

## **AMENDED Exhibit 788**

# **PLAINTIFFS' OMNIBUS OPPOSITION TO DEFENDANTS' MOTIONS FOR SUMMARY JUDGMENT**

Case No.: 4:22-md-03047-YGR

MDL No. 3047

In Re: Social Media Adolescent Addiction/Personal Injury Products Liability Litigation

## Produced in Native



# Watch Next Overview

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January 22, 2016 Product Review

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<https://docs.google.com/>

## Agenda

Mission

History, team, and 2015 highlights

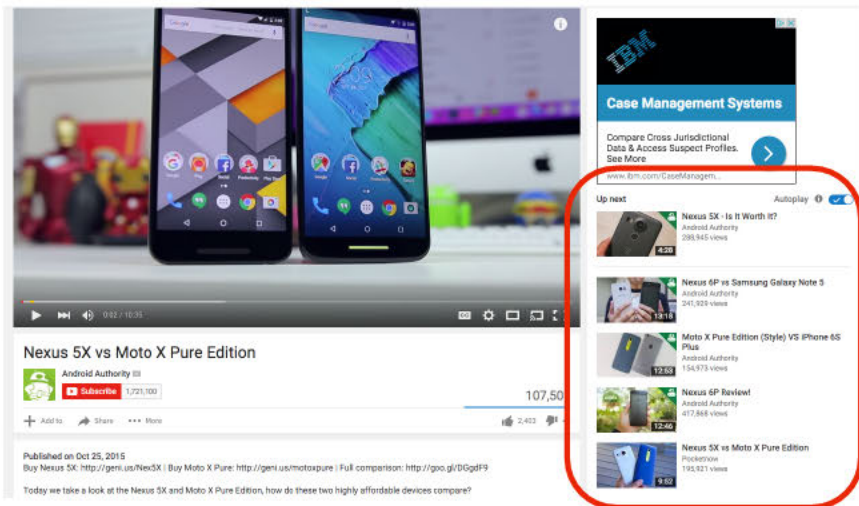
Product and architecture walkthrough

+ metrics, challenges, opportunities, lessons learned

Current projects and roadmap

How you can help

## Watch Next: Desktop

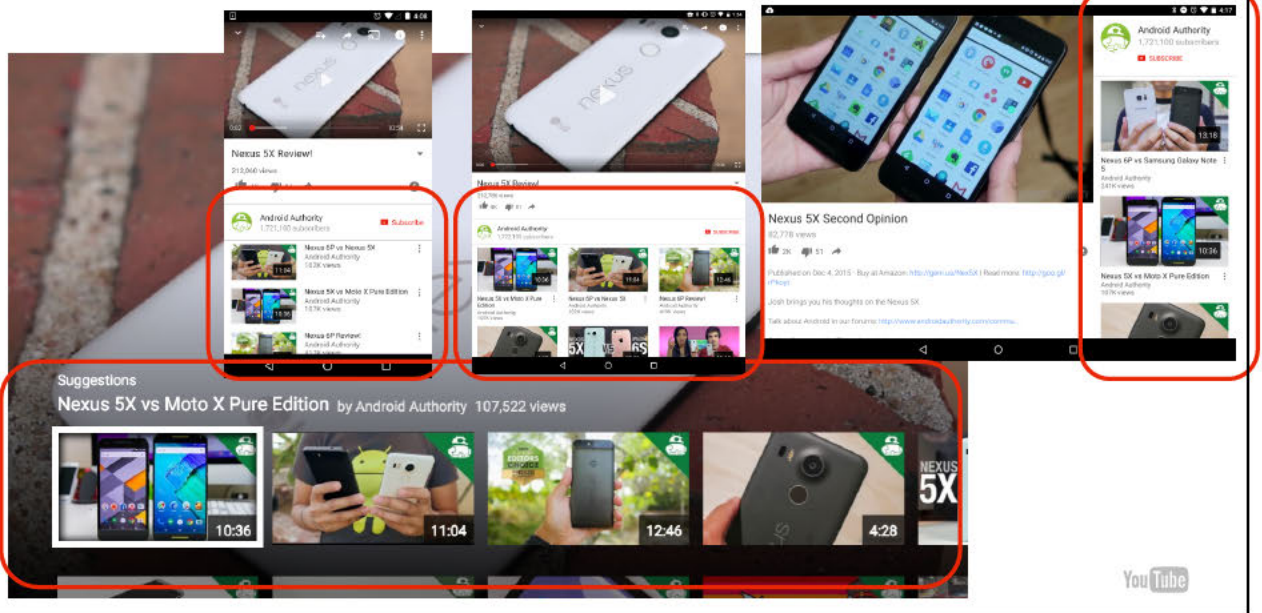


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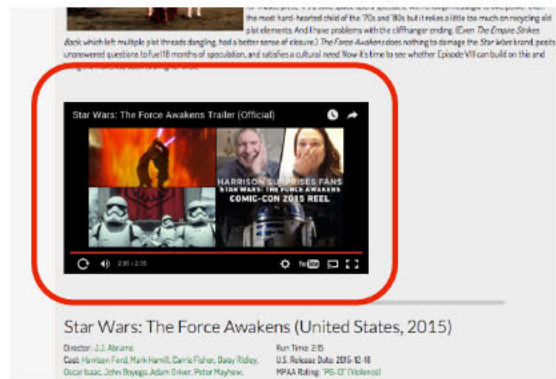


Note -- clean up screenshots in next iteration

## Watch Next: Mobile/Tablet/TV



## Watch Next: Endscreen

