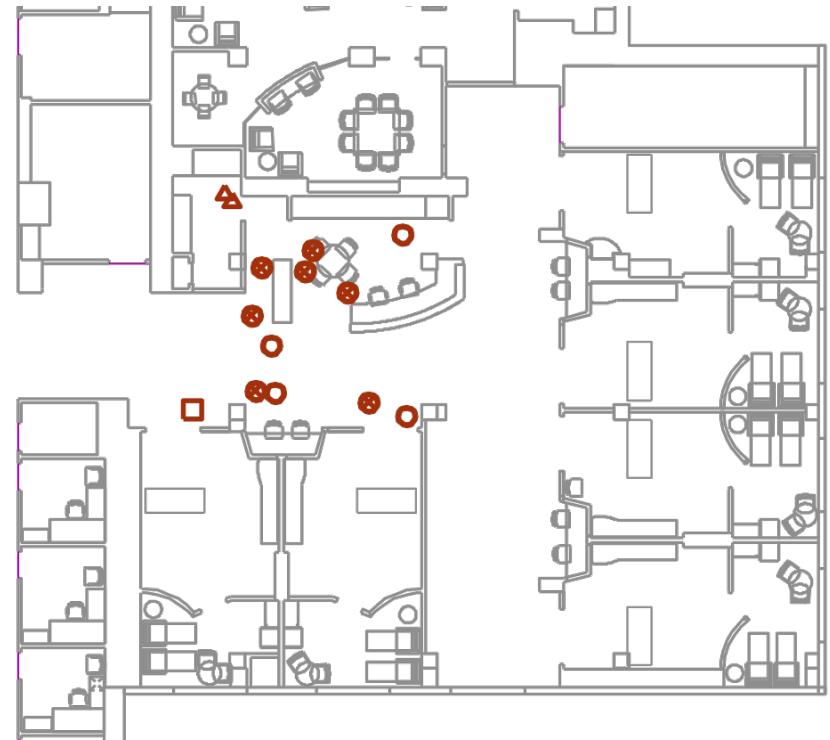




# What is the value of mapping behavior?

Room Name	Room Type	detail sNO	Date	headers Start DateTime	X coordinate	Y coordinate	detailsPersonT type
ENTRY	ENTRY	230	12/3/2014	8:45:42 AM	708	1784	patientandfamily
ENTRY	ENTRY	231	12/3/2014	8:45:42 AM	705	1699	patientandfamily
ENTRY	ENTRY	232	12/3/2014	8:45:42 AM	747	1681	patientandfamily
COR 1	CORRIDOR	233	12/3/2014	8:45:42 AM	712	1601	patientandfamily
COR 1	CORRIDOR	234	12/3/2014	8:45:42 AM	714	1561	patientandfamily
COR 3	CORRIDOR	235	12/3/2014	8:45:42 AM	709	1508	patientandfamily
COR 3	CORRIDOR	236	12/3/2014	8:45:42 AM	709	1466	patientandfamily
COR 3	CORRIDOR	237	12/3/2014	8:45:42 AM	710	1431	patientandfamily
COR 3	CORRIDOR	238	12/3/2014	8:45:42 AM	753	1358	patientandfamily
N/CMA	NURSE/CMA STATION	239	12/3/2014	8:45:42 AM	859	1215	cma
N/CMA	NURSE/CMA STATION	240	12/3/2014	8:45:42 AM	825	1213	cma
COR 11	CORRIDOR	241	12/3/2014	8:45:42 AM	910	738	cma
COR 11	CORRIDOR	242	12/3/2014	8:45:42 AM	907	769	patientandfamily
COR IN	CMA/SP OFFICE	243	12/3/2014	8:45:42 AM	828	261	administrator
CMA OF	CMA/SP OFFICE	244	12/3/2014	8:45:42 AM	809	212	behavioralhealth
CMA OF	CMA/SP OFFICE	245	12/3/2014	8:45:42 AM	752	207	behavioralhealth
PRO OF 2	PROVIDER OFFICE	246	12/3/2014	8:45:42 AM	701	86	provider
PRO OF 2	PROVIDER OFFICE	247	12/3/2014	8:45:42 AM	530	129	provider
PRO OF 2	PROVIDER OFFICE	248	12/3/2014	8:45:42 AM	556	120	others
PRO OF 2	PROVIDER OFFICE	249	12/3/2014	8:45:42 AM	530	76	provider

VS



# What can this contribute to architecture?

## The Impact of Nurse Station Typology on Nurses' Informal Communication and Peer Co-awareness

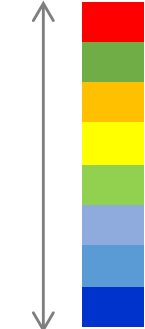
*Hui Cai, Ph.D.*

*Craig Zimring, Ph.D.*

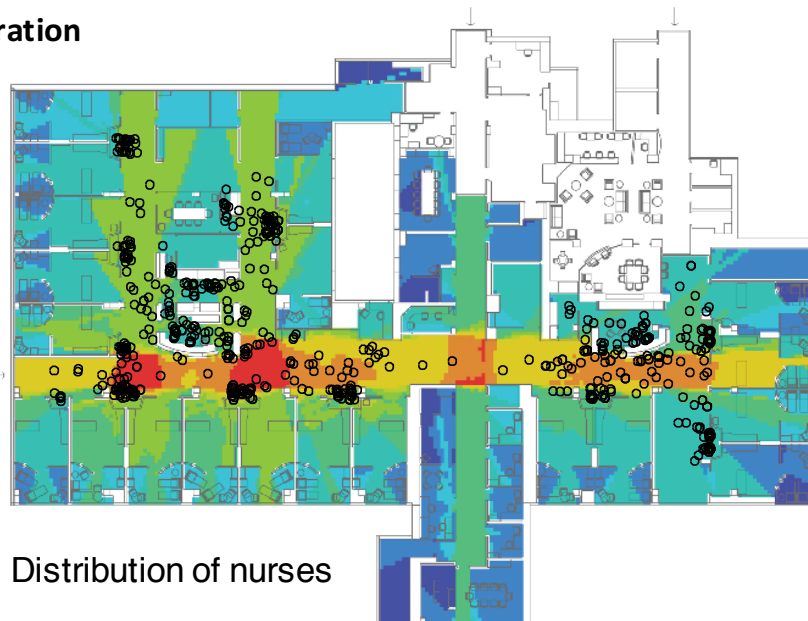
Question: What spatial configuration of nursing station's typology allows nurses to be close to the patients, yet keep the nurses connected and support informal communication and learning?

### Visual Integration

High



Low



Distribution of nurses



Distribution of nurses' interaction

# What can this contribute to architecture?

## Seating Patterns in a Hospital Waiting Room

*Michelle Ossmann, Ph.D. Candidate*

Question: How patients use the waiting area?



