Personalised Web TV for the 2012 Olympics

Dr Stefan Poslad

Interactive Media Research Group

School of Electronic Engineering & Computer Science

Queen Mary University of London

stefan@eecs.qmul.ac.uk

Richer Interaction

Current

- Limited UI Interaction: Few ‘trick’ modes,
- Limited, sparse , inaccessible, metadata
- Single user views of an event
- Manual view switching
- Partitioned media access

Upcoming

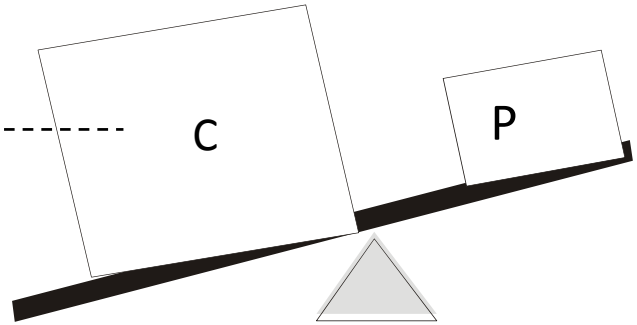
- More UI Interaction: More trick modes, rich task models
- More, richer, accessible, metadata data
- Multi user views of an event
- Smart view switching
- Seamless, converged, multi-play device, media access

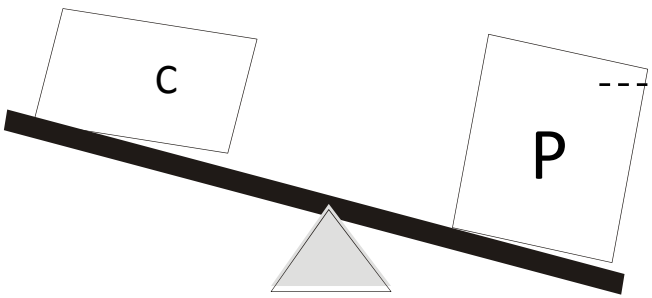
Context-aware Interaction

- Active & passive object / person awareness:
  - Current context
  - Tracking context ,change history
  - Planning context-based paths
- Views that adapt to:
  - Match a user context, e.g., personal preference
  - Complement a user context, e.g., w.r.t. a viewer location
  - Multiple users' contexts, e.g., group experiences
- Multi-objective context-awareness

Personalised (P) vs. Collaborative (C) Interaction

Sharing experiences:
Non-collocated?,
Synchronised?,
Time-shifted?
Non-deterministic





Personalised experiences:
Prior profiles?
Explicit profile?
1-click repeat profiles?
Deterministic profiles?

What can QMUL can offer in Digital Media?

- New directions & world leading research:
  - Video and audio content analysis & sharing
  - Physical world aware, user-aware, ICT aware content access
  - User modelling and analysis, usability studies & lab
  - Social networking
  - Network performance analysis, QoE analysis, adaptive streaming
- Technologies / Prototypes:
  - Automated camera switching
  - Custom AV players & advanced UI for Web/PC/Mobile
  - UI task / event /context tracking, sensing, clustering
  - Smart AV stream recommender

