MobyDick

An Interactive Multi-swimmer Exergame

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50%
of persons drop out of exercise
within 6 months
Wilson & Brookfield, 2009

Reasons for Exercise Drop-out

Lack of

- Social interaction
- Motivation
- Poor body image
- Expense & Time

Len Kravitz
University of New Mexico

"A digital game where the outcome of the game is predominantly determined by physical effort."

Florian Mueller
University of Melbourne

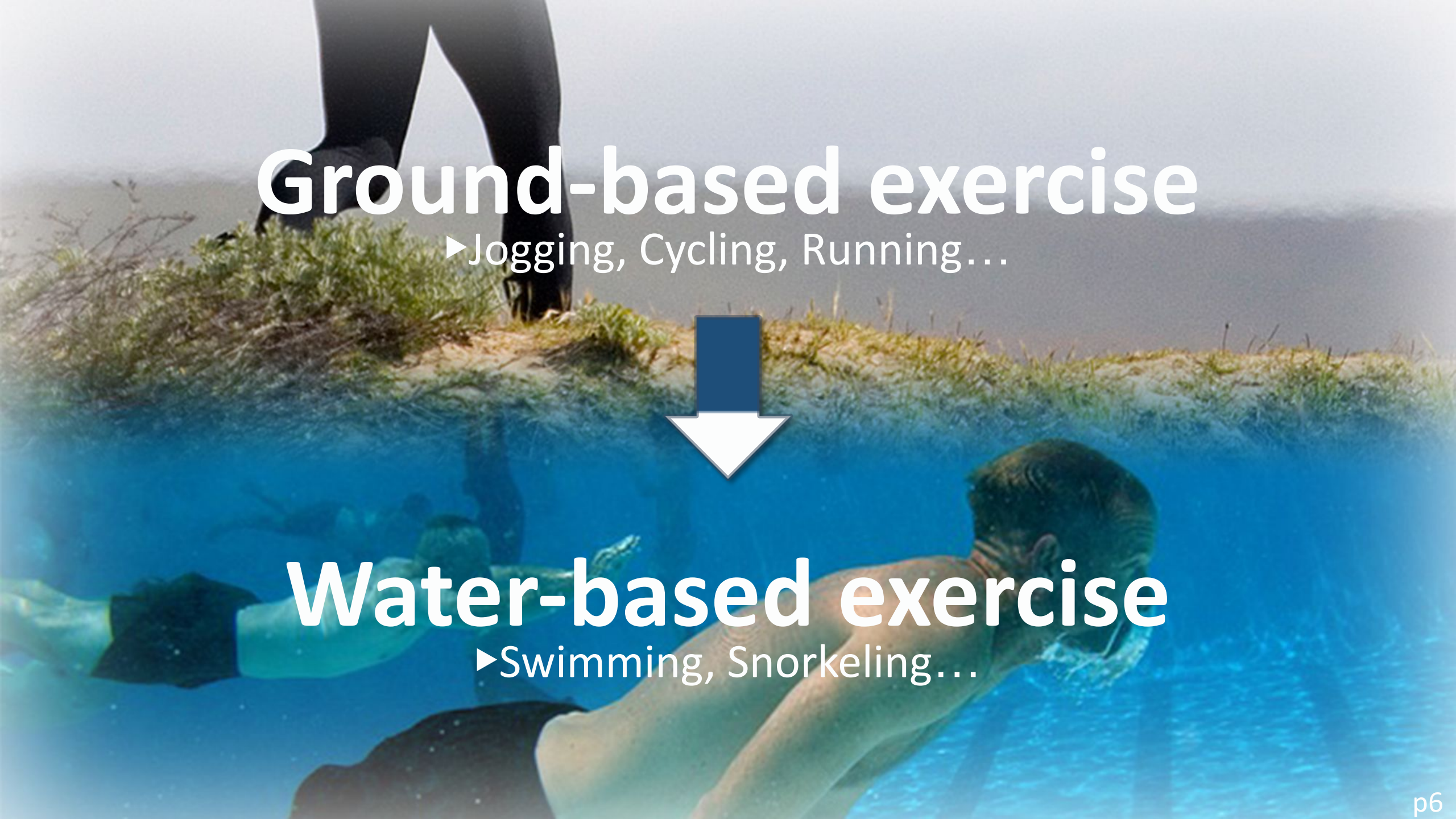
Exertion Game

Adapting exertion activities

- PCGamerBike, Kinect Sports

Supporting social interaction

- Jogging over Distance [CHI ‘07], Remote Impact [CHI ‘08]


Ground-based exercise
Jogging, Cycling, Running…
Water-based exercise
Swimming, Snorkeling…