# Understanding Collaboration

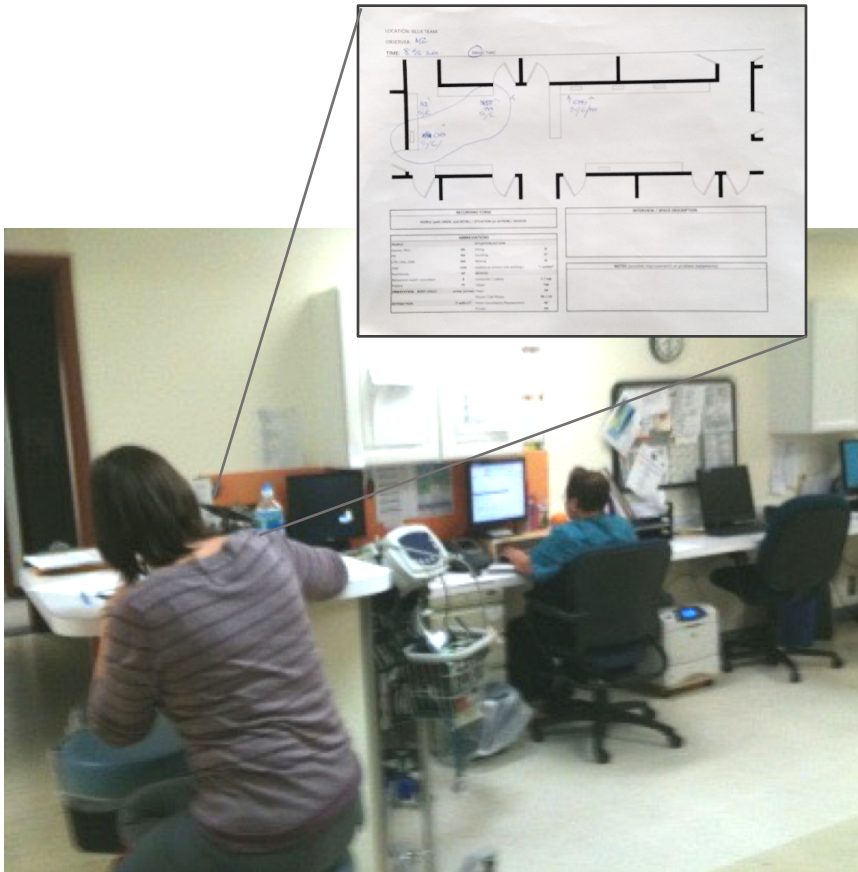


Image source: <http://www.mskcc.org/cancer-care/your-care-team>

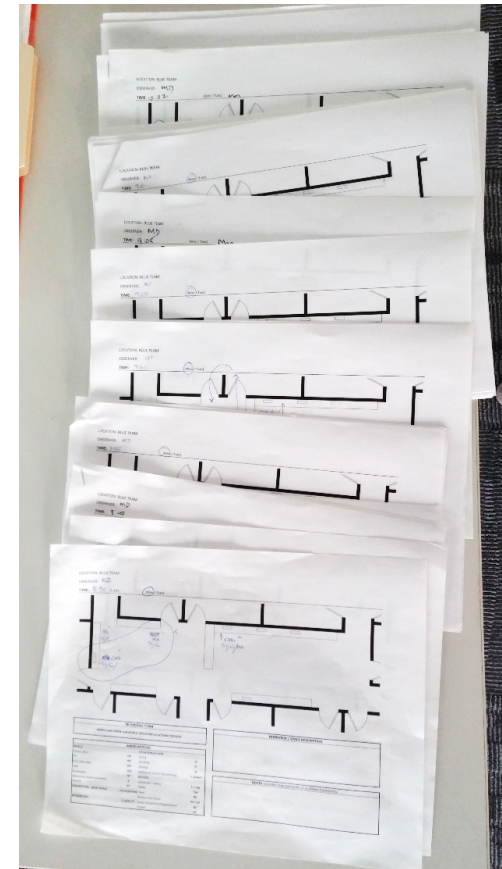


# Our Experience: Cherokee Indian Hospital Team Room

## *Manual recording*



*On-Site paper and pencil observations*

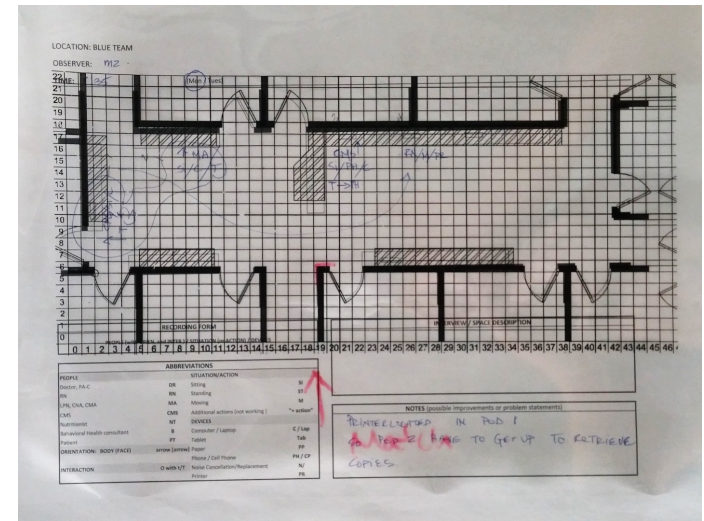


*Pile of observation sheets*

# Our Experience: Cherokee Indian Hospital Team Room

*Time consuming data entry*

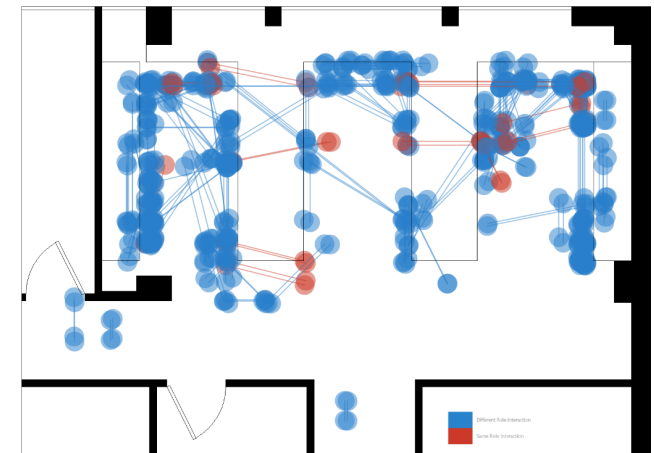
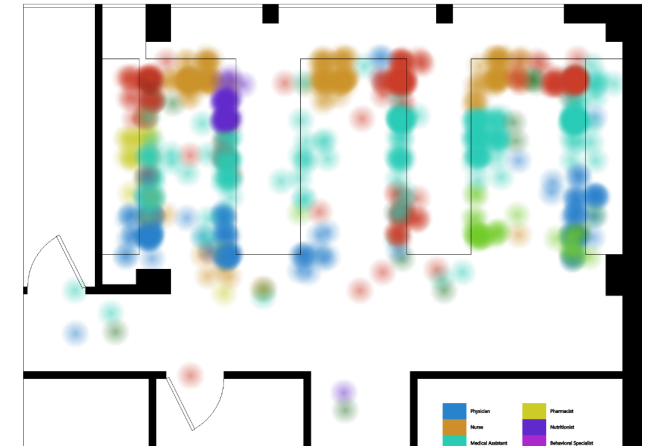
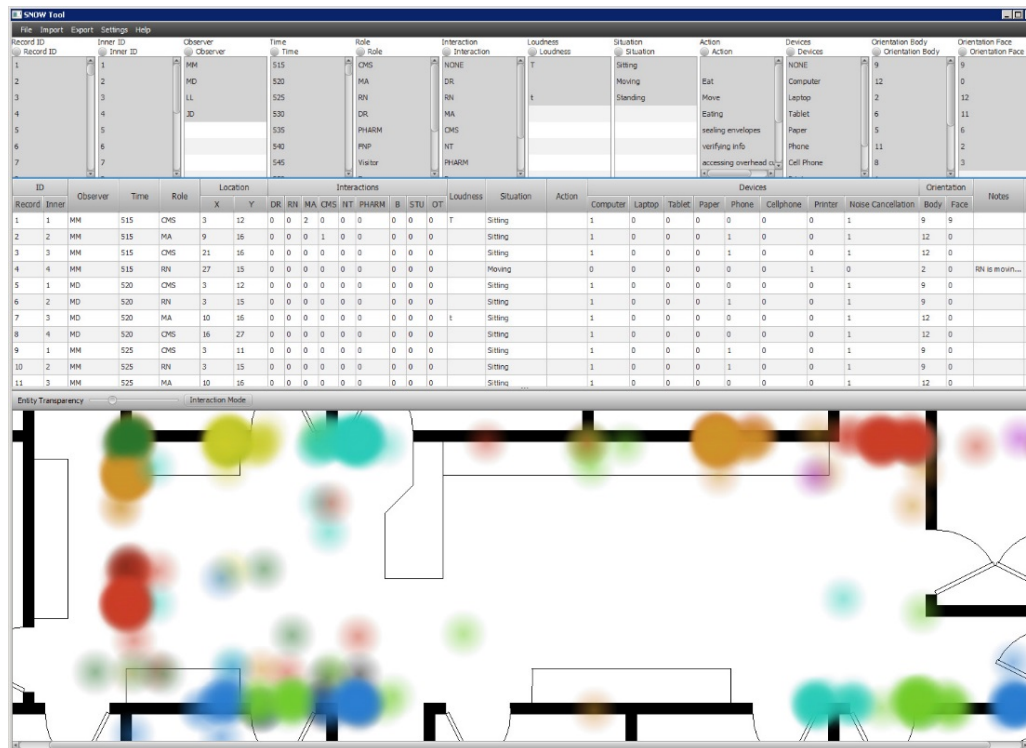
*Grid coordinate system on top of the observation sheets*



Number	Observer (LL, MM, JD, MD)	Time	ID	Role (DR, RN, MA, CMS, NT, PHARM, S, STU)	Sitting Standing Moving	additional actions	Computer	Laptop	Tablet	Paper	Phone	Cell Phone	Printer	Noise Cancellation	Talking loudness (L/T)	DR	RN	MA	CMS	NT	PHARM	B	STU	DT (other)	BODY	FACE (if different)	Location	Location	Notes
16	MM	8:55	1	CMS	Sitting		1								T		2			1					9	12	3	11	
17	MM	8:55	2	RN	Sitting		1								T										12		3	15	
18	MM	8:55	3	CMS	Sitting		1																		12		3	16	
19	MM	9:00	1	CMS	Moving		1																		12		14	16	
20	MM	9:00	2	RN	Sitting		1				1														9		3	15	CMS moves to prep exam rooms
21	MM	9:00	3	CMS	Sitting		1																		12		21	16	
22	MM	9:05	1	CMS	Moving		1				1														9		10	10	
23	MM	9:05	2	RN	Sitting		1				1														9		3	15	
24	MM	9:05	3	MA	Sitting		1																		12		9	16	
25	MM	9:05	4	CMS	Sitting		1																		12		21	16	
26	MM	9:10	1	CMS	Sitting		1																		9		3	12	
27	MM	9:10	2	RN	Sitting		1					1													9		3	15	
28	MM	9:10	3	PHARM	Sitting			1																	12		7	16	
29	MM	9:10	4	MA	Sitting		1																		12		10	16	
30	MM	9:10	5	CMS	Sitting		1																		5		21	16	
31	MM	9:10	6	DR	Standing										T	6			5						11		13	25	
32	MM	9:15	1	CMS	Sitting		1				1														9		3	12	
33	MM	9:15	2	PHARM	Sitting			1			1														12		7	16	
34	MM	9:15	3	MA	Sitting		1																		12		10	16	
35	MM	9:15	4	CMS	Sitting		1				1														12		21	16	
36	MM	9:20	1	CMS	Sitting															3					2		3	12	
37	MM	9:20	2	RN	Sitting		1					1			t										9		3	16	
38	MM	9:20	3	PHARM	Sitting														1						8		6	15	Chairs w/ casters facilitate CMS and Pharm roll to each other for low voice ch
39	MM	9:20	4	MA	Sitting		1				1														12		10	16	

# Our Experience: Cherokee Indian Hospital Team Room

*SNOW software custom made*



*SNOW software for the visualization of the observation data  
for this project made in less than 2 weeks*