My eDirector 2012

Personalized interactive video broadcast service

Grant Agreement Number 215248

Olympic Games evolution

Athens 2004

- First experiences in IPTV

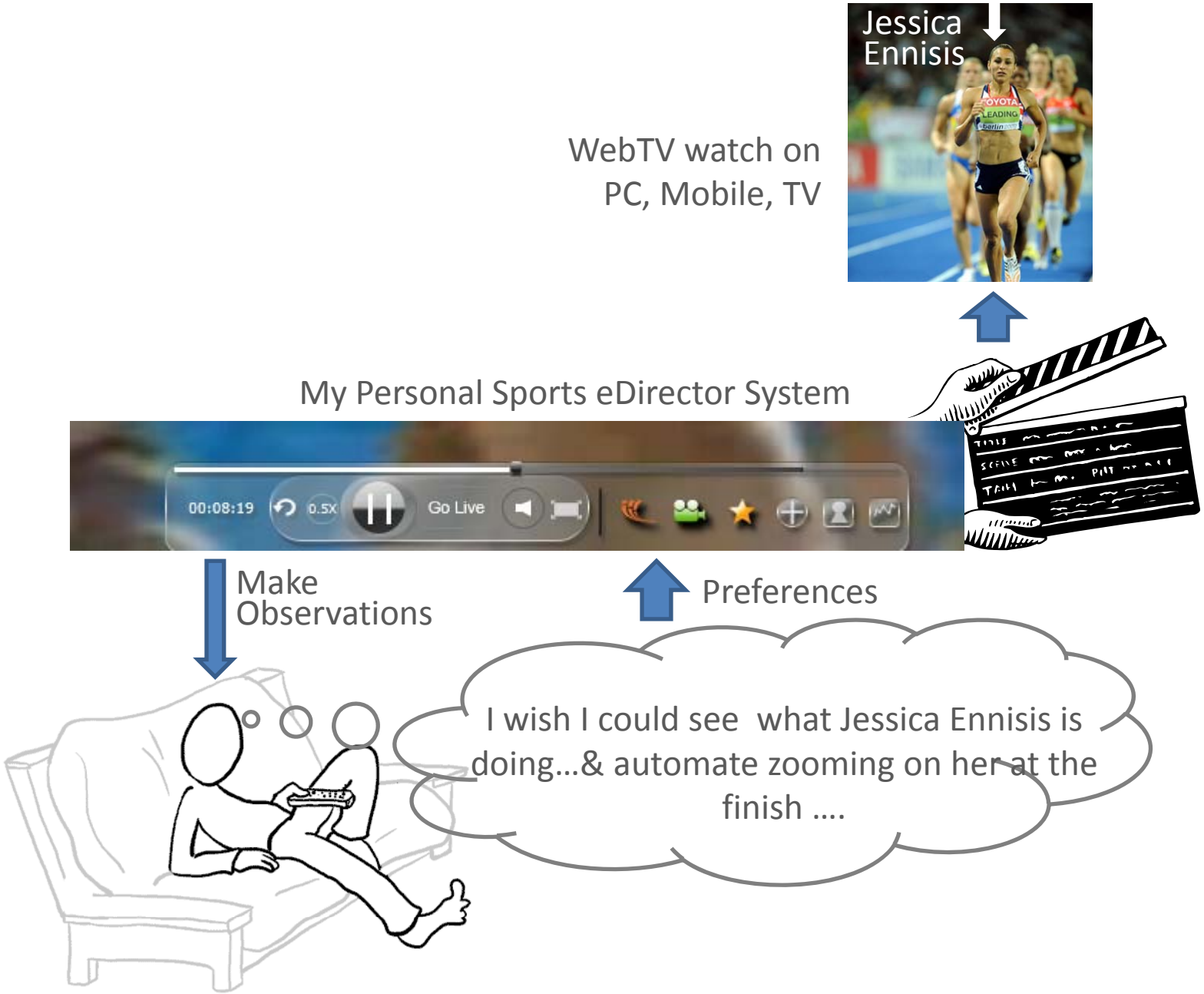
Beijing 2008

- Controlled production environment.
- Interactive TV.
- Improved IPTV experience in USA (http://www.nbcolympics.com/)

London 2012

- Social Olympic Games, personalized and mobile experience

From Broadcasting to multicasting


Jessica Ennisis
WebTV watch on
PC, Mobile, TV
My Personal Sports eDirector System
00:08:19
0.5X
Go Live
Make Observations
Preferences
I wish I could see what Jessica Ennisis is doing…& automate zooming on her at the finish ….

The main objective

...research and develop a solution that will allow viewers to select, personalise automate, rich, customisable interactions within points of interest for focal actors and within real-time broadcasted scenes such as the **Olympic Games** of **London 2012**

Project impact

Broadcasters

- will increase their audience, due to audience fragmentation
- will gather information about audience preferences
- will transfer part of their creative power to Consumers

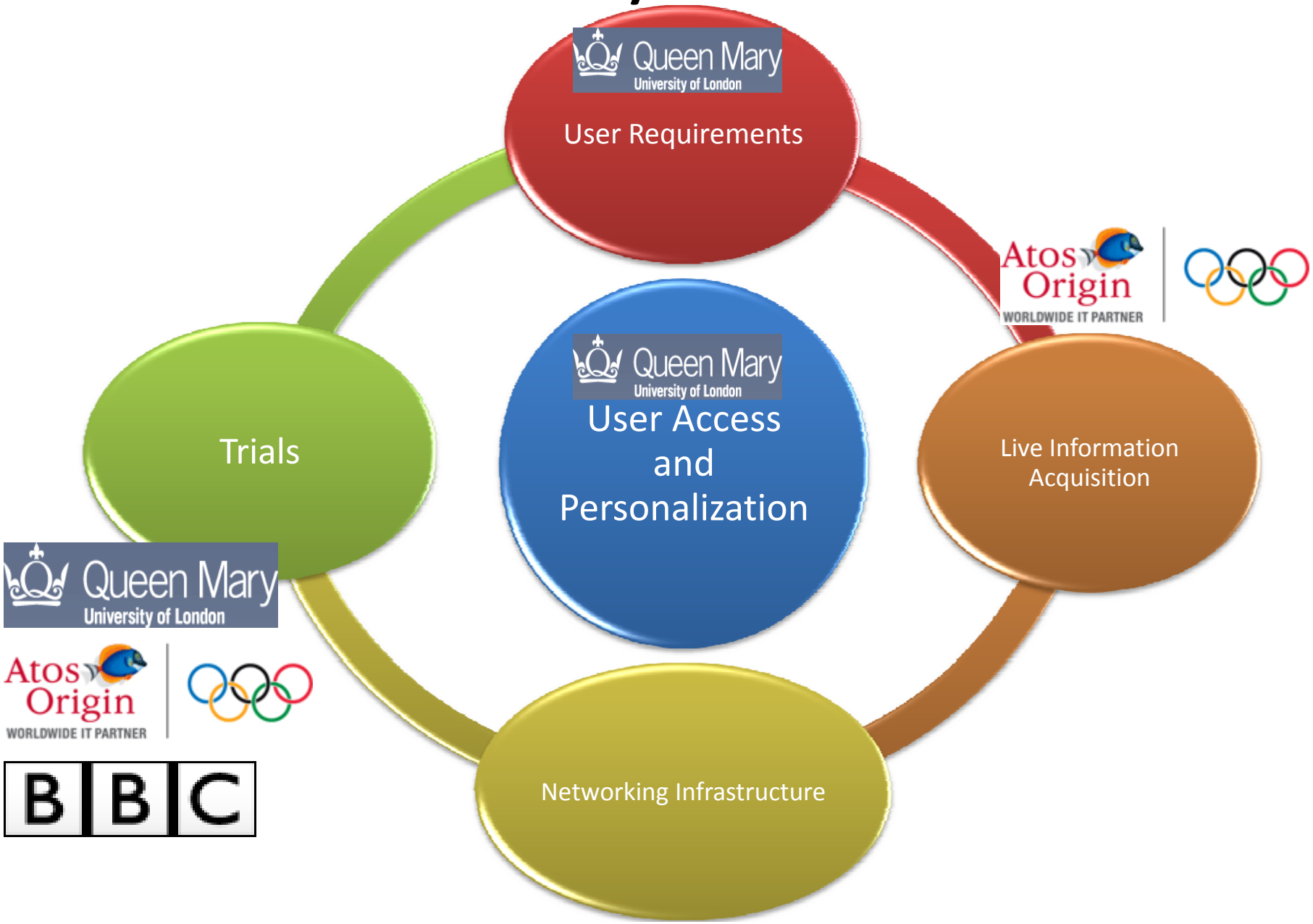
Consumers

- will gain greater control of the TV content at a reasonable cost
- will be able to consume live personalized TV content independent of location and device