Transforming
swimming
activity into
multi-player
exergame

MobyDick Game.mp4


How to enable
wireless
communication
among swimmers

How to recognize
swimming activity in real time

How to design an exergame considering swimming contexts

Research Agenda

Networking Performance in the Pool

How to enable wireless communication among swimmers

Swimming Stroke Recognition

How to recognize swimming activity in real time

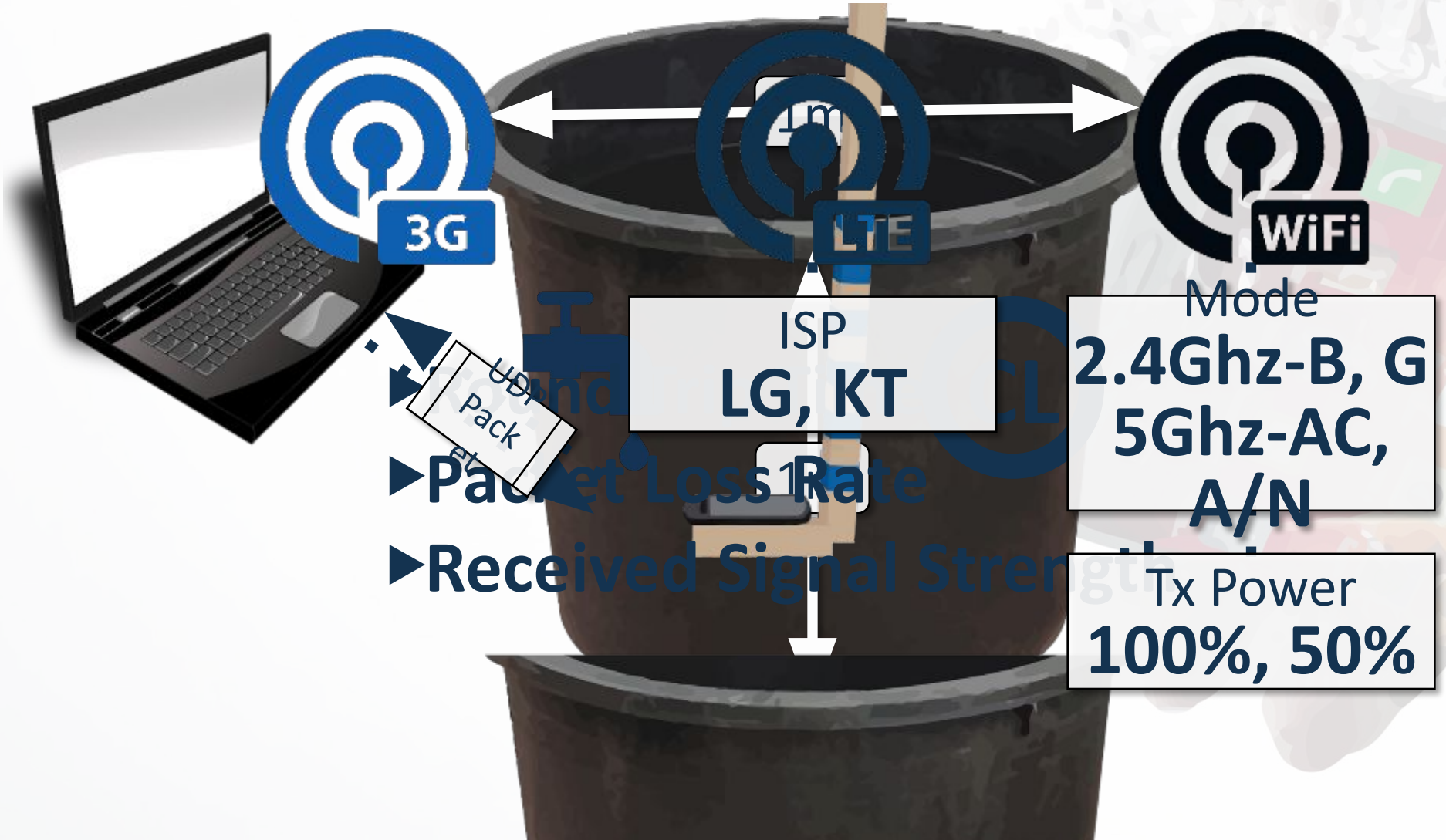
