This is future TV.

http://notube.tv
@notubeproject

Lora Aroyo
VU University Amsterdam
Web & Media Group
Thank you for their slides to:

• Dan Brickley, Vicky Buser, Valentina Maccatrozzo, Libby Miller, Davide Palmisano, and the whole NoTube team
• Ericsson user study report
• RedBee Media
• Ugli building wall posters
Scenario
TV & the People
choices, choices ...
lost in space
always missing
From...

What is on right now?

...to:

What do I feel like watching right now?

And now also:

Who else is watching this right now?

Source: Ericsson ConsumerLab TV & Video Consumer Trends 2011

demand for experience
TV & the Web
60% of Americans engaging in couch potato multitasking

By Jacqui Cheng | Last updated about a month ago

Many of us just spent several hours on Sunday night watching the healthcare bill debate on CSPAN while simultaneously chatting, making forum posts, or Tweeting about it. We may be used to it, but that behavior is no longer reserved for us nerds. According to the latest Three Screen report (PDF) out of Nielsen, Americans in general now spend 35 percent more time using the Internet and TV at the same time than a year prior.

That translates to about 3.5 hours of overlapping TV/Internet time per month for the average American consumer, according to Nielsen's data from the fourth quarter of 2009. Nearly 59 percent of consumers reported doing this at least once a month as well, up from 57.5 percent in 2008. That's a lot of people spreading their attention across multiple screens, which is why so many shows are beginning to advertise live online polls, chats, and more during the course of broadcast. People aren't just hitting up those websites after the show is over—they're hitting them up as the show is going on.
42% of UK adults who use Internet while watching TV also discuss or comment on programs they are watching.

Social interaction around TV is spreading online, >40% use social media from the TV sofa.

TV getting active
More than 40% use Social Media while watching TV (on a weekly basis)

Question: Which activities do you do at the same time as you are watching TV?

Source: Ericsson ConsumerLab TV Video Consumer Trends 2011, BASE: ALL, 13 Markets
TV & the Devices
The role of devices is changing...

From accessing devices...

...to accessing content!

35% - There is no longer any need to buy/rent DVD/Blu-rays - everything I need is available through the Internet

multitude of devices
multitude of access
Social & Personalized TV
not a single TV-viewer activity any more
Viewing behaviors are both triggering and triggered by social interaction online.

Live broadcast viewing triggers social interaction.

LIVE / BROADCAST

ON DEMAND

Online gaming turned into viewing

Chats turned into viewing

On demand viewing triggered by social interaction

YouTube parties

VOD parties

START: Content

Start: Social interaction

ONLINE SOCIAL TV/VIDEO BEHAVIOR

ONLINE SOCIAL TV/VIDEO BEHAVIOR

Social forums could become an alternative starting point to content consumption, as natural as the EPG or Zapping!

Source: Ericsson ConsumerLab TV Video Consumer trends 2011
Consumers express increased need for relevant information about TV/video content

**Information needs**
- To identify content
- To choose between content
- Help screen content for kids
- Reliable and independent

**New sources for Info**
- Google
- Wikipedia
- IMDB
- Amazon

**The context determines the use and value of recommendations**
- Content triggered
- Time Centered
- Spontaneous

Know what to watch

Need inspiration & recommendations

Recommendations need
Social Recommendations

RESULTS OF NOTUBE SOCIAL WEB & TV SURVEY 2012
I usually find NEW programmes to watch by:

RESULTS OF NOTUBE SOCIAL WEB & TV SURVEY 2012

Social TV

RESULTS OF NOTUBE SOCIAL WEB & TV SURVEY 2012

Social Recommendations

Thursday, May 24, 12
Social Recommendations
“We are shifting from the wisdom of crowds to the wisdom of friends”

Joanna Shields, Facebook, IBC 2011
So, ...
what does this all mean?
passive vs. active
what’s on vs. what’s there
group vs. individual
single vs. multiple devices
rich source for entertainment vs. rich source of data
competition for attention
demand for social recommendations
What is NoTube?

a project about (future) TV and ...

• the Web
• personalization
• social media
• second screens
NoTube User Perspective

... the role of social recommendations

how do people watch TV together?

how do devices influence watching?

privacy vs. personalization: perceived trade-offs ...
... role of metadata in TV & Apps?

... a good way to share information in real time?