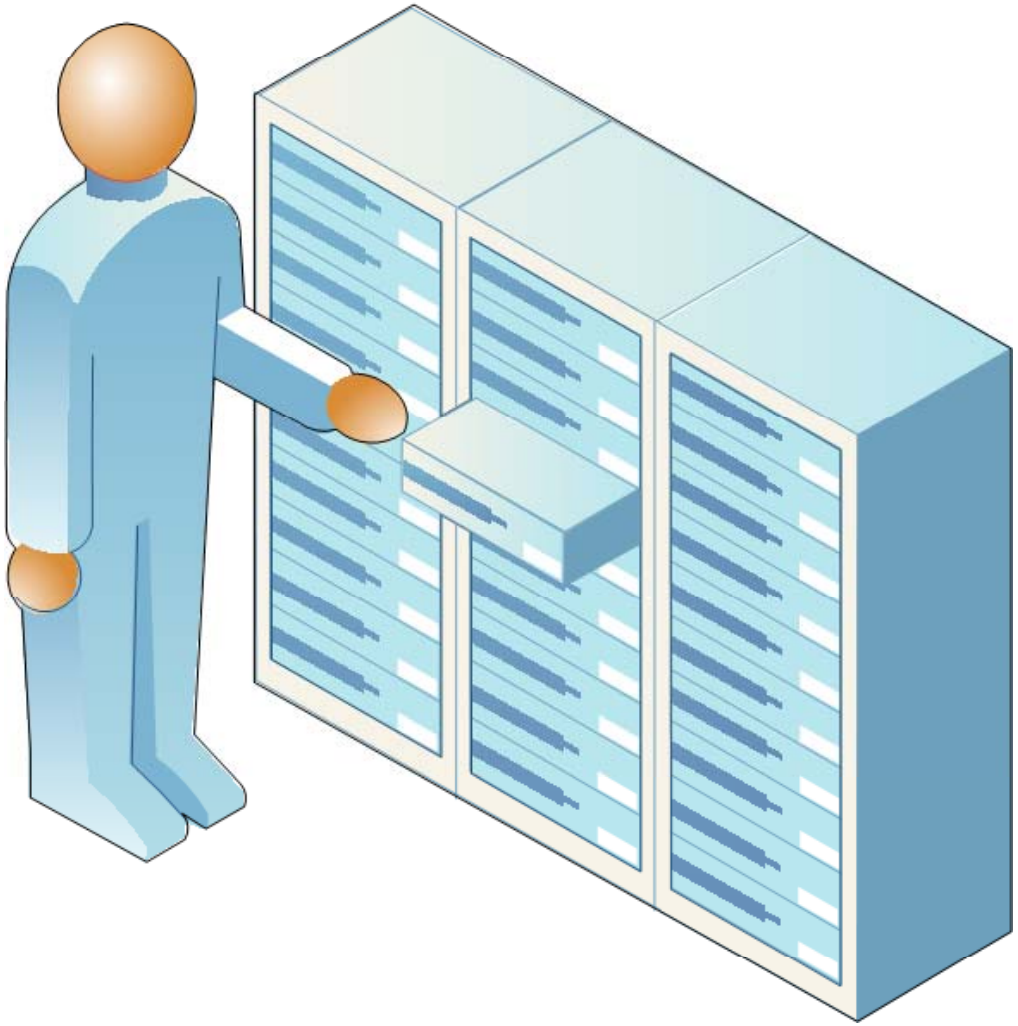
Telco / ISP / CDN

- will become empowered to offer novel video services, which will leverage their significant investments in spectrum and bandwidth