Game Design and User Study

How to design an exergame considering swimming contexts

1. Networking Performance in the Pool

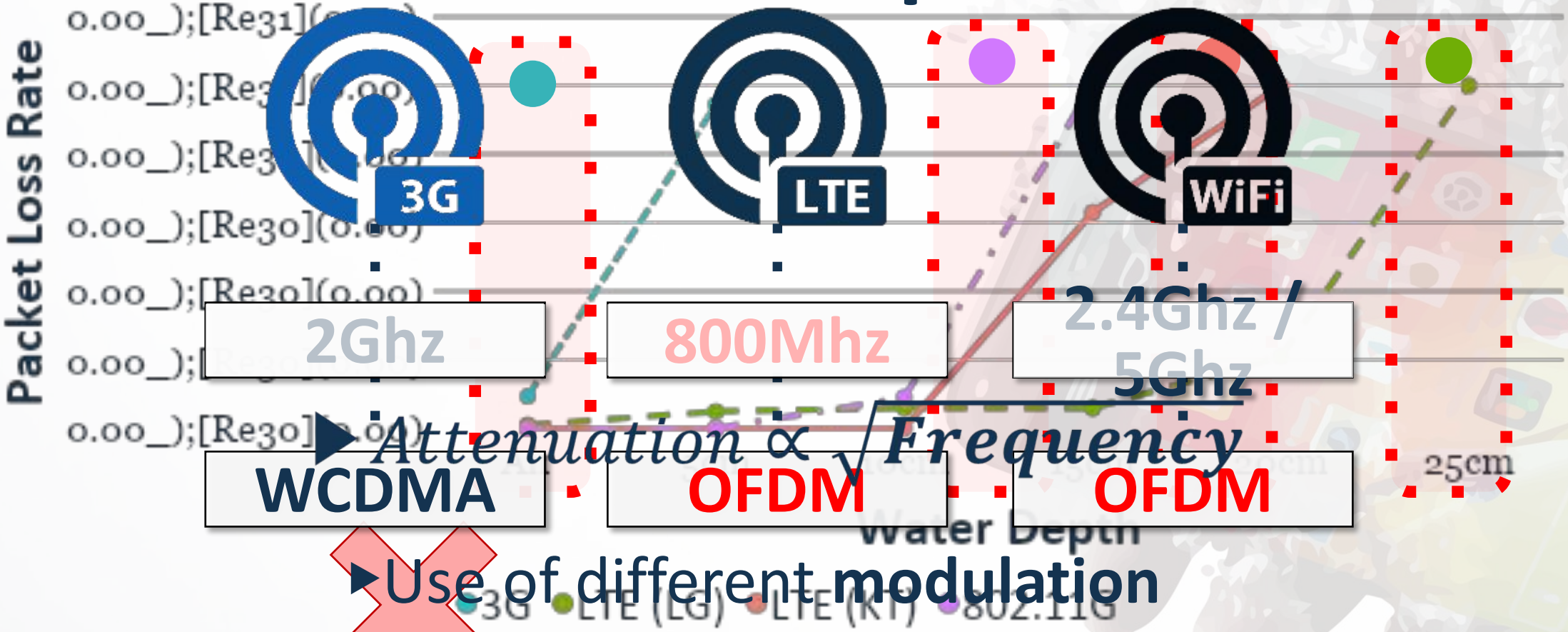
- Network performance by **water depth**
- Network **reconnection time**
- Network performance by **swimming styles**

Experimental setup



- Packet Loss Rate
- Received Signal Strength

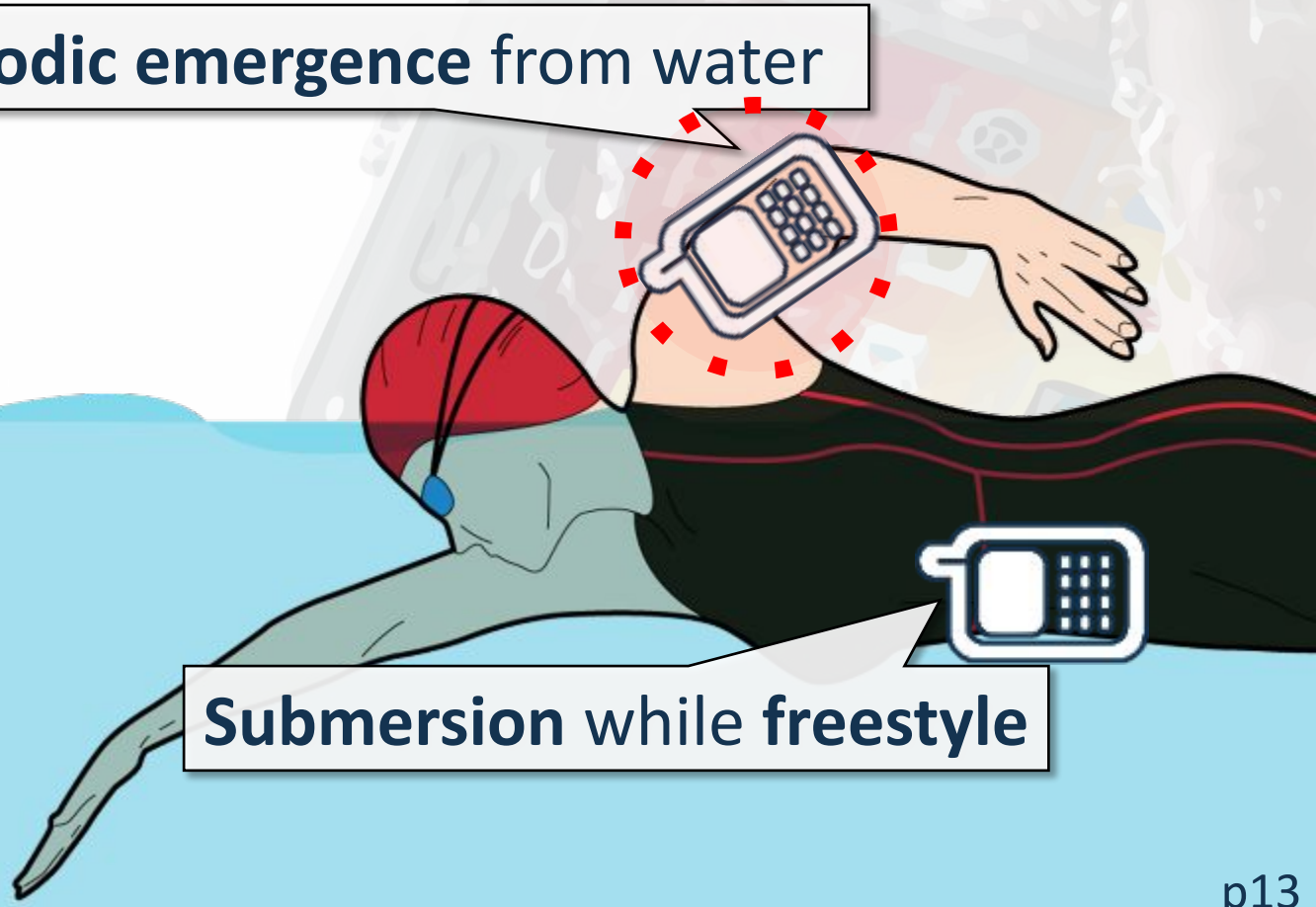
Network performance by water depth



- Use of different **modulation**

The depth of 20cm…?

