Supplemental Material for the VIS 2018 InfoVis (TVCG) publication:

R. Langner, U. Kister, and R. Dachselt, "Multiple Coordinated Views at Large Displays for Multiple Users: Empirical Findings on User Behavior, Movements, and Distances", IEEE *Transactions on Visualization and Computer Graphics* (Proceedings of Information Visualization 2018), vol. 25, no. 01, pp. sss--eee, Jan. 2019.

Further Study Material

(Material presented in this PDF is also available on the project's website: https://imld.de/mcv-displaywall)

Study Tasks

The following study instructions were presented at the top and bottom of the wall-sized display screen. We translated them here from the participants' native language.

Themed Exploration Phase

Question Block: Districts

1. Name the two districts in which most crimes are committed.
2. Are those two districts consistently the ones with most crimes up to 2016?
3. Is the order of these two districts the same for every day of the week?
4. What district has the least number of crimes on Thursdays?
5. In which month(s) does this district not have the lowest number of crimes?

Question Block: Crime Types

1. Which crime type had a distinct increase in committed crimes in April 2015?
2. Which crime type displays all in all the most crimes?
3. How do these two crime types differ in regard to times of day crimes are committed?

Question Block: Neighborhoods I

1. How many crimes are committed in each of the three neighborhoods with most crimes?
2. To which districts do these three neighborhoods belong?
3. During which times of day do the numbers of crimes differ strongly in these three neighborhoods?
4. With what crime types are these neighborhoods especially affected?

Question Block: Neighborhoods II

1. Which four neighborhoods with over 3000 crimes do not have robbery as the highest crime type?
2. What are the highest crime types for each of these neighborhoods?
3. To which district does the neighborhood 'INNER HARBOR' belong?
4. The neighborhood 'INNER HARBOR' has a strong increase in crime rate in the afternoon, due to which crime type(s)?

Question Block: Weapons

1. How many crimes were committed with the mentioned weapons each?
2. Did the number of crimes using firearms increase over time?
3. Which crime types are committed with firearms?
4. How do crime types committed with firearms differ in regard to time of day?
5. Which neighborhood with number of crimes higher than 1000 has firearms as the most often used weapon?

Question Block: Years

1. Which year generally had the lowest amount of crimes?
2. Exactly how many crimes occurred in June of 2014?
3. Were there more crimes on Thursdays than on Mondays in 2014?
4. Which year had a distinct increase in crime at the end of April?

Open Exploration Phase

Users were encouraged to explore data to find evidence on whether to confirm or reject a hypothesis.

1. The western part of Baltimore is more dangerous than the eastern part.
2. Due to a snow storm there was a decrease of crimes in January 2016.
3. Gun shootings occur predominantly at night.
4. In neighborhoods with generally lower crime rates there are relatively more crimes involving firearms.

Data Analysis Methodology

1. **Grouping and Categorization of Protocol Data**
   The following two photos illustrate our procedure for grouping and categorizing notes takes by the experimenters during the study.