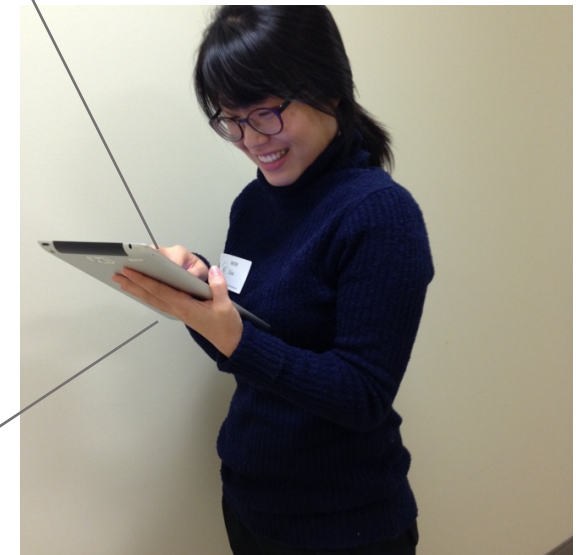
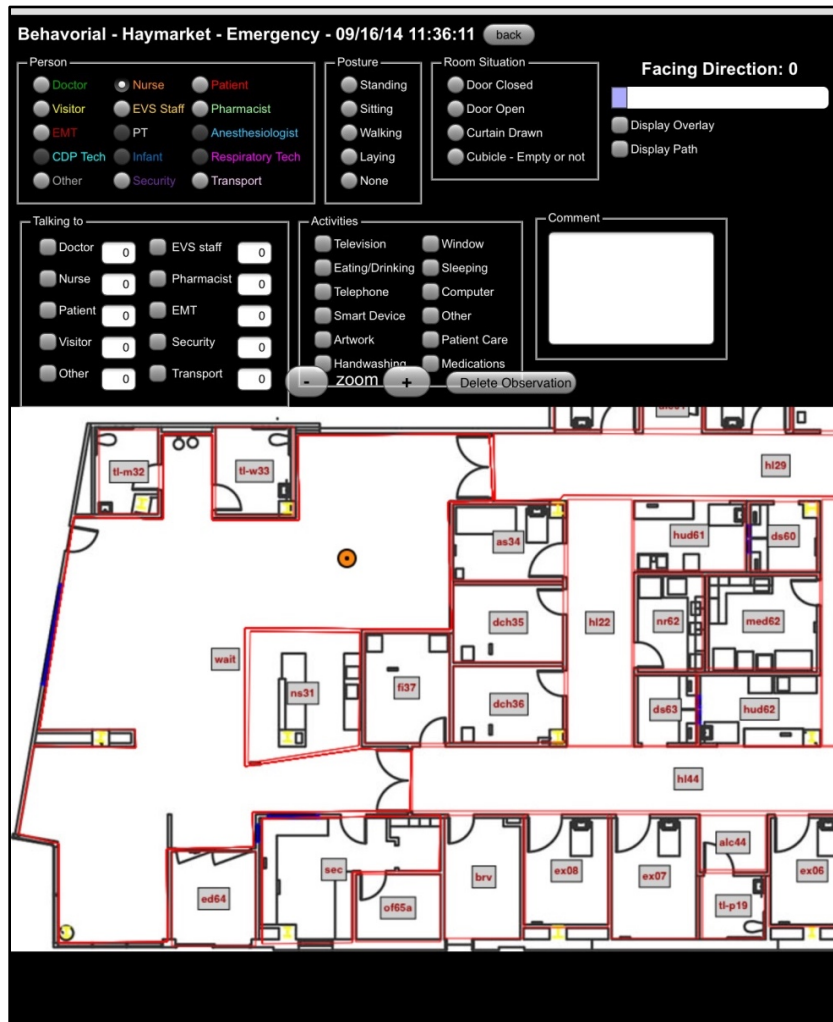
# Our Experience: Mercy Care