... a good way to sync TV & other metadata?

... an easy way for devices to find & talk to each other?
What did we do?

APIs & prototypes to link the Social Web with broadcast and on-demand television as open source services
How did we do it?

- Open Web Standards
  - XMPP to pair devices with TV & group interaction
  - OAuth for trusted connection
  - Web APIs

- Open Web Data
  - Open Graph API; standardized Activity Streams
  - Linked Data Cloud
  - Program metadata enriched with Web URLs

Key Point: Linking Web Data to User Profiles
Scenario
TV Program Enrichment

Semantic Content Patterns for TV Programs

RDF Graph TV Programs

User Data Analysis

Similarity Clusters of Programs

Recommendation Service

Semantic Pattern-based Recommendation Strategy

Statistical Similarity-based Recommendation Strategy

Hybrid Recommendation Strategy

End Users

User Ratings & Demographics (BBC EPG Data)

EPG Metadata (BBC)
NoTube’s Beancounter
aggregate, analyze & profile

BEANCOUNTER
Personalise your TV recommendations based on what you do and say on the web

INTERESTS ANALYTICS ACTIVITIES

24
Television hours this week

COMEDY
Is your favourite genre of all time

365
Programs watched since 12 July 2009

76%
Of your TV hours are at night

FAVOURITE PROGRAMMES

Little Britain
Have I Got News for You

Top Gear

The Wire

WHEN YOU WATCH OR LISTEN

6-12 am
12-6 pm
6-9 pm
9-12 pm

YOUR FAVOURITE ACTOR

JASON STATHAM
He was in 56% of the movies you watched since 13 August 2009

WHAT YOU’VE WATCHED OR LISTENED TO IN THE PAST 7 DAYS

Mon
Top Gear >
Little Britain >

Tue
Karate Kid >

Wed
The Apprentice >
Wallander >
Flight of the Conrads >

EVOLUTION OF YOUR TOP INTEREST: KUNG FU
TV Preference Data Sparse

- Even for a single service (e.g. Netflix)
- NoTube’s open systems: challenges multiply
  - often no global view, only per-user data
  - many ways of identifying same content item
  - many ways of identifying same user
  - many ways of identifying entities e.g. actors, directors, ...
Fragmentation by Site

<table>
<thead>
<tr>
<th>Facebook</th>
<th>Facebook</th>
<th>Facebook</th>
<th>Facebook</th>
<th>LinkedIn</th>
<th>Meetup</th>
<th>Reddit</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="linkedin.png" alt="LinkedIn" /></td>
<td><img src="meetup.png" alt="Meetup" /></td>
<td><img src="reddit.png" alt="Reddit" /></td>
</tr>
<tr>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="linkedin.png" alt="LinkedIn" /></td>
<td><img src="meetup.png" alt="Meetup" /></td>
<td><img src="reddit.png" alt="Reddit" /></td>
</tr>
<tr>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="linkedin.png" alt="LinkedIn" /></td>
<td><img src="meetup.png" alt="Meetup" /></td>
<td><img src="reddit.png" alt="Reddit" /></td>
</tr>
<tr>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="facebook.png" alt="Facebook" /></td>
<td><img src="linkedin.png" alt="LinkedIn" /></td>
<td><img src="meetup.png" alt="Meetup" /></td>
<td><img src="reddit.png" alt="Reddit" /></td>
</tr>
</tbody>
</table>
TV Preferences in NoTube

- Inferred from the Social Web
  - tweets, FB likes, last.fm listened, etc.
  - weighted interests

- Represented using Linked Data web identifiers
  - record-linkage:

- NLP: #littlebritain

http://dbpedia.org/resource/Matt_Lucas
http://dbpedia.org/resource/David_Walliams
TV Preferences in NoTube

• Inferred from the Social Web
  • tweets, FB likes, last.fm listened, etc.
  • weighted interests

• Represented using Linked Data web identifiers
  • record-linkage: facebook.com/pages/ → dbpedia.org/

• NLP: #littlebritain #tagdef Brilliant british humor by Matt Lucas & David Walliams - whole range of fascinating characters portraying diversity of british society
  http://dbpedia.org/resource/Matt_Lucas
  http://dbpedia.org/resource/David_Walliams
You watched Karate Kid on N-Screen
30 mins ago