QMUL and My eDirector 2012



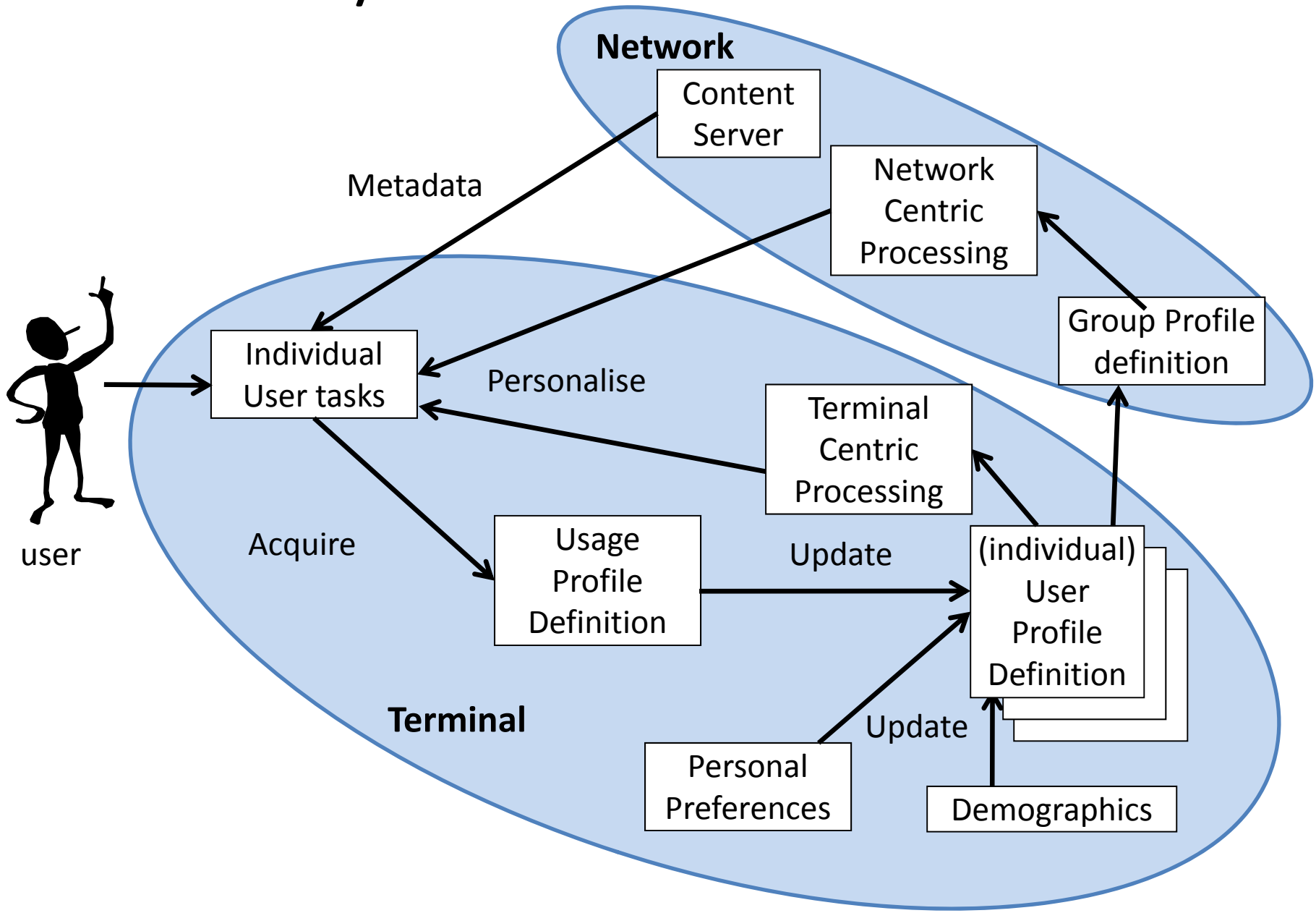
User profiles and Personalisation



QMUL Objectives

- More finely grained explicit and implicit user profiling
- Much richer personalised interaction & tasks far beyond personalised channel selection
- Personalisation adapts QoE, e.g., zooming ↑ BW
- Scalable personalisation that personalised based upon group membership
- Flexible and integrated video and metadata text views
- Cross-terminal network interaction and personalisation
- Greater context-aware interaction (viewer location at event w.r.t athlete location, object location w.r.t. field)

Terminal /Personalisation Architecture



Personalisation Engine (D5.2)

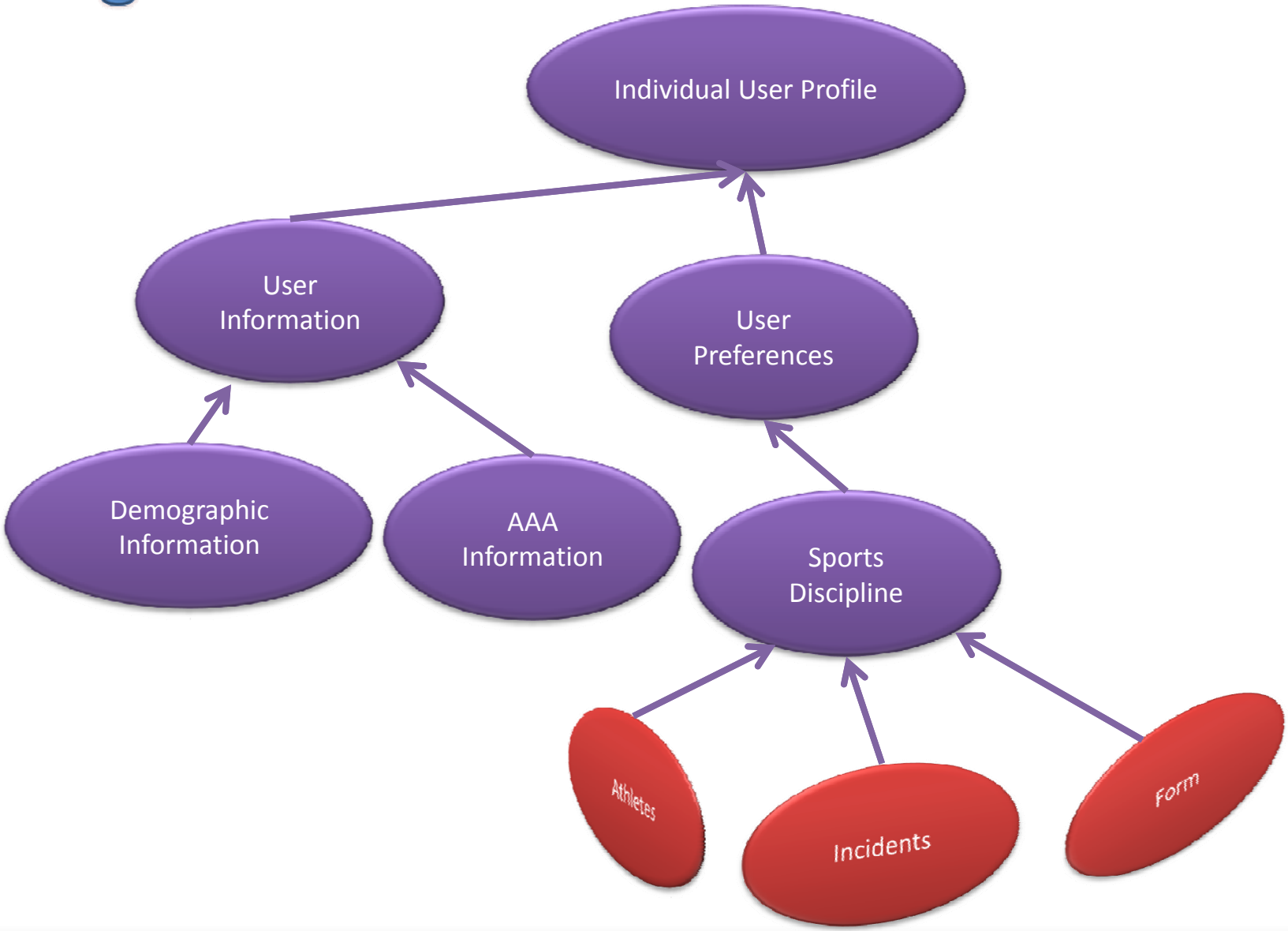
The personalisation engine is based upon:

- Representing User Profile: WS (XML) rather than MPEG
- Acquiring User profile:
  - Static: Explicitly entering user profiles (collected pre-session, off-line, **~ 500 collected**)
  - Dynamic: Monitoring a User's Usage (zooming, replaying etc)
- Personalising user tasks by adapting to individual user's usage
  - Personalised Event Selection (PES)
  - Personalised Event Information Display (PEID)
  - Personalised Target Zooming (PTZ)
  - Personalised Replay (PR)
  - Personalised Camera Selection (PCS)
- Personalising user tasks by adapting to groups of users' usage
  - Personalised Event Selection (PES)
- Personalising content to adapt to user terminal
  - Define and share terminal profile.

Personalisation Engine: Design and Implementation Issues

- Explicit vs. Implicit, static vs. dynamic, individual vs. group, etc profiling
- Experimenting with much finely grained profiles
  - Viewer profiling: just by disciplines (but multiple levels of granularity), by nationality, by gender, by age
  - Profiling by camera, by event incident (depends on image processing algorithms)
- Multiple uses of profiles:
  - To individual personalise & ease repeating local interactions
  - To adapt network QoS to interactions
  - To provide scalable personalisation to 100s, of 1000s, of millions of users

Single User Profile Generic Structure



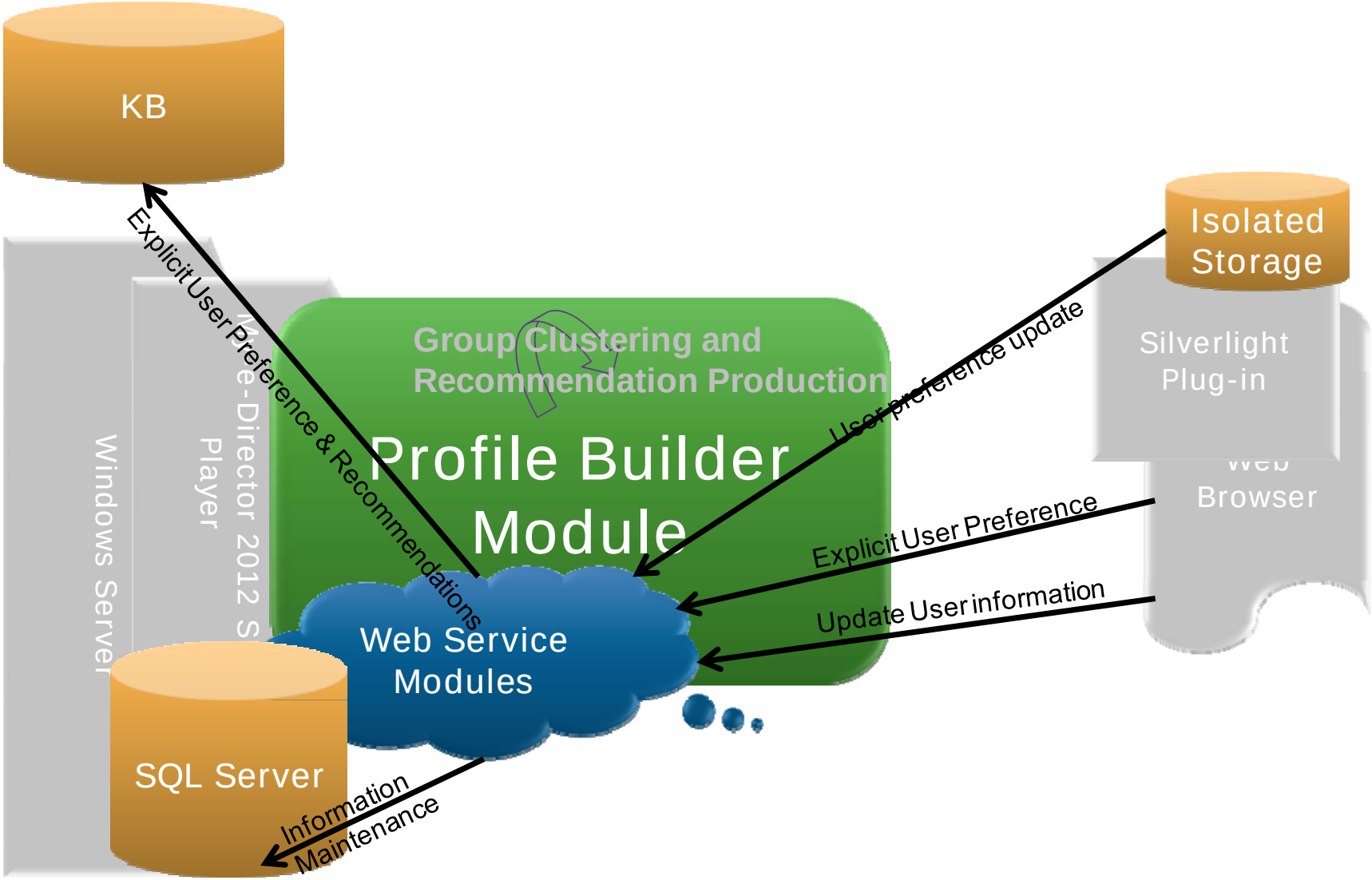
Learning Schemes for Adaptive Personalisation