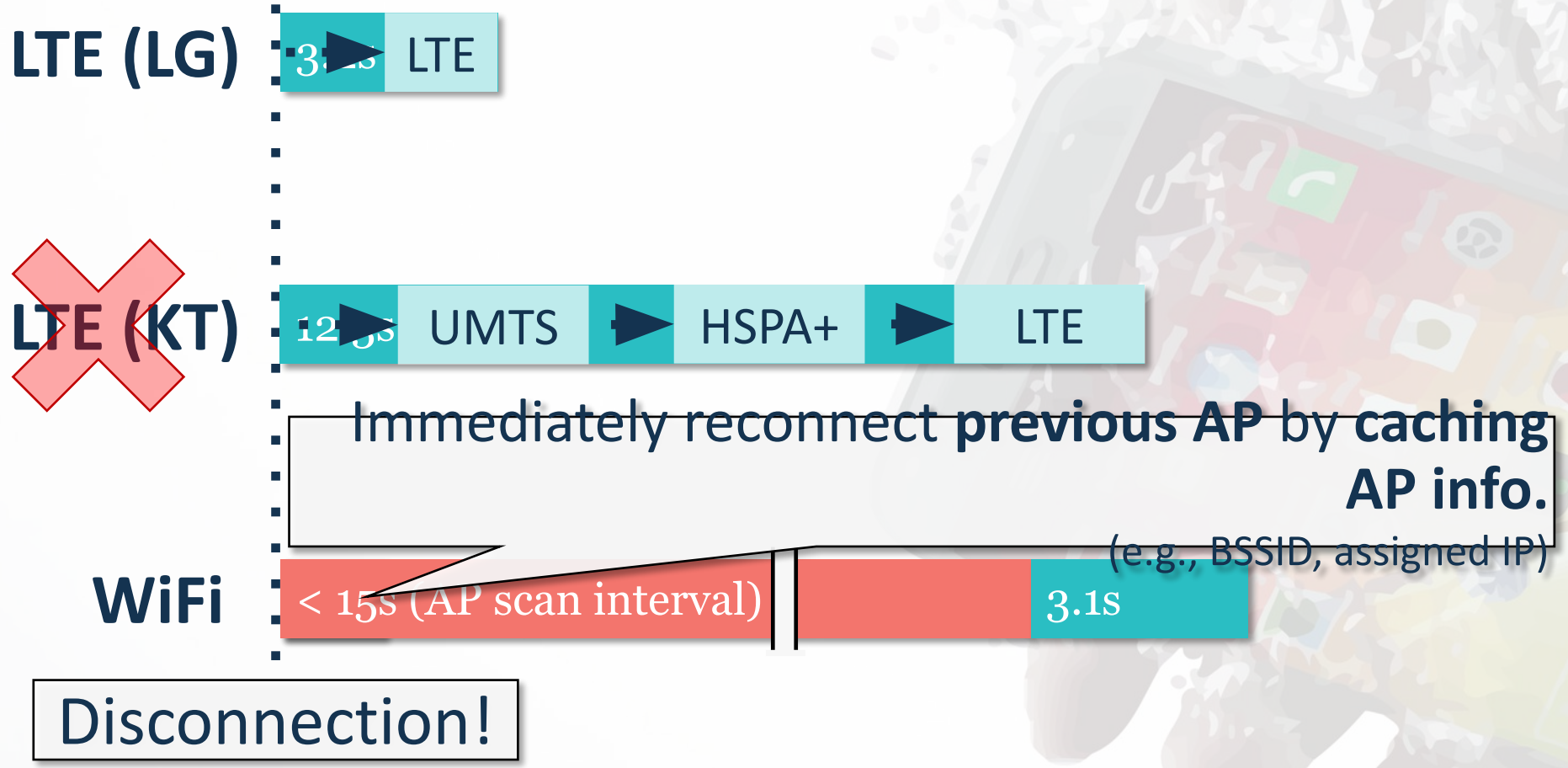
Available while **swimming?**



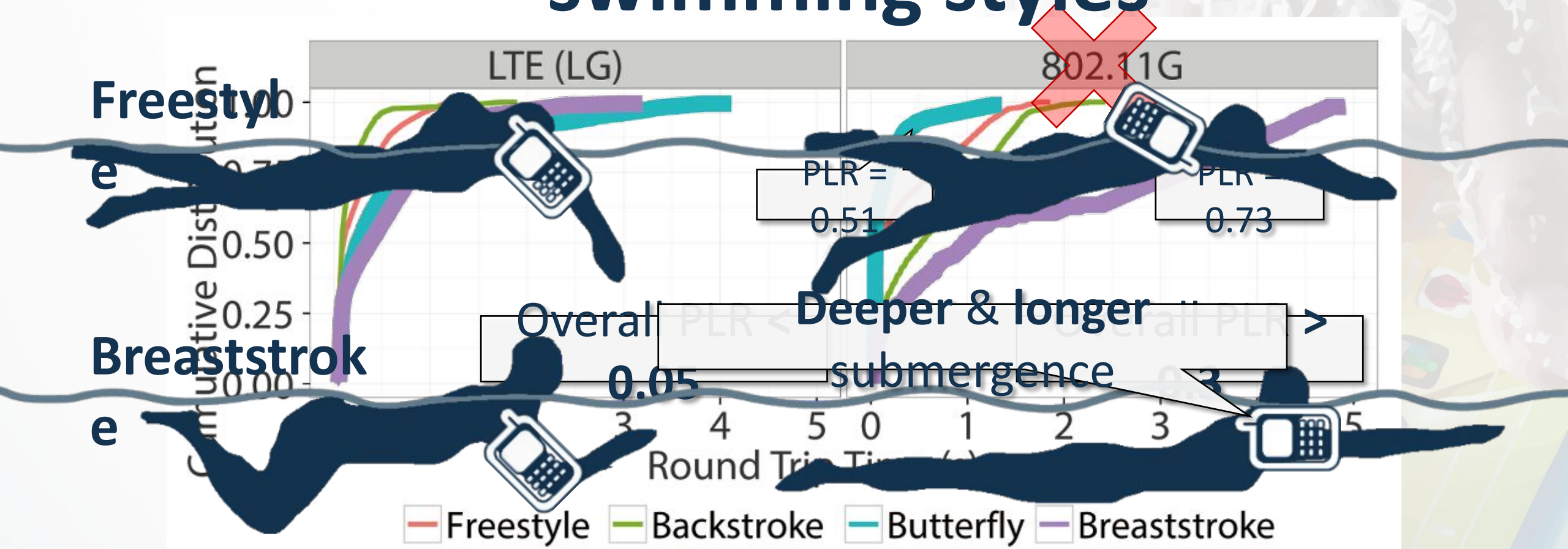
Still poor channel conditions…

Disconnection might **occur!**

Network reconnection time



Network performance in swimming styles



LTE

most robust under swimming contexts