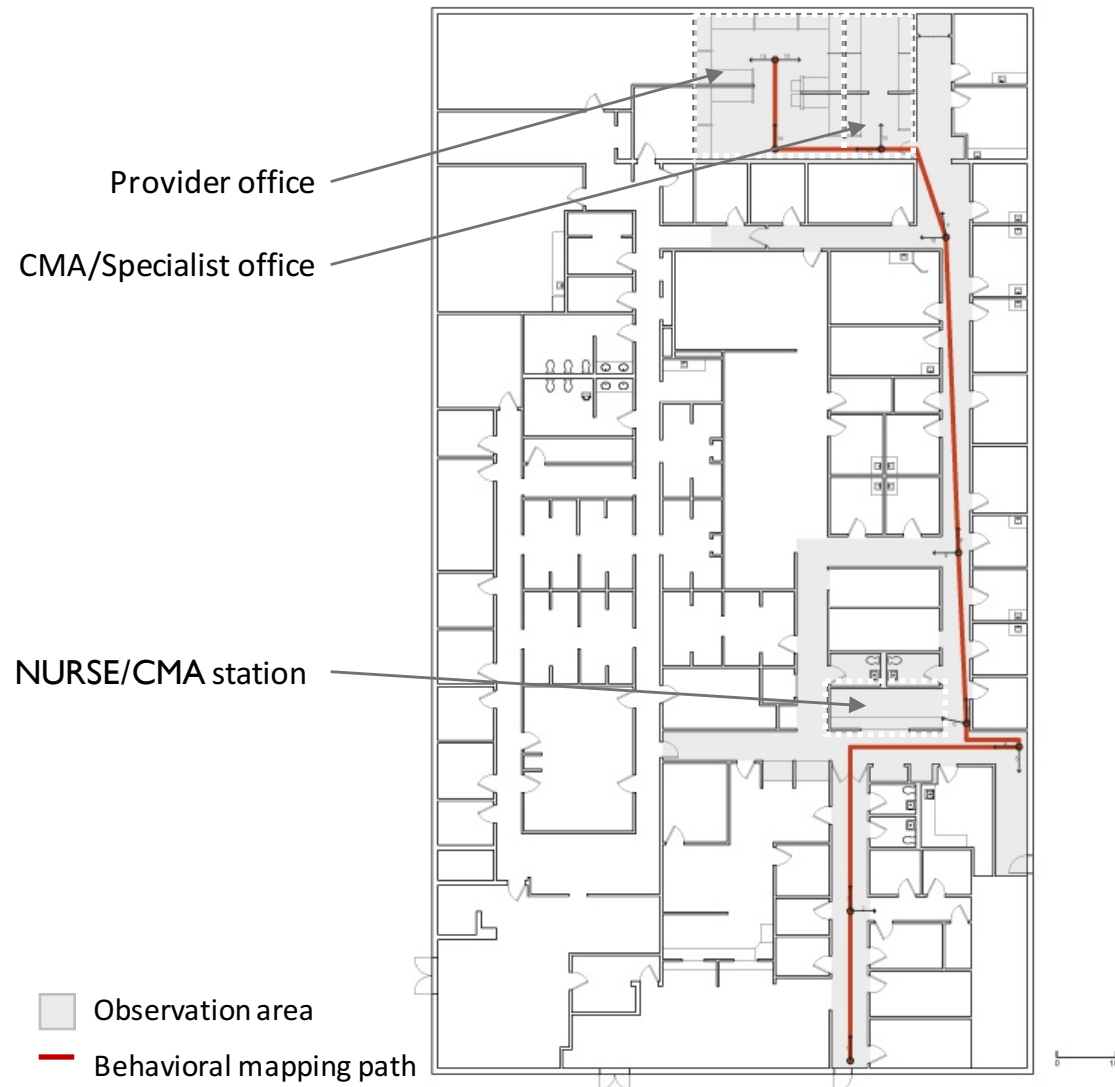
# Our Experience: Mercy Care

*DOTT tool*



# Our Experience: Mercy Care

## *What we did*

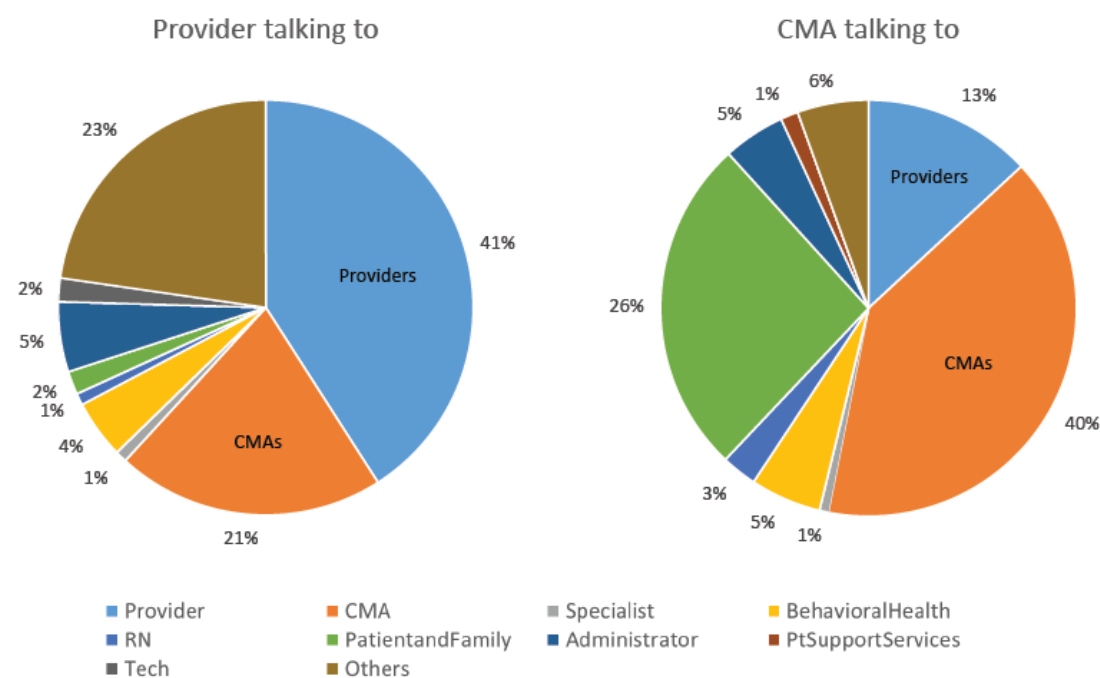


- Observations were conducted over four days during the first and second weeks of December 2014 by five trained researchers
- **BEHAVIORAL MAPPING:** A total of 94 rounds of path-following behavioral mapping was conducted. As a result, 1238 data points were collected.
- **SHADOWING:** A total of 14 hours and 37 minutes of shadowing data (947 data points) of 4 providers was collected.