- Learning schemes and adaptation are the most advanced part of the WP5 work
- Have implemented some unsupervised learning to create and the maintain the group profiles –
  - this is not yet fully implemented, tested and integrated.

Group Profile Builder?

- Updates users' preferences with respect to sports disciplines
- Keeps records of user personal information
- Keeps track of viewing session information for individual users
- Custer user profiles in terms of: sports events, preferences …
- Recommends users with tailored list of available sports events (from strong to weak)
- Share the User Profile Knowledge Base via Web services

Profile Builder Setup



User-Task Interface Models

- A task-based model is used to specify the functionality supported in the UI
- Detailed task descriptions are formally described using CTT (Concurrent Task Trees) diagrams
- UI Tasks are grouped into 3 groups:
  - Textual Information Display (Event Information Display, Athlete Identification Display, Results Notification);
  - Visual Customisation (Overlay Layout);
  - Multimedia Stream Control (Replay Control, Camera Selection, Event selection , Play control, Objects of Interest Selection)

User-Task Interface Models Specification: Design and Implementation Issues

- Implementation based upon MS Windows APIs (because their available, public, open, free, cross-platform, advanced AV player and record features support at the start of the project)
- Switch from Application-based (full access to local resources etc) to Web-based (limited access to local-resources) during year 2, e.g., Silverlight (SL), to maximise accessibility , ease installation (1 click) etc
  - Note SL use in mobiles does not support PC SL version 3 features
- Cross –platform task interaction: PC platform has the capability to support richer UI tasks & interaction (for player control, overlays, etc)
- Event selection tasks depend on maturity of network centric processing, e.g., athlete tracking etc.

Commercial Applications

2010 World Cup Players Comparison

Web Live TV	CPU Use @ 800kbps	Adaptive Streaming	DVR Controls	Mobile Support
iPlayer	30-40%	?	√	√
itv Player	70-90%	√	√	√
Stv Player	30-40%	?	√	√
QMUL player	10-20%	√	√√	√

High CPU Use: image stagnates, laptop overheating, increasing fan noise

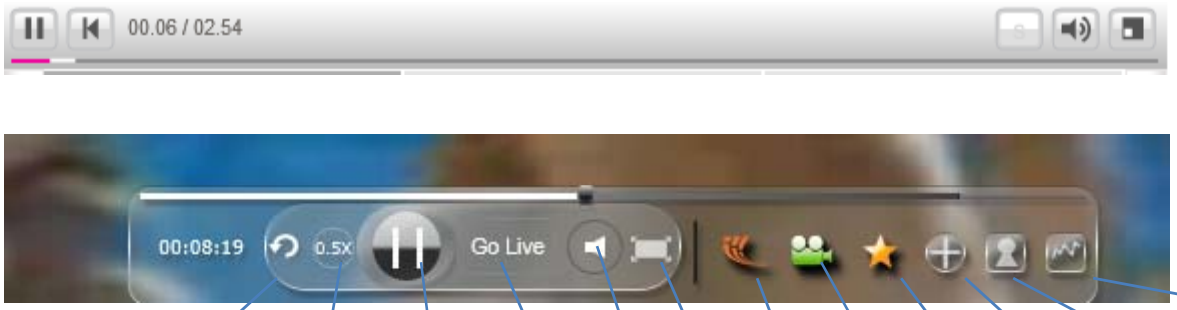
No adaptive streaming: buffering when bandwidth is low,
increasing video card workload when full screen

