

UX-based personalization of timed media experiences

Ingar Arntzen

NORCE Norwegian Research Centre, Tromsø

Human-Computer Interaction (HCI)

Workshop for Ph.D. Students

University of Bergen, Norway

9-10 Dec 2021

My background

- Distributed Systems
- 10+ years research on media systems, NORCE, Tromsø
- Special focus on multi-device media experiences and synchronization
- Author - timingsrc - <https://webtiming.github.io/timingsrc/>
 - “””A programming model for timed Web applications, based on the Timing Object. Precise timing, synchronization and control enabled for single-device and multi-device Web applications.”””

Media SFI, WP4

Objective

Develop methods and technologies for **interaction** between media content and users, both humans and computerised, and to provide **personalised, adapted** media experiences to all users regardless of their technical aptitude and personal needs.



- **Making different experiences for different people!**
- **Dynamically changing experiences as needs and circumstances change!**

Aspect Ratio

Simple personalization challenge!

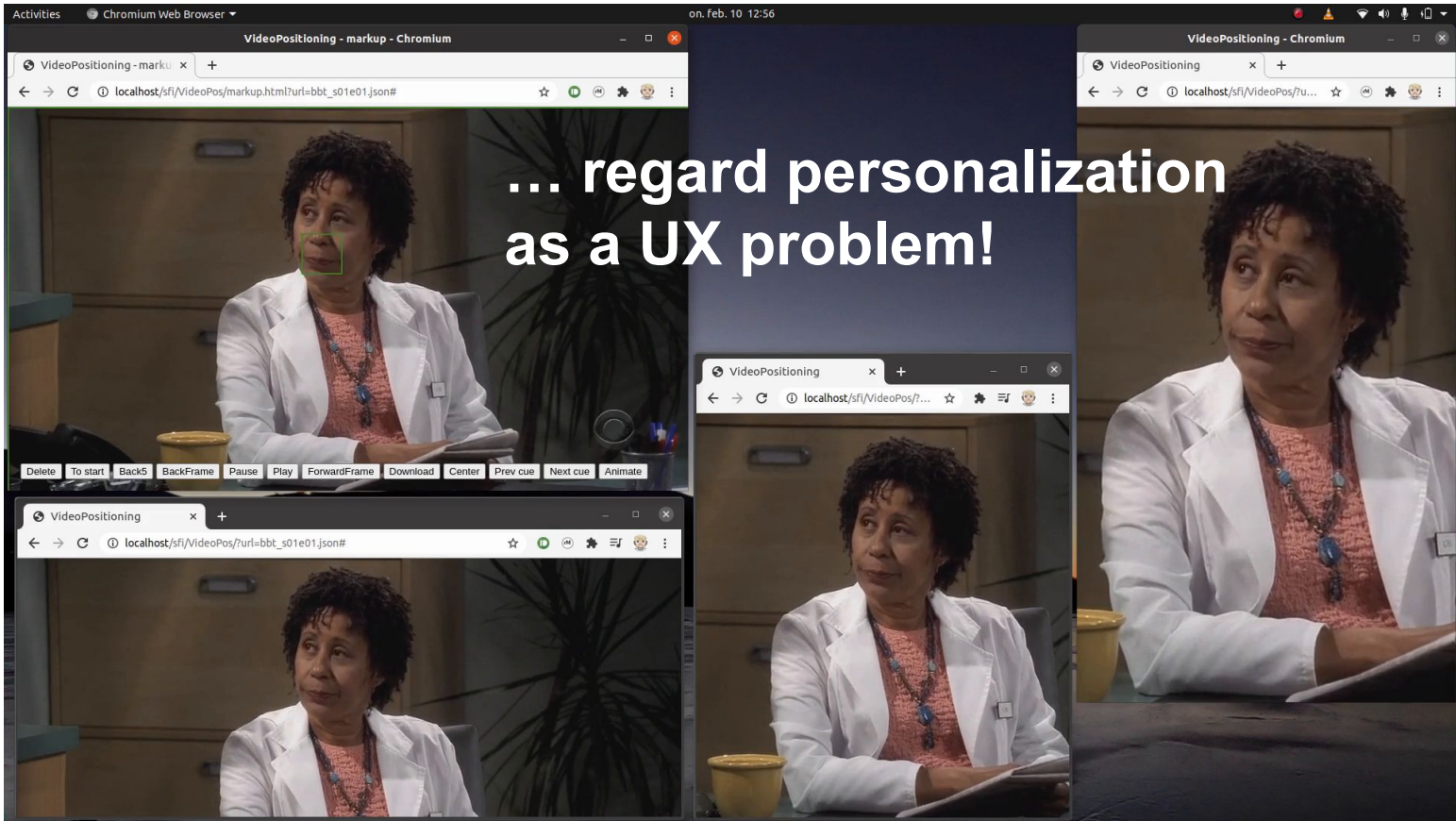
- Adapt experiences to aspect ratio...
- Change on screen rotate or window resize...