You liked Jackie Chan (actor) on Facebook
1 hour ago

You listened MC Solaar on Last.fm
3 hours ago

You tweeted about London on Twitter
5 hours ago

You tweeted about London on Twitter
5 hours ago

You watched Karate Kid on N-Screen
30 mins ago

You liked Jackie Chan (actor) on Facebook
1 hour ago

You listened MC Solaar on Last.fm
3 hours ago

You tweeted about London on Twitter
5 hours ago

You tweeted about London on Twitter
5 hours ago
12 MAR 2012: You watched Karate Kid

This activity added the following new interests to your profile:

Jackie Chan

And added extra weight to these existing interests, you can adjust them by using the sliders:

China

Kung Fu

Martial Arts

SHOW OLDER
**BEANCOUNTER**

Personalise your TV recommendations based on what you do and say on the web

---

**24**

Television hours this week

---

**COMEDY**

Is your favourite genre of all time

---

**365**

Programs watched since 12 July 2009

---

**76%**

Of your TV hours are at night

---

**FAVOURITE PROGRAMMES**

- Little Britain
- Top Gear
- Have I Got News for You
- The Wire

---

**WHEN YOU WATCH OR LISTEN**

<table>
<thead>
<tr>
<th>Time</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12 am</td>
<td>1</td>
</tr>
<tr>
<td>12-6 pm</td>
<td>2</td>
</tr>
<tr>
<td>6-9 pm</td>
<td>3</td>
</tr>
<tr>
<td>9-12 pm</td>
<td>4</td>
</tr>
</tbody>
</table>

---

**YOUR FAVOURITE ACTOR**

**JASON STATHAM**

He was in 56% of the movies you watched since 13 August 2009

---

**WHAT YOU'VE WATCHED OR LISTENED TO IN THE PAST 7 DAYS**

**Mon**

- **Top Gear**
  - **Little Britain**

**Tue**

- **Karate Kid**

**Wed**

- **The Apprentice**
  - **Wallander**
  - **Flight of the Conrords**

**Thu**

- **Psychoville**

**Fri**

- **Celebrity Masterchef**

**Sat**

- **The Wire**

---

**EVOLUTION OF YOUR TOP INTEREST: KUNG FU**

---

**TOP 5 INTERESTS EVOLUTION THIS MONTH**
NoTube's N-Screen
drag & drop, sharing & TV control
Suggestions for You

Idea of personalised suggestions based on things you've done in the past was universally liked.
Recommendations

surface interesting, new & relevant programs to individual and group users

combine in a complementary way statistical & semantic approaches

find the balance between serendipity & diversity of recommendations

- COLD START
- PRIVACY
- INTRUSIVENESS

LOD
METADATA ENRICHMENT
CONTENT PATTERNS
DEMOGRAPHICS
### Analysis of LOD Sources

#### Dataset

<table>
<thead>
<tr>
<th>Dataset</th>
<th>LinkedMDB</th>
<th>DBpedia</th>
<th>Freebase</th>
</tr>
</thead>
<tbody>
<tr>
<td>#triples</td>
<td>6,147,978</td>
<td>385,000,000</td>
<td>337,203,427</td>
</tr>
<tr>
<td>#props</td>
<td>221</td>
<td>1643</td>
<td>n.a.</td>
</tr>
<tr>
<td>#types</td>
<td>53</td>
<td>3,640,000</td>
<td>12,000,000</td>
</tr>
</tbody>
</table>

#### Dataset Enriched BBC

<table>
<thead>
<tr>
<th>Dataset</th>
<th>#triples</th>
</tr>
</thead>
<tbody>
<tr>
<td>#triples</td>
<td>240,630</td>
</tr>
<tr>
<td>#props</td>
<td>41</td>
</tr>
<tr>
<td>#types</td>
<td>17,029</td>
</tr>
</tbody>
</table>

#### Properties

- **foaf:page**: 512,944
- **http://purl.org/dc/terms/date**: 74,111
- **foaf:made**: 53,180
- **linkedmdb:actor_actorid**: 50,603
- **dbprop:hasPhotoCollection**: 30,354

#### Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Pattern</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>person - <strong>co_participation</strong> - person</td>
<td>62162</td>
</tr>
<tr>
<td>People</td>
<td>person - <strong>actor</strong> - person</td>
<td>24843</td>
</tr>
<tr>
<td>Format</td>
<td>program - <strong>has_format</strong> - format</td>
<td>13108</td>
</tr>
<tr>
<td>Genre</td>
<td>program - <strong>has_genre</strong> - genre</td>
<td>12767</td>
</tr>
<tr>
<td>People</td>
<td>person - <strong>influencedBy</strong> - person</td>
<td>10053</td>
</tr>
<tr>
<td>People</td>
<td>person - <strong>partner</strong> - person</td>
<td>10053</td>
</tr>
<tr>
<td>Award</td>
<td>program - <strong>award_won</strong> - award</td>
<td>782</td>
</tr>
</tbody>
</table>
From Predictability to Serendipity
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

Secret Gardens
Make ‘em laugh
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

documentary

Secret Gardens

Make 'em laugh

format

format

format

Thursday, May 24, 12
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

Secret Gardens

Make 'em laugh

Homes and gardens

Basic patterns

Format, genre, award

Documentary

Art culture and the media

Grammy Awards

Thursday, May 24, 12
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

Paul Merton

Paul Merton looks at Alfred Hitchcock

Caroline Quentin

Life of Riley

documentary

art culture and the media

Grammar Awards

Make ‘em laugh

Secret Gardens

homes and gardens

Basic patterns
Homogeneous patterns

Thursday, May 24, 12
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

Paul Merton

documentary

art culture and the media

Grammy Awards

Secret Gardens

Make 'em laugh

homes and gardens

Spike Milligan

The adventures of Barry McKenzie

Life of Riley

comedy

film

Paul Merton looks at Alfred Hitchcock

Paul Merton

influence

Caroline Quentin

actor

Spike Milligan

actor

The adventures of Barry McKenzie

Life of Riley

comedy

film

Basic patterns
Homogeneous patterns
From Predictability to Serendipity

Paul Merton looks at Alfred Hitchcock

Secret Gardens

Make ‘em laugh

Homes and gardens

The adventures of Barry McKenzie

Shanghai Knights

Action and adventure

Paul Merton

Influence

Charlie Chaplin

Influence

Spike Milligan

Actor

Life of Riley

Comedy

documentary

Art culture and the media

Grammar Awards

Award

Format

Genre

Basic patterns

Homogeneous patterns

Heterogeneous patterns

Wednesday, May 24, 12
From Predictability to Serendipity
Weak Semantics & Statistical Support
Weak Semantics & Statistical Support

Paul Merton looks at Alfred Hitchcock

Paul Merton

Caroline Quentin

Life of Riley

actor

format

genre

documentary

art culture and the media
Weak Semantics & Statistical Support

Paul Merton looks at Alfred Hitchcock

Documentary, art culture and the media

Partner

Caroline Quentin

Actor

Life of Riley

User profile

Documentary format, art culture and the media

Paul Merton

Anchor

Caroline Quentin

25 years old, 1 child

User profile

Thursday, May 24, 12
Weak Semantics & Statistical Support

Paul Merton looks at Alfred Hitchcock

- Anchor: Paul Merton
- Partner: Caroline Quentin
- Genre: documentary
- Art culture and the media

User profile: Woman, 25 years old, 1 child

Life of Riley: 25 years old women with 1 child
Weak Semantics & Statistical Support

Paul Merton looks at Alfred Hitchcock

Paul Merton

Caroline Quentin

Life of Riley

User profile

Similar users

25 years old

25 years old women with 1 child

woman

1 child

format

genre

art culture and the media

documentary

User profile

25 years old

1 child

Thursday, May 24, 12
Shuffle

Most people liked random selection as another way of finding new programmes.

Some people wanted to see programme genres up-front to help them decide whether a programme might be interesting or not.

Not clear that you can repeatedly shuffle by tapping 'Random selection' again.
Real-time Sharing

People didn’t realise programmes were draggable initially.

Picking up an item can be tricky: it’s easy to select an item by mistake, opening an overlay instead.

Target for dropping is too small, most people had to make a couple of attempts before they managed to share something successfully.

Most people thought the drag and drop made the app simple, fun and easy to use - once they realised they could do it and got the hang of it.
Suggestions from Friends

Random Selection

Most people liked random selection as another way of finding new programmes.

- Jimmy and the Wild Honey Hunters
- Eggheads: Series 12, Episode 83
- The World's Strictest Parents: Series 4, North Carolina, USA
- After Life: The Strange Science of Decay
- Any Questions?: 02/12/2011
- The Little World of Don: Series 3, The 13th Century
- The Radio 2 Arts Show: Penny meets actor Simon Shepherd
- Saturday Classics: Nicola Benedetti
- Guy Garvey's Finest Hour: 04/12/2011

Some people wanted to see programme genres up-front to help them decide whether a programme might be interesting or not.

How do you get back to other types of suggestions? Link to 'home' not obvious.

Not clear that you can repeatedly shuffle by tapping 'Random selection' again.
Explanations
Changing Program on TV
# Surveys

## The Social Web & TV

### Response Summary

Total Started Survey: 132  
Total Completed Survey: 117 (88.6%)

Select a page to view below or view all pages:

### PAGE: SOCIAL NETWORKS AND SHARING

1. Which of the following social networks do you use regularly (at least twice a week)?

<table>
<thead>
<tr>
<th>Social Network</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>79.8%</td>
<td>99</td>
</tr>
<tr>
<td>Twitter</td>
<td>43.5%</td>
<td>54</td>
</tr>
<tr>
<td>LinkedIn</td>
<td>34.7%</td>
<td>43</td>
</tr>
<tr>
<td>Hyves</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Google+</td>
<td>21.0%</td>
<td>26</td>
</tr>
</tbody>
</table>
Focus Groups
INTERESTING PROGRAMMES

- suggestions based on your past 'Social Web' activities
- suggestions based on programmes others have watched
- linking programmes by guests, actors, presenters etc.
- 'shuffle' option for programme selection
- explaining recommendations

✔ drag & drop

swapping suggestions with specific friends

? sharing suggestions with others in the same room

? sharing to watch immediately

sharing them

✔ drag & drop to change what's playing on TV

watching with friends

✔ watching 'together apart' in different locations

✗ changing programmes on someone else's TV

controlling the TV

finding

USER TESTING RESULTS

December 2011, BBC R&D London
10 participants: 5 male, 5 female, aged between 20 to 64

✔ loved
✔ liked
✓ disliked
△ unsure

For more details:
Thursday, May 24, 12

http://notube.tv
Challenges
More from NoTube ...

http://notube.tv
Second Screen

**TEA & TEAPlayer**
video annotation & second screen

**Shaker**
Randomizing program chooser
Second Screen

Google

UN BIMBO DI DIECI ANNI E MORTO SCHIACCIATO NEI PANNI DI UNA PORTA DA CALCIO CROLLATA MENTRE SI STAVA TRASITANDO PER RECUPERARE IL PALLONE E HA TENUTO BANCO IN PROVINCIA DI NAPOLI. ADRIANO ALBA IL PALLONE INCASTRATO IN ALTO SULLA TRAVERSA NELLA RETE VOLEVA RECUPERARE TUTTI I COSTI SI E' AGGAPPAATO ALLA PORTA DEL CAMPETTO DI CALCIO ED E' CROLLATA.

UN BIMBO DI DIECI ANNI E' MORTO SCHIACCIATO NEI PANNI DI UNA PORTA DA CALCIO CROLLATA MENTRE SI STAVA TRASITANDO PER RECUPERARE IL PALLONE E HA TENUTO BANCO IN PROVINCIA DI NAPOLI. ADRIANO ALBA IL PALLONE INCASTRATO IN ALTO SULLA TRAVERSA NELLA RETE VOLEVA RECUPERARE TUTTI I COSTI SI E' AGGAPPAATO ALLA PORTA DEL CAMPETTO DI CALCIO ED E' CROLLATA.

Rai

Polymedia kitdigital
Second Screen

Pick a programme to watch

Prince William: I Decided It Was the Right Time

White CZ Cluster Ring

September, 2011

Prince William: I Decided It Was the Right Time
Personal Ads

Low interest in this corner

Best moment

Thursday, May 24, 12
Thank you

for their slides to:

• Dan Brickley, Vicky Buser, Valentina Maccatrozzo, Libby Miller, Davide Palmisano, and the whole NoTube team

• Ericsson user study report

• RedBee Media

• Ugli building wall posters
http://notube.tv

mailing list: public-notube@few.vu.nl

twitter: @notube, #notube

videos: https://vimeo.com/user3487770
videos: http://youtu.be/0QUPKQLvOHU

http://www.slideshare.net/NoTubeProject