Swimming Styles

significant performance variation

Water Depth

performance degradation /occasional disconnection

Reconnection Time

need enough time to re-establish connectivity

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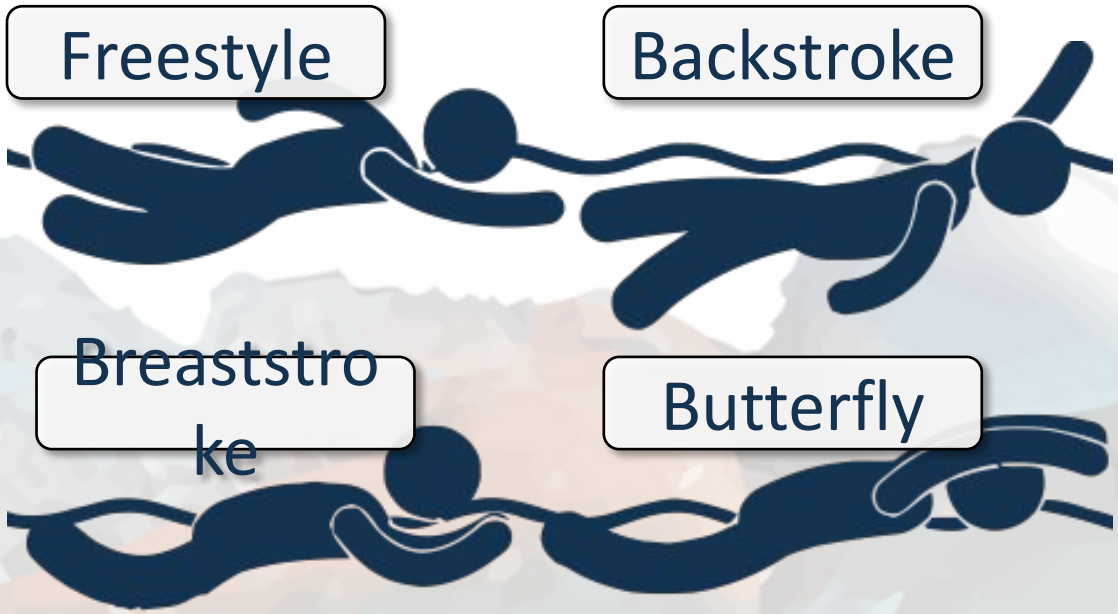
2. Swimming Stroke Recognition