Next challenge - add

- **subtitles for different reading levels or hearing impairments**
- **different languages**
- **different graphics**
- **different audio tracks**

Or...













Potential of the UX approach...

- . Real-time client-side rendering...
- . Programmable...
- . Structured data...
- . Direct use of live data sources...
- . Multi-source...
- . Multi-rendering techs...
- . Multi-device...
- . Interactivity...
- . Device capabilities...
- . Responsiveness, adaptability...
- . Composition...

BUT...

When it comes to timed media experiences, the UX/Web approach got some really unfortunate limitations...

UX got no real sense of timing

 Francois Letexier signaliserer et frispark til Besiktas JK på egen banehalvdel.	55'
 Frispark for Besiktas JK på egen banehalvdel.	58'
 Francois Letexier tildeler Borussia Dortmund en corner. Mahmoud Dahoud sparker ballen inn fra det venstre cornerflagget.	59'
 Offsidel! Mahmoud Dahoud (Borussia Dortmund) er alene igjennom, men linjedommeren har flagget oppe.	59'
 Spillerbytte - Borussia Dortmund Inn: Felix Passlack Ut: Marius Wolf Borussia Dortmund gjør sitt andre bytte. Marius Wolf erstattes av Felix Passlack.	62'
 Spillerbytte - Borussia Dortmund  Inn: Erling Braut Haaland Ut: Marco Reus Marco Reus (Borussia Dortmund) erstattes av Erling Håland.	63'
 Donyell Malen (Borussia Dortmund) kommer seg fri på Signal Iduna Park, men avslutningen går utenfor.	66'
 Mål for Borussia Dortmund! Borussia Dortmund 4 - 0 Besiktas  Mål: Erling Braut Haaland Målgivende: Nico Schulz Mål! Erling Håland (Borussia Dortmund) header inn 4-0 på Signal Iduna Park. Nico Schulz sto for den målgivende pasningen.	68'



Challenge 1: Time-driven UX rendering

UX tech is fundamentally data-driven

- renders data, data changes, interactivity

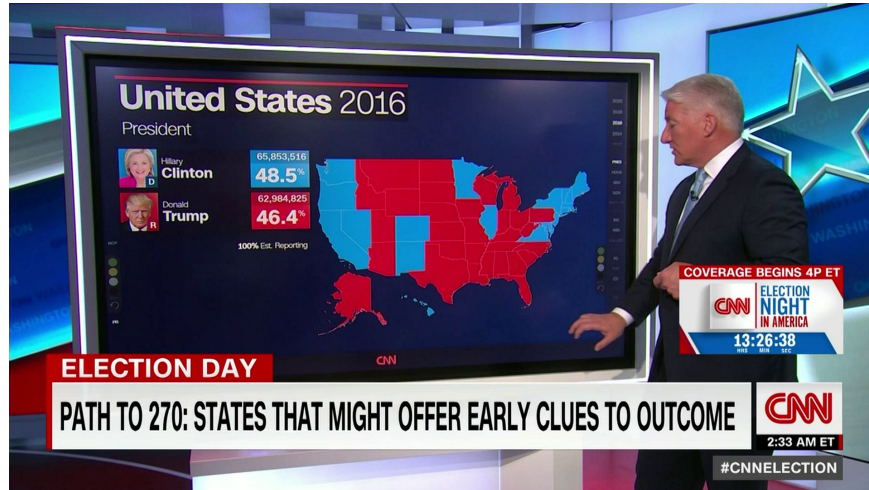
Need support for time-driven, consistent rendering

across different data tracks, UX components, devices

Both live and on-demand

“Air” interactive UX?