# Our Experience: Mercy Care

## Brief findings

### WHO THEY TALK TO? TO THEIR TEAM MEMBERS?



### PROVIDERS TALKING TO:



### CMAS TALKING TO:



# Our Experience: Mercy Care

## *Brief findings*

### WHERE DO THEY TALK?



#### PROVIDERS TALKING AT:

NEAR PROVIDER OFFICE 82%  NEAR NURSE STATION 9%

#### CMAS TALKING AT:

NEAR PROVIDER OFFICE 16%  NEAR NURSE STATION 54%

# Our Experience: Mercy Care

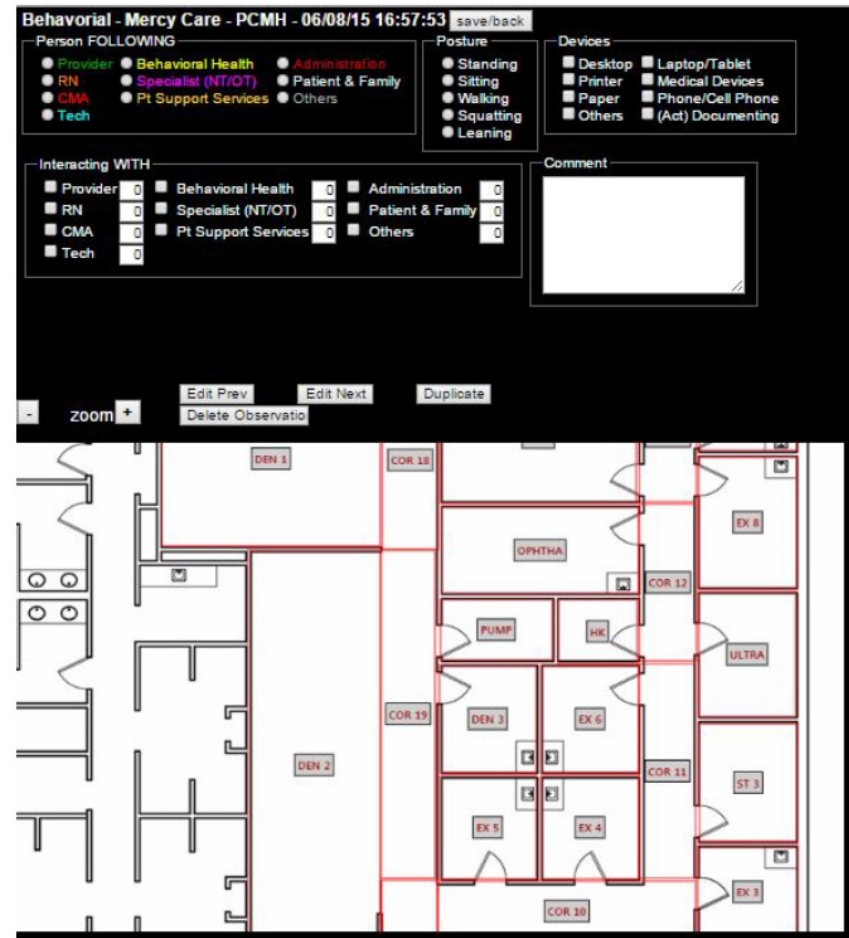
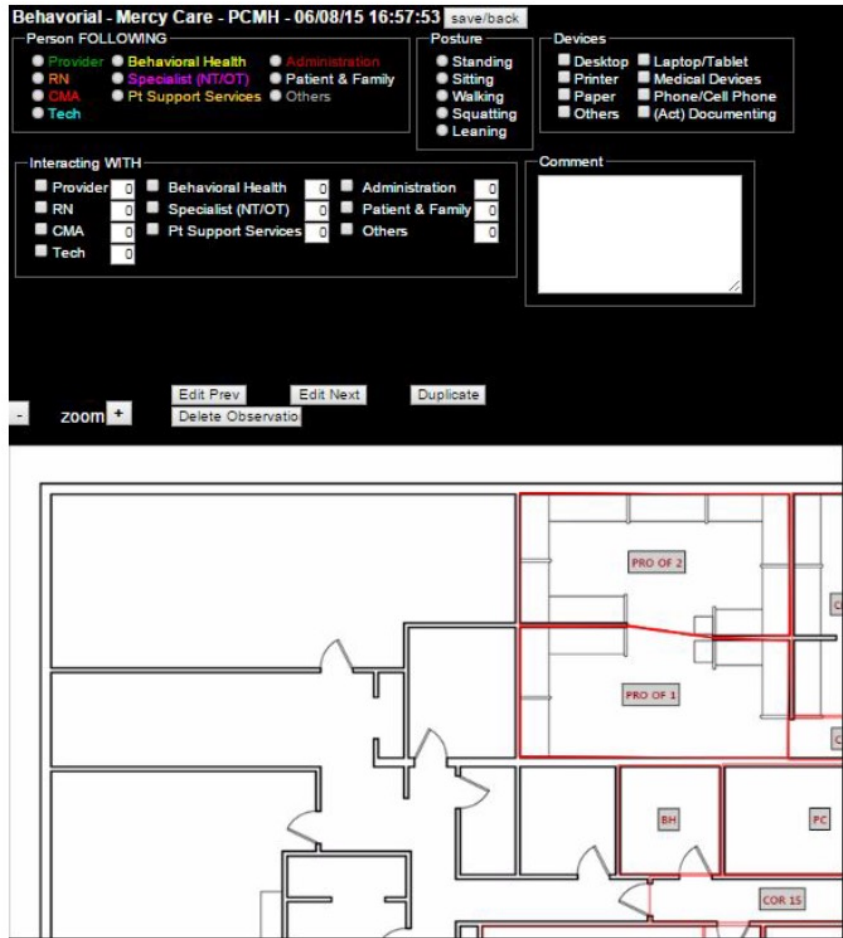
## *DOTT tool: what was good*