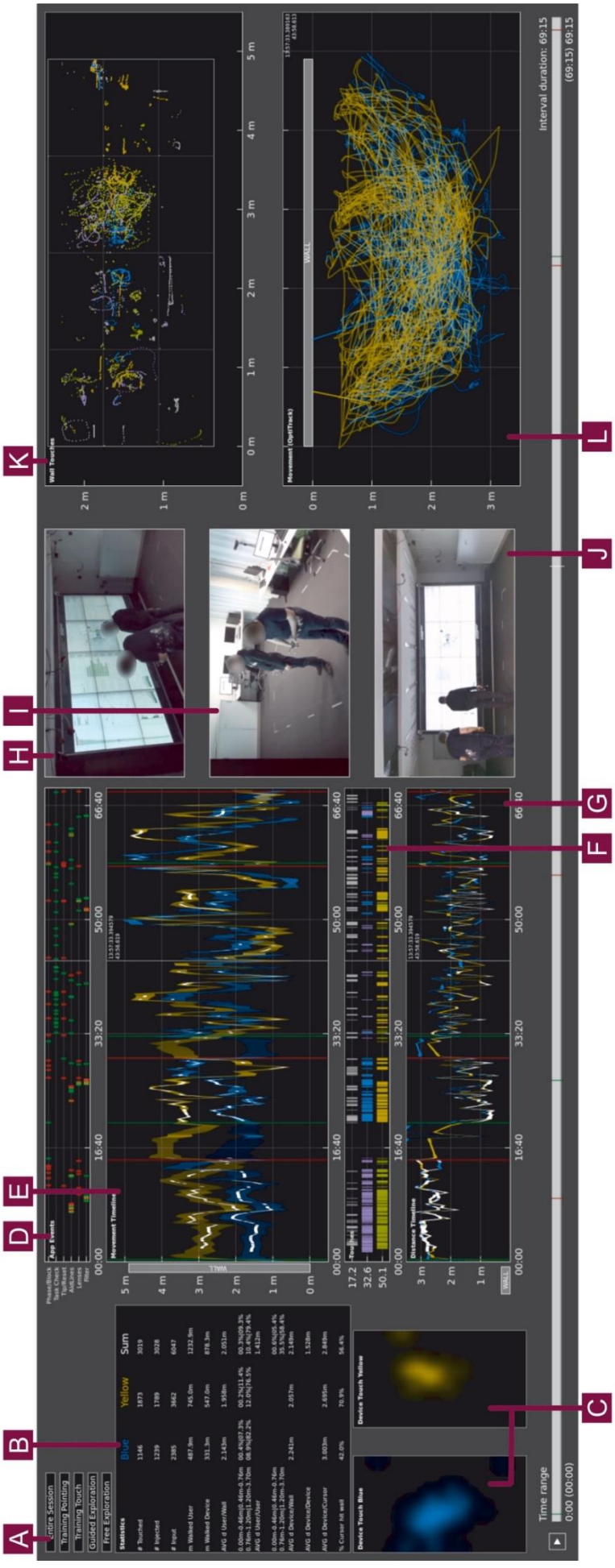

2. Usage of Open-Source Tool GIAnT for Video Coding Analysis

We applied the open-source group analysis toolkit [1] and extended it with additional views. All views are connected to the timeline at the bottom of the screen which allows zooming in on selected time spans. In sum the following views/interface elements can be seen in the screenshot:

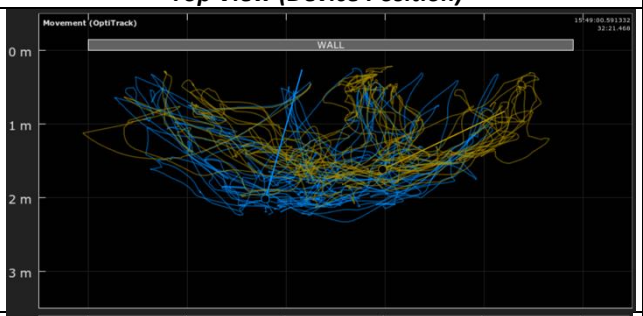
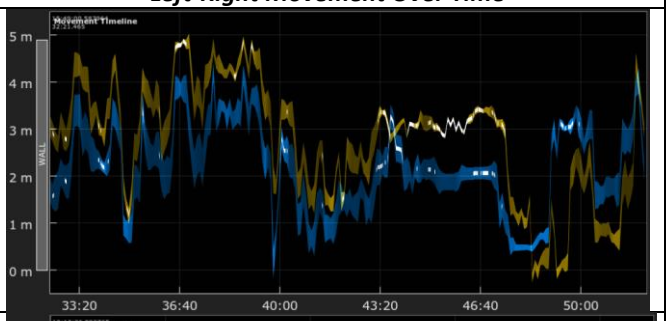
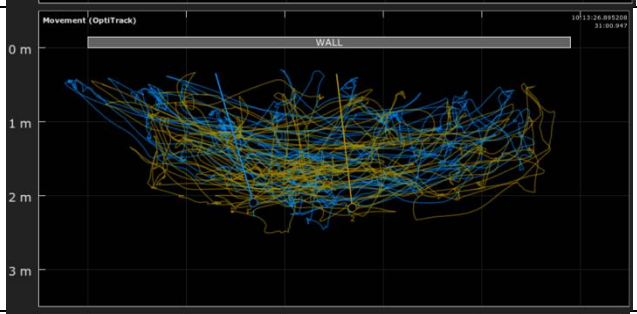
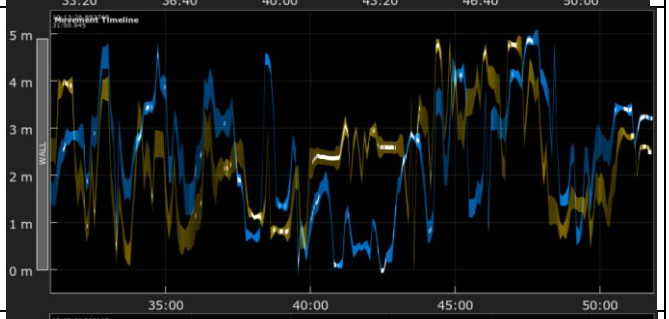
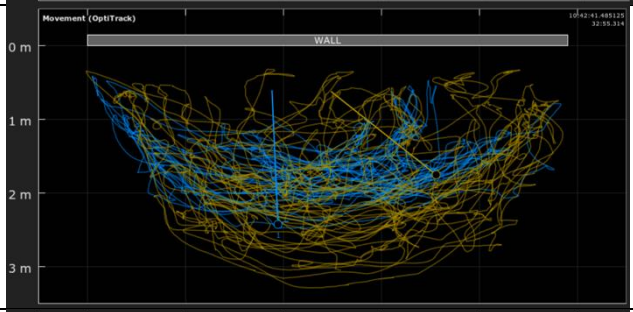
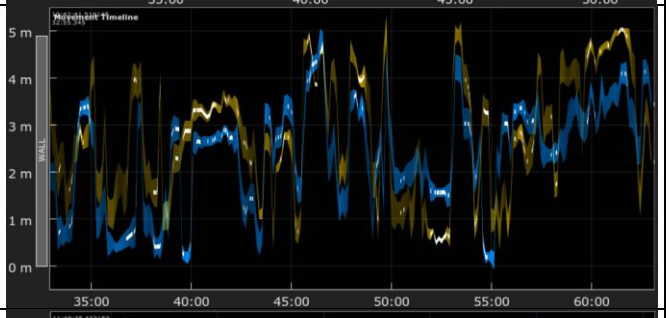
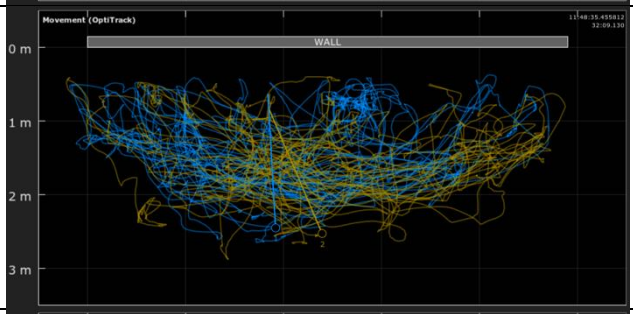
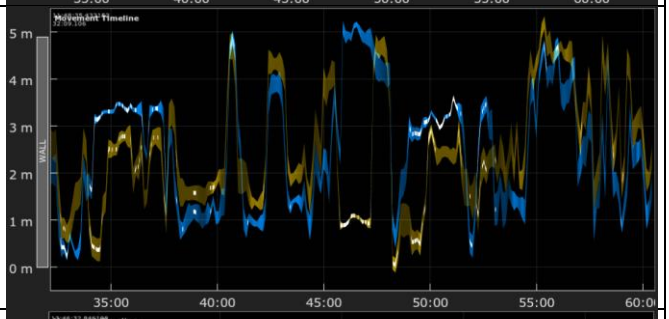
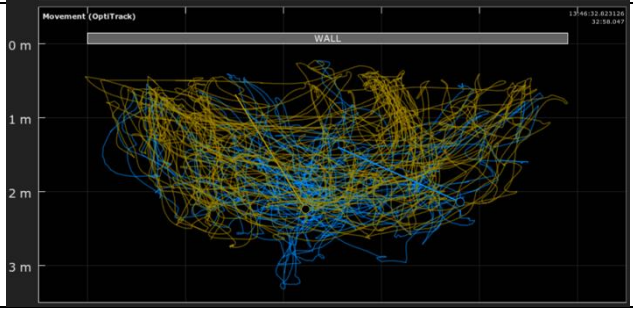
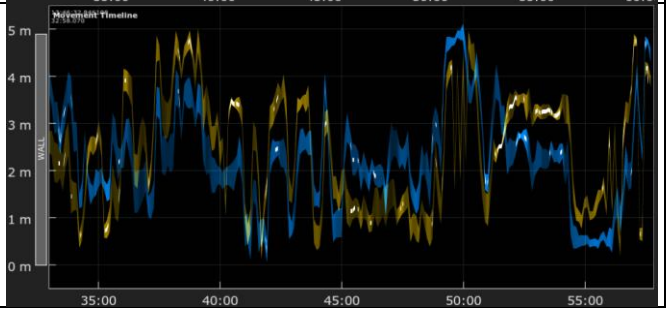
A. Buttons to jump to specific study phases.
B. Statistic view showing number of touches, distances walked etc. for selected time span per user (blue and yellow) and in sum.
C. Location of touch interaction on the mobile devices (per user).
D. App events including beginning and end of task blocks as well as invoked functionality such as magic lenses and interactive rulers.
E. Movement of users (blue and yellow) over time where left-right position is in regard to wall-sized display and distance is width of line. Interactions are highlighted in white. Green and red lines indicate the start and end of study phases, respectively.
F. Interactions over time per user and non-associated (in grey) where each user is encoded with two colors for either TOUCH interaction at the display wall or DISTANT interactions using the mobile device.
G. Showing each users' distances to the wall-sized display. White highlights indicate input to the system.
H. Camera with focus on the display wall showing interaction result.
I. Camera with focus on participants' interactions.
J. Kinect camera recording of users from behind.
K. Locations of interactions and touch events on the wall-sized display encoded with two colors per user equal to F.
L. Top view of movement in front of display wall showing either device positions (Optitrack) or body positions (Kinect) toggled by keyboard button.