No DVR controls: missing goals, missing incidents,

No mobile support: undermining Web platform advantages

Terminal / Application UI Design

UI: Playback Controls



iPlayer

eDirector Player

Network Stats

REPLAY

Slow Motion

Play/Pause

Go Live

Volume

Full Screen

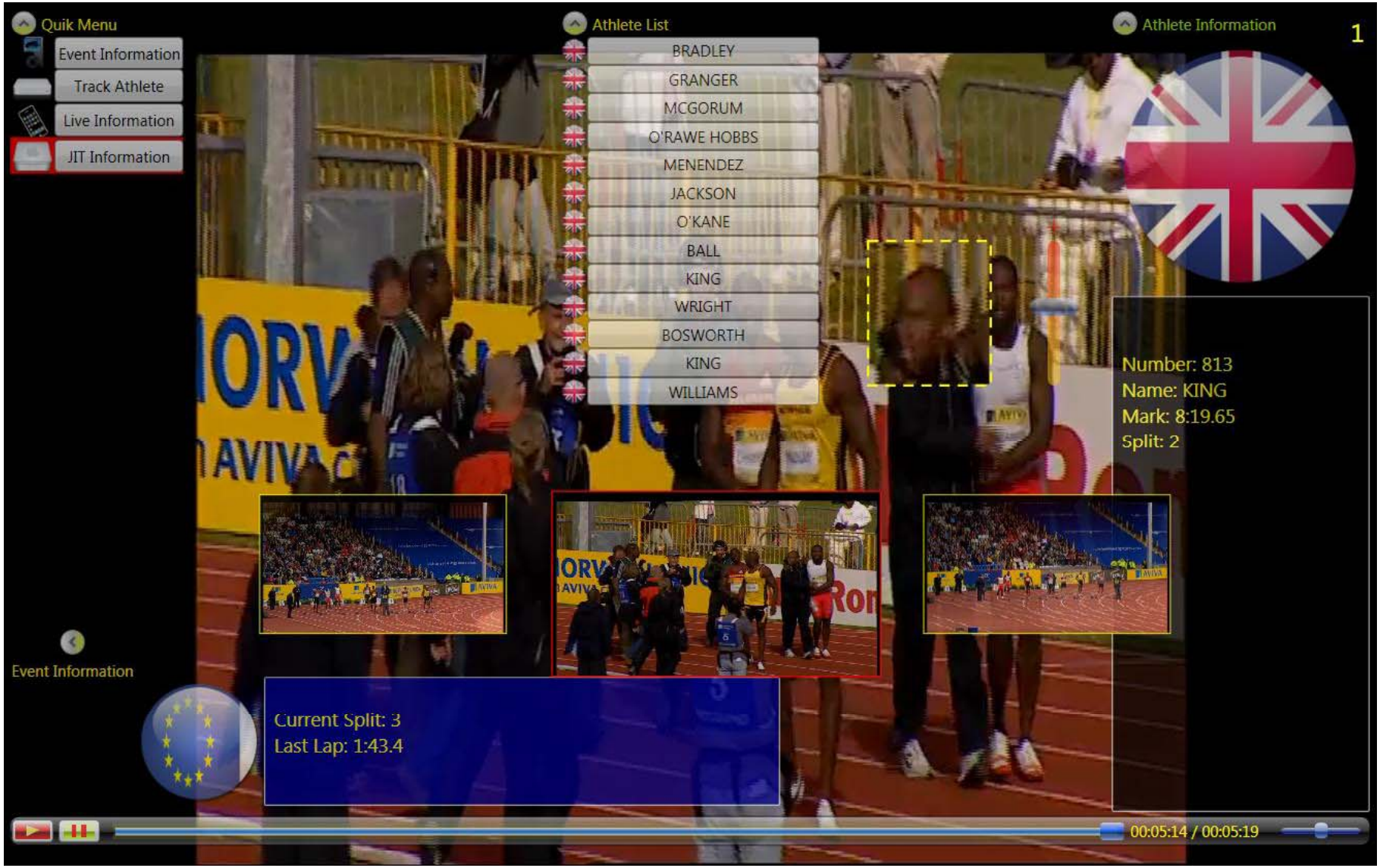
Personalised Event Selection

Personalised Camera Selection

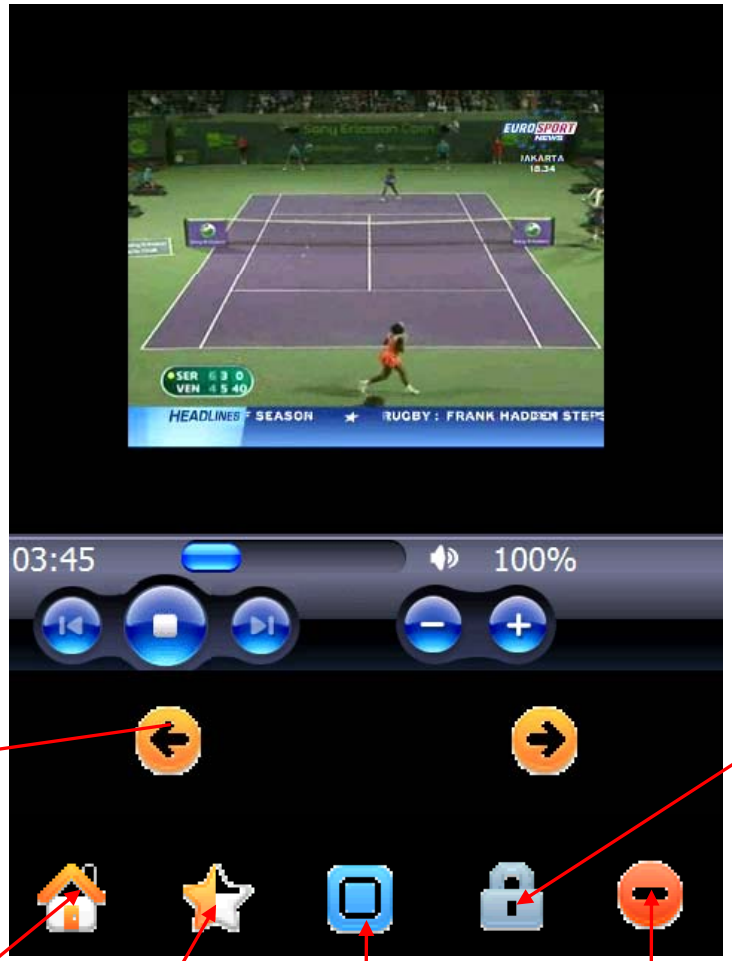
Group Personalised Recommendation

Personalised Zooming

User Preference Setting


Quik Menu
Event Information
Track Athlete
Live Information
JIT Information
Athlete List
BRADLEY
GRANGER
MCGORUM
O'RAWE HOBBS
MENENDEZ
JACKSON
O'KANE
BALL
KING
WRIGHT
BOSWORTH
KING
WILLIAMS
Athlete Information
1
Number: 813
Name: KING
Mark: 8:19.65
Split: 2
Event Information
Current Split: 3
Last Lap: 1:43.4
00:05:14 / 00:05:19

eDirector on Mobile



Not BUTTON!!! Finger move direction Indicator

Locks the player to the current stream.
So that further 'shakes' does not change the stream