Location data

Room Name	Room Type	detail sNO	Date	headers Start DateTime	X coordinat e	Y coordinat e	detailsPersonT ype	detailsDateCreate d	detailsComments	Posture	ActD ocu men ting	Desk top	Lapt opTa blet	Medi calD evic es	Othe rDevic es	Pape r	Phon eCell Phon e	Print er	Talki ng (Y/N)	TalkT oAdm inistra tor	TalkT oAdm inistra torTal kingTo	TalkT oBeha vioral Health Talkin gTo	TalkT oCMA	TalkT oCMA Talkin gTo#	TalkT oOthe rs	TalkT oOthe rsTalk ingTo #
ENTRY	ENTRY	230	12/3/2014	8:45:42 AM	708	1784	patientandfamily	8:46:17 AM		sitting									N							
ENTRY	ENTRY	231	12/3/2014	8:45:42 AM	705	1699	patientandfamily	8:46:21 AM		sitting									N							
ENTRY	ENTRY	232	12/3/2014	8:45:42 AM	747	1681	patientandfamily	8:46:24 AM		standing									N							
COR 1	CORRIDOR	233	12/3/2014	8:45:42 AM	712	1601	patientandfamily	8:46:35 AM		sitting									N							
COR 1	CORRIDOR	234	12/3/2014	8:45:42 AM	714	1561	patientandfamily	8:46:37 AM		sitting									N							
COR 3	CORRIDOR	235	12/3/2014	8:45:42 AM	709	1508	patientandfamily	8:46:39 AM		sitting									N							
COR 3	CORRIDOR	236	12/3/2014	8:45:42 AM	709	1466	patientandfamily	8:46:42 AM		sitting									N							
COR 3	CORRIDOR	237	12/3/2014	8:45:42 AM	710	1431	patientandfamily	8:46:44 AM		sitting									N							
COR 3	CORRIDOR	238	12/3/2014	8:45:42 AM	753	1358	patientandfamily	8:46:46 AM		standing									N							
N/CMA	NURSE/CMA STATION	239	12/3/2014	8:45:42 AM	859	1215	cma	8:48:22 AM		sitting									Y				x	1		
N/CMA	NURSE/CMA STATION	240	12/3/2014	8:45:42 AM	825	1213	cma	8:48:33 AM		sitting	x								Y				x	1		
COR 11	CORRIDOR	241	12/3/2014	8:45:42 AM	910	738	cma	8:49:12 AM		walking									Y							
COR 11	CORRIDOR	242	12/3/2014	8:45:42 AM	907	769	patientandfamily	8:49:20 AM		walking									Y				x	1		
COR IN	CMA/SP OFFICE	243	12/3/2014	8:45:42 AM	828	261	administrator	8:49:56 AM		standing									Y		x	2				
CMA OF	CMA/SP OFFICE	244	12/3/2014	8:45:42 AM	809	212	behavioralhealth	8:50:35 AM		sitting									Y	x	1	x	1			
CMA OF	CMA/SP OFFICE	245	12/3/2014	8:45:42 AM	752	207	behavioralhealth	8:50:43 AM		sitting									Y	x	1	x	1			
PRO OF 2	PROVIDER OFFICE	246	12/3/2014	8:45:42 AM	701	86	provider	8:51:36 AM		sitting		x							N							
PRO OF 2	PROVIDER OFFICE	247	12/3/2014	8:45:42 AM	530	129	provider	8:51:47 AM	St	sitting		x							Y						x	1

# Our Experience: Mercy Care

*DOTT Tool Problem1. had to modify it to collect the data we wanted*



# Our Experience: Mercy Care

## *DOTT Tool Problem2. Not enough flexibility during the data collection*

LOCATION: BLUE TEAM  
OBSERVER: MZ  
TIME: 8:25 (Mon / Tues)

RECORDING FORM

PEOPLE (with ORIEN. and INTER.) / SITUATION (or ACTION) / DEVICES

ABBREVIATIONS			
<b>PEOPLE</b>	<b>SITUATION/ACTION</b>		
Doctor, PA-C	DR	Sitting	SI
RN	RN	Standing	ST
LPN, CNA, CMA	MA	Moving	M
CMS	CMS	Additional actions (not working)	"+ action"
Nutritionist	NT	<b>DEVICES</b>	
Behavioral Health consultant	B	Computer / Laptop	C / Lap
Patient	PT	Tablet	Tab
<b>ORIENTATION: BODY (FACE)</b>	arrow (arrow)	Paper	PP
		Phone / Cell Phone	PH / CP
<b>INTERACTION</b>	Q with t/T	Noise Cancellation/Replacement	N/
		Printer	PR