- **Swimming style** classification
- **Stroke timing** detection

Intrinsic swimming activities

Swimming Styles

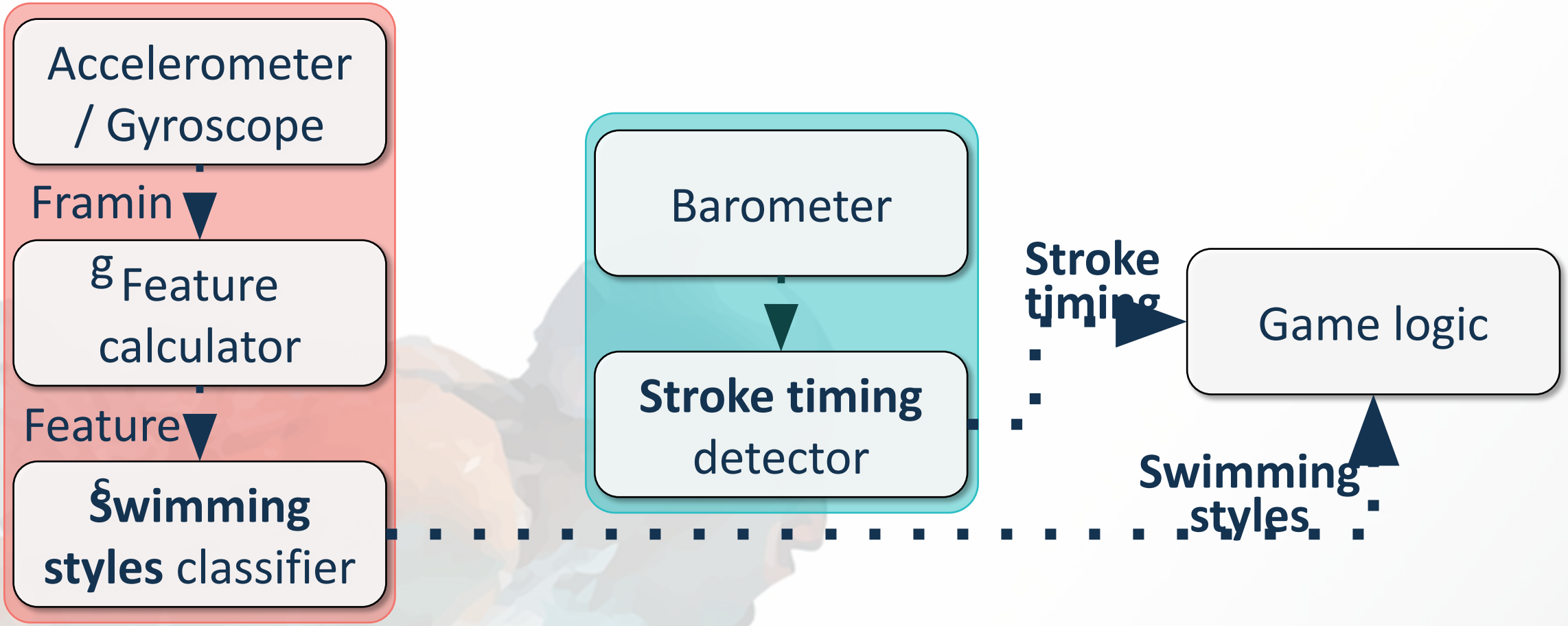


Stroke Timing

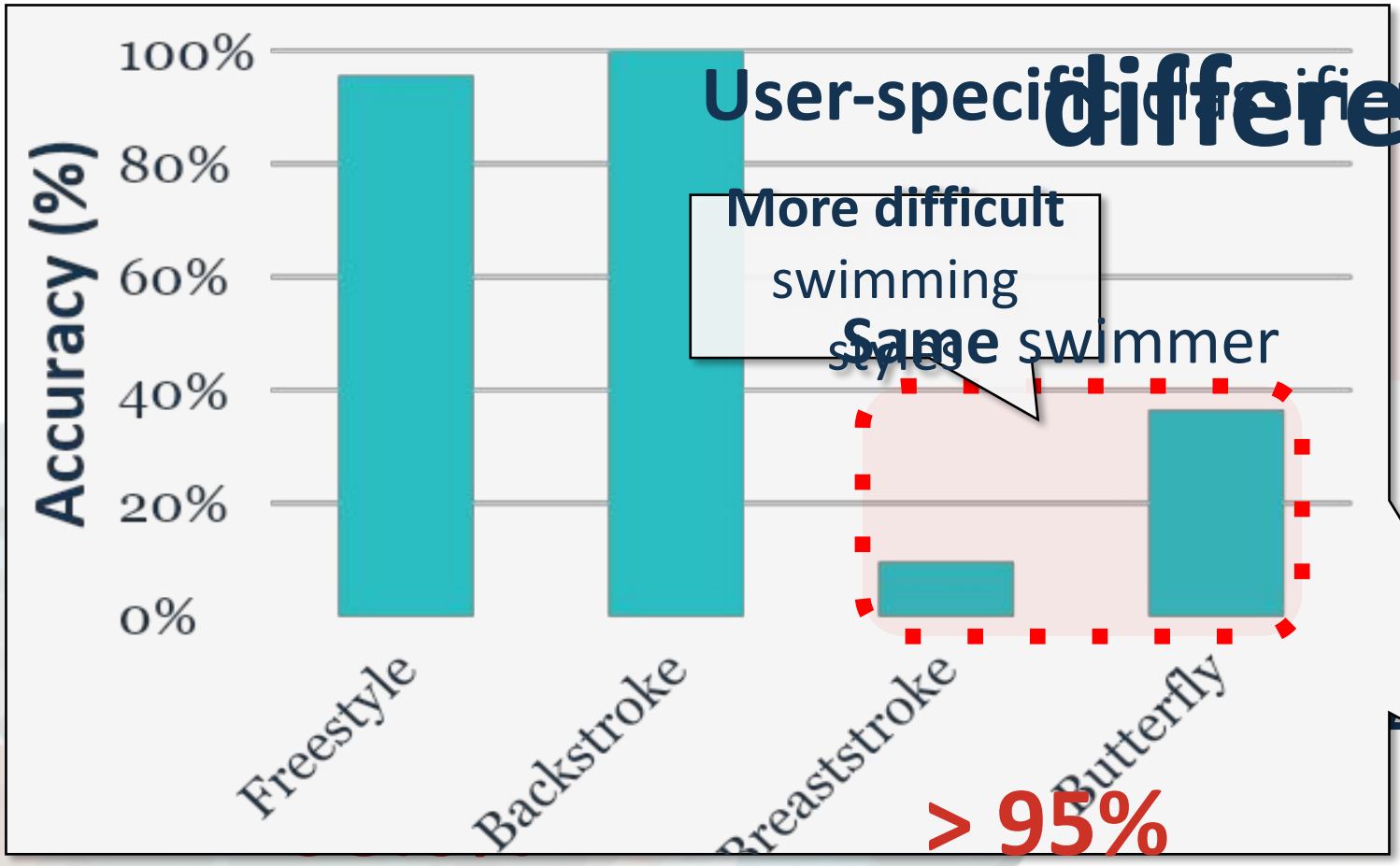
Stroke Timing.wmv

StrokeSense

swimming styles& stroke timing recognition system



Swimming styles classification & Effec of skill level differences



Test data

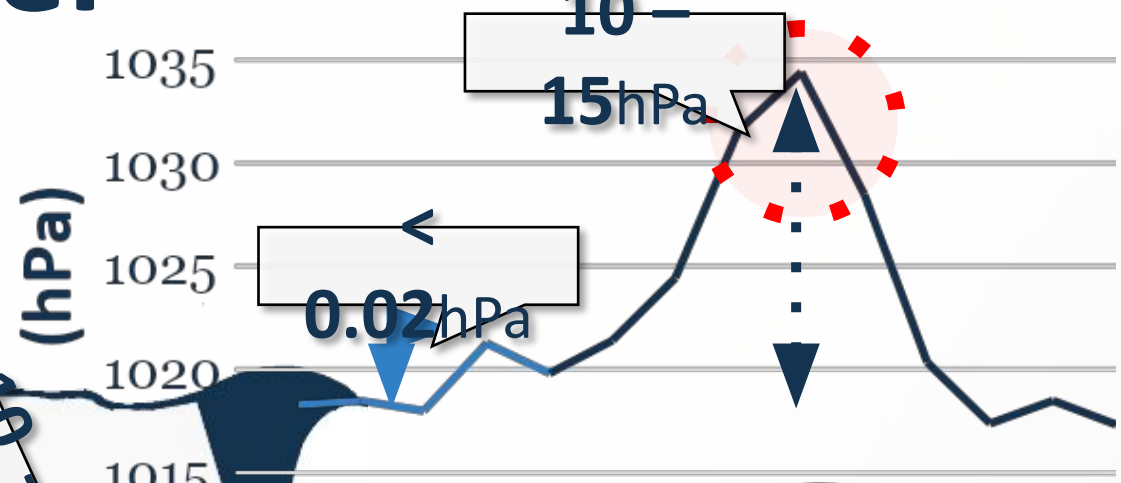
60.7%

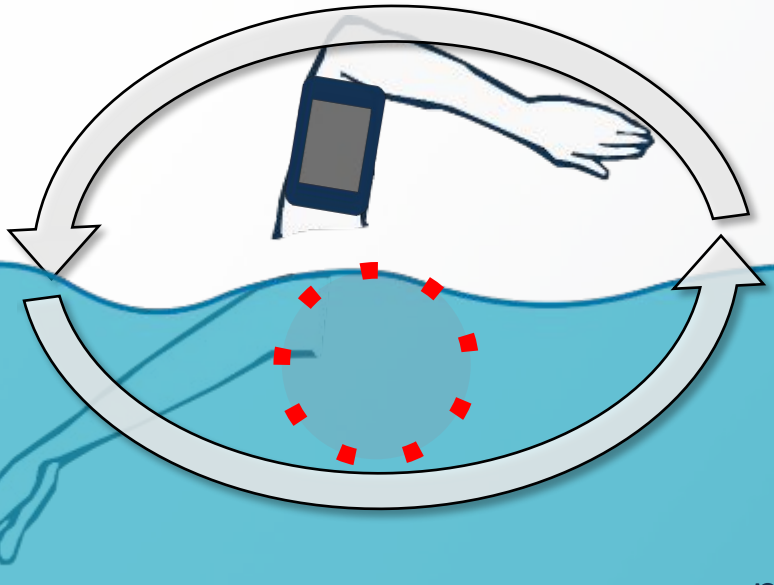
Stroke timing detection using barometer

Required height/depth for **1**hPa **change**

7.9m

0.01m





StrokeSense

swimming styles & stroke timing recognition system

Skill Differences

user-specific swimming styles classification

Barometric Sensor

stroke timing as peaks of barometric values

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3. Game Design & User Study

- Mapping **swimming activities** into **the game**
- Multi-player collaboration with **social awareness cues**
- **Loss-** and **Latency-tolerant** design

Mapping
swimming activities
into the **game**

Swimming Styles Mapping.wmv

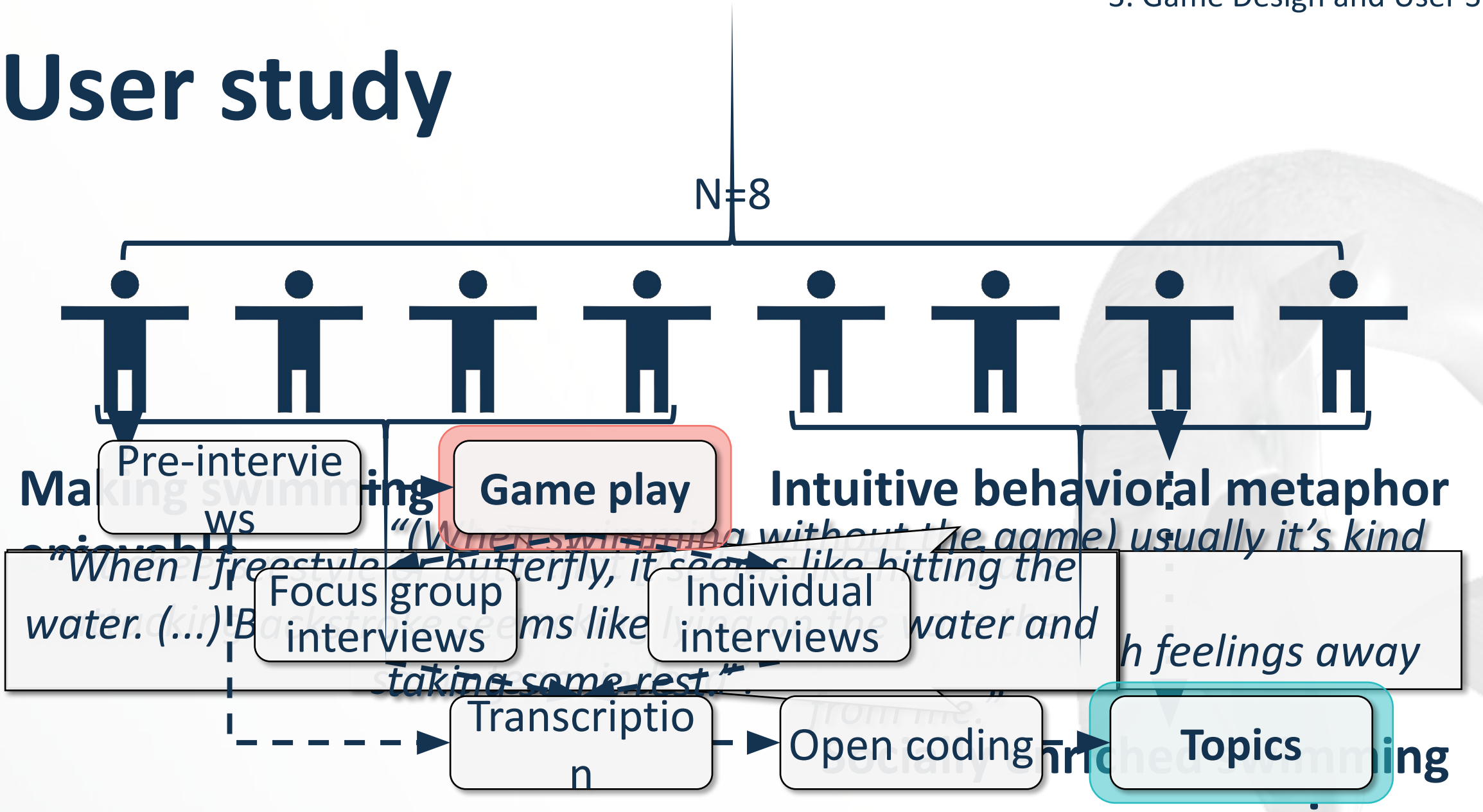
Multi-player collaboration with social awareness cues

Loss- and Latency-tolerant design

Swimming freestyle for a period of time increases

Decreases frequency of stat updates

User study


N=8
Pre-interviews
Game play
Focus group interviews
Individual interviews
Transcription
Open coding
Topics
Intuitive behavioral metaphor
experiences

Future Work

Swimming Styles Classfication

general classification model considering the unique characteristics of swimming

Exercise Intensity

adapting swimmer's condition into the game (e.g., heart rate)

Group Fitness Swimming

explore novel social interactions in group fitness swimming

Summary

Networking Performance in the Pool

- the most robust network under water: LTE
- water depth degrades network performance
- need enough time to reconnect
- swimming styles influences network performance

Swimming Stroke Recognition

- swimming styles & stroke timing recognition
- user-specific classification to cover skill level differences
- stroke timing detection using barometric values

Game Design and User Study

- mapping swimming styles into game commands
- multi-player collaboration with social awareness cues
- loss- & latency-tolerant game design