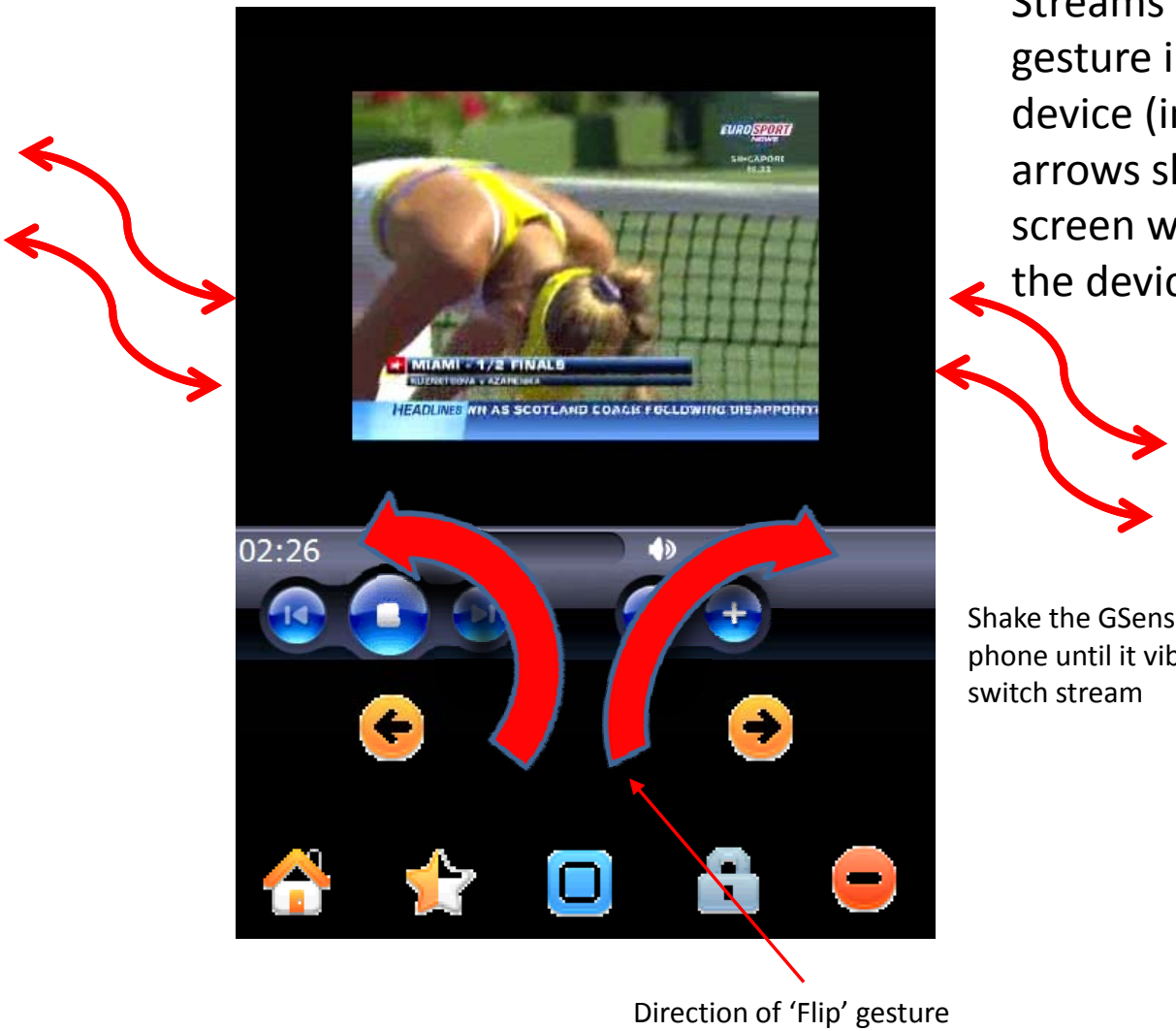
goes to the Home Welcome screen (with Menus)

Toggles the visibility of the player's controls

Activates "Full Screen" view

Stops the stream

Start/Switching between streams

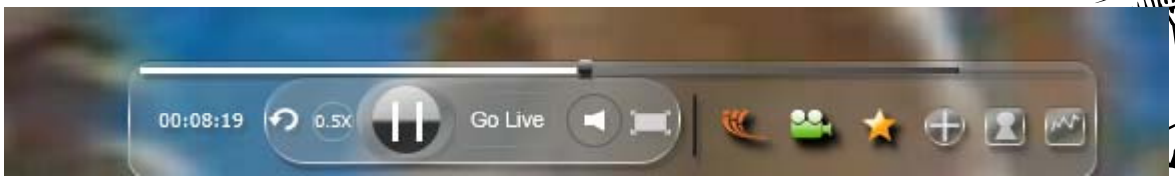


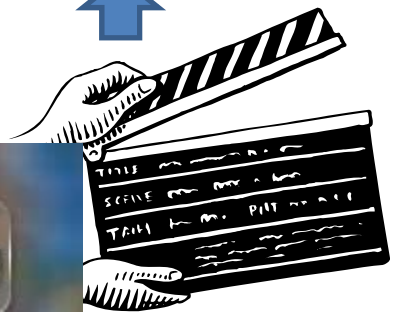
Streams can be switched by a ‘flip’ gesture in any touch screen device (in the direction of the red arrows shown , Keep finger touching on screen when moving) and also by shaking the device – for HTC devices.

Shake the GSensor supported phone until it vibrates to switch stream

Direction of ‘Flip’ gesture

My Personal Sports eDirector System





I wish I could see what Jessica Ennisis is doing…& automate zooming on her at the finish ….