INTERVIEW / SPACE DESCRIPTION

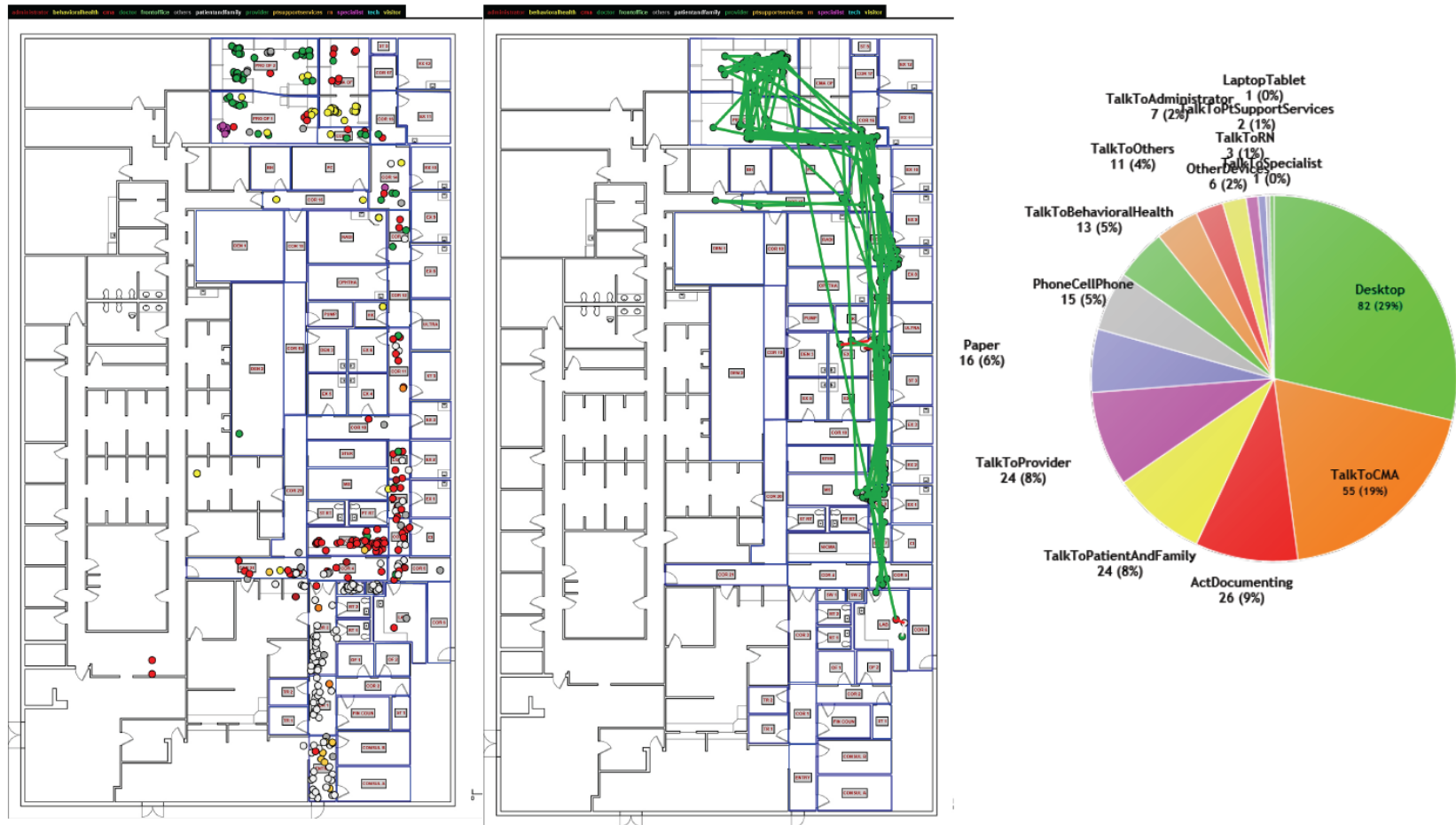
NOTES (possible improvements or problem statements)

PRINTED IN POD 1  
SO POD 2 HAVE TO GET UP TO RETRIEVE  
COPIES



# Our Experience: Mercy Care

*DOTT Tool Problem3. Weren't able to make the associations that we wanted*



*Example graphs generated by DOTT tool with unedited data*



# Our Experience: Mercy Care

*DOTT Tool Problem4. had to make our own custom output graphics*

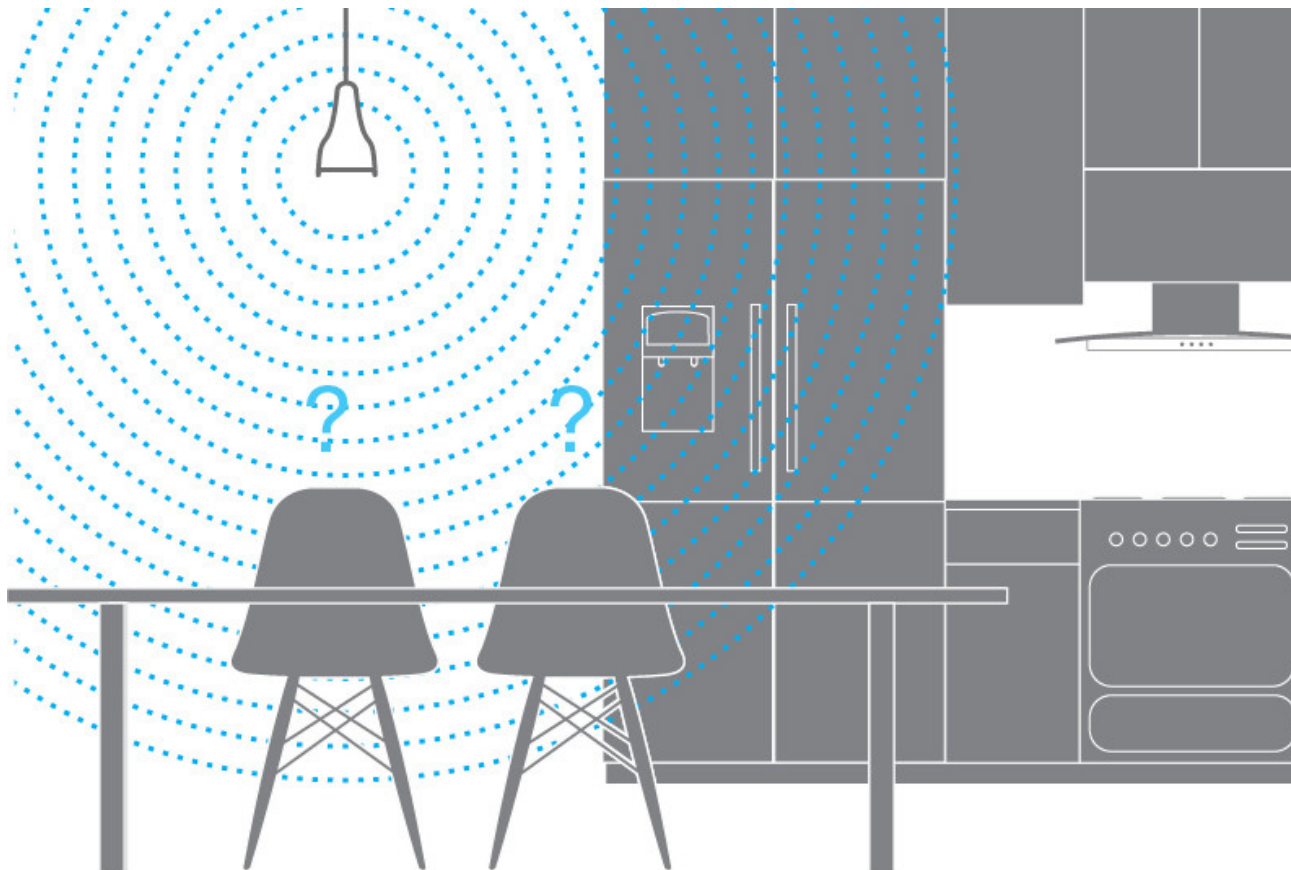
**ROLE + TALKING = WHERE?**



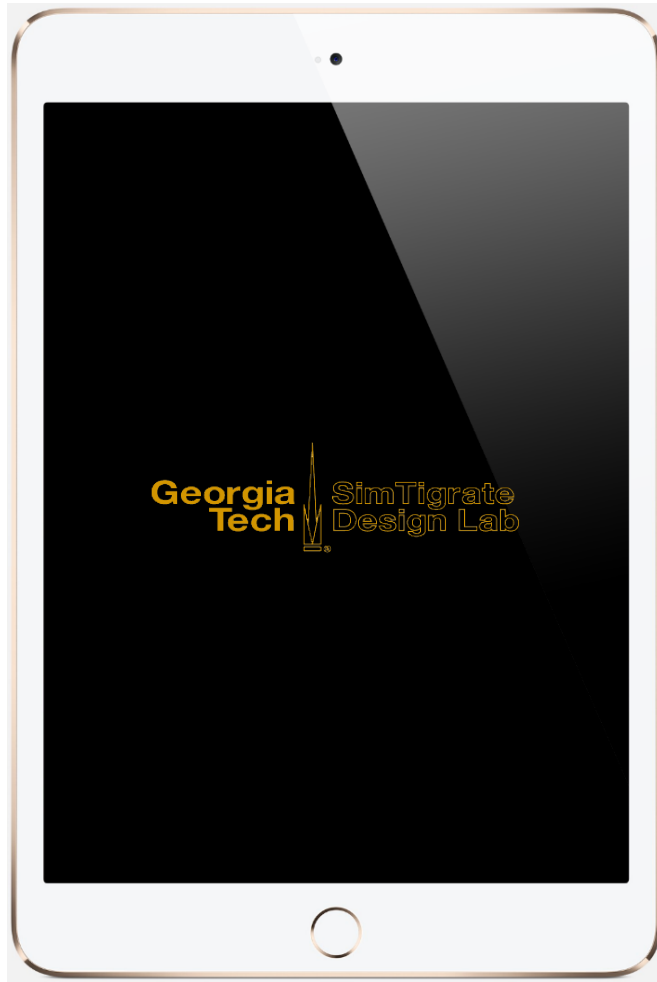
*Location while talking (Left: providers, right: CMAs)*

# Other Tools for Observation

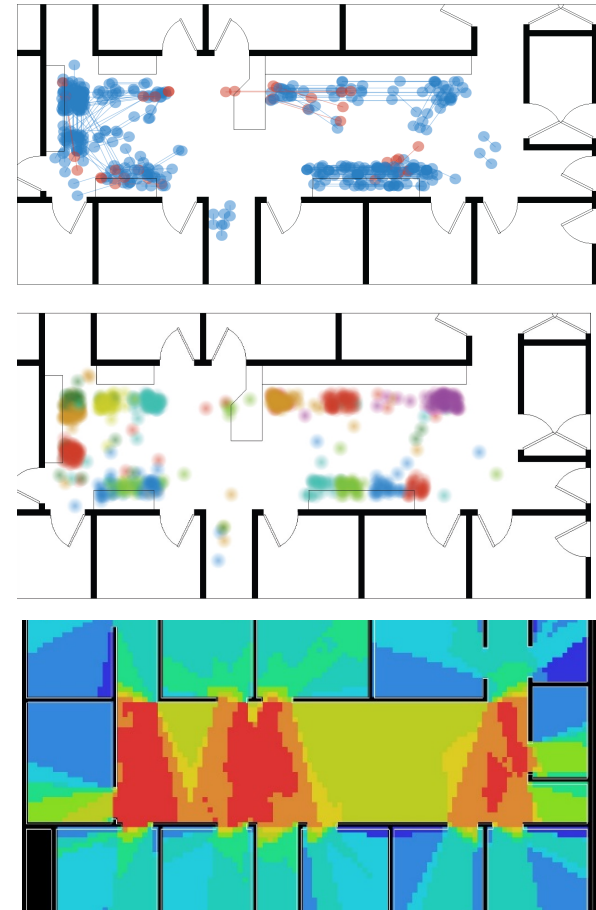
- Observation tools (not for mapping)
- Internet of things
- Sensors (RFID, Sociometric badges, etc)



# Our plan to create the next behavior mapping tool



**Collecting data**



**Managing & Visualizing data**

# Desired Functionalities

- Consistent data storage format for use across projects
- Maximum flexibility to tailor inputs for different projects
- Flexible to record unexpected data



- Accurately spatialized visualization aligned to a given floorplan
- Ability to explore patterns in unanticipated ways
- Filtering and organizing data many ways
- Combine with multiple data types
- Generate visualizations

Collecting data

Managing & Visualizing data

**We invite you . . .**

**to share your experience to help us  
create a tool with maximum utility**

**Jennifer DuBose**  
**Jennifer.dubose@coa.gatech.edu**

**Lisa Lim**  
**lilim30@gatech.edu**