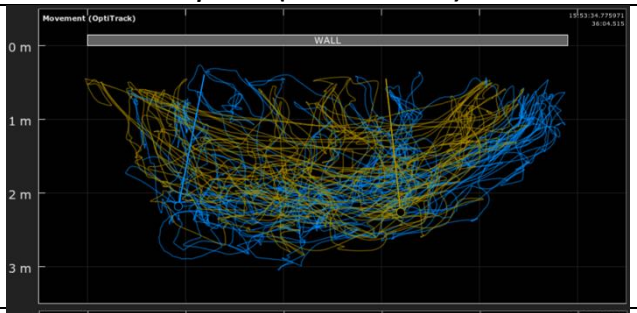
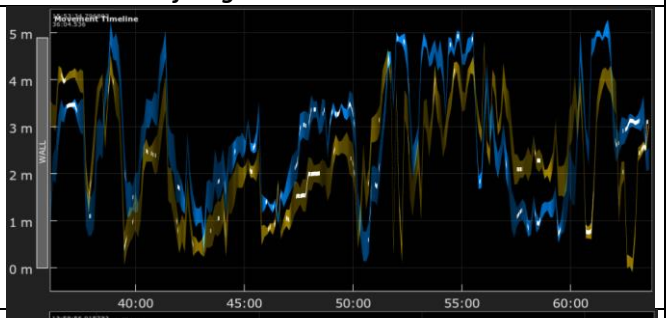
Note that we use GIAnT's original dark theme for the following screenshots, while our paper contains a light-themed version of a specific time span of view E as Fig. 4.

[1] U. von Zadow and R. Dachselt. Giant: Visualizing group interaction at large wall displays. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '17, pp. 2639–2647. ACM, New York, NY, USA, 2017. doi: 10.1145/3025453.3026006


A
B
C
D
E
F
G
H
I
J
K
L
Entire Session
Training Pointing
Training Touch
Guided Exploration
Free Exploration
Statistics
Blue
Yellow
Sum
Time range
0:00 (00:00)
Interval duration: 69:15
(69:15) 69:15
Movement Timeline
Zapp Events
Distance Timeline
Wall Touches
Movement (OptiTrack)
WALL

3. Movement of Participant Teams at Large Display – Themed Exploration

Team	*Top View (Device Position)*	*Left-Right Movement Over Time*
P1+P2		
P3+P4		
P5+P6		
P7+P8		
P9 + P10		

Team	*Top View (Device Position)*	*Left-Right Movement Over Time*
P11 + P12		
P13 + P14