...without converting it to non-interactive video pixels



It would be real nice if we could though!

Challenge 2: Shared interactivity

UX interactivity is a local thing

Smooth, high time-resolution, gradual transitions

Need to share interactivity online

- Latency, bandwidth, time-interpolation/extrapolation
- Time-shift!

The real challenge

UX dev is already quite hard.

Adding timing and shared interactivity to the mix could make things a lot worse!

Is it possible to make this easy enough to become practical?

Inspiration

It is possible to do timed rendering in UX...

- . Precisely, live, time-shifted and multi-device
- . That is my previous research :)

It is possible to share interactivity online...

- . multiplayer games do it and complexity is encapsulated in game engines

Also, these challenges seem somewhat related...

Technical Approach

Need to think about state representations in UX, how we can relate UX state and state developments to a timeline

Representations of timed state-change

CONCEPTS

- Log
- Database
- Live stream
- Feed
- Event source
- Variable
- Track
- Transitions/animation

PURPOSES

- Archival
- Analysis
- Viz/playback
 - Live
 - On-demand
- Interactivity
- Effects

Basic Idea

Create a new unifying concept for dealing timed data and interactivity, encapsulating complexities associated with...

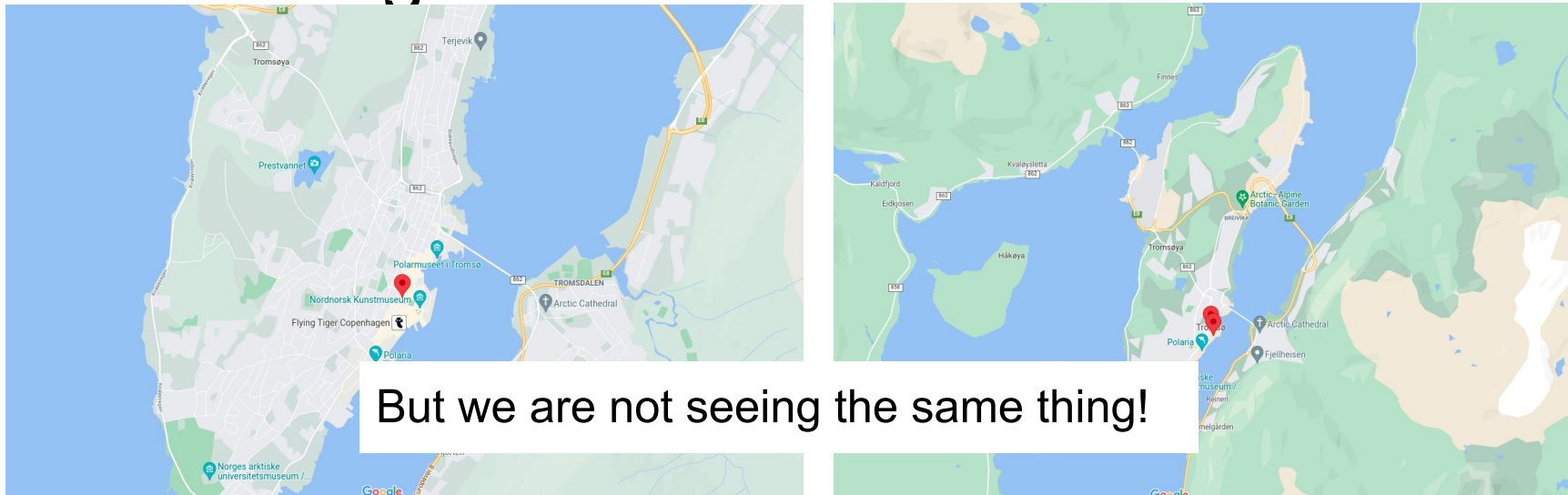
- Online sharing/distribution
- Time-consistent playback
- Time-shifting
- Live recording
- Smooth, gradual changes

Hypothesis

- A unifying approach to timed data and interactivity in UX is feasible and would ...
 - ease development
 - allow reuse across apps and app components
 - transitions between “application modes”
 - Live - Time-shifted
 - Private - Collaborative
 - Shared - Local
 - Data - Control
 - valuable conceptual and technical contribution towards WP4 goals

Thank you!

Challenge 3: I want to show you something...



How to allow for differences, yet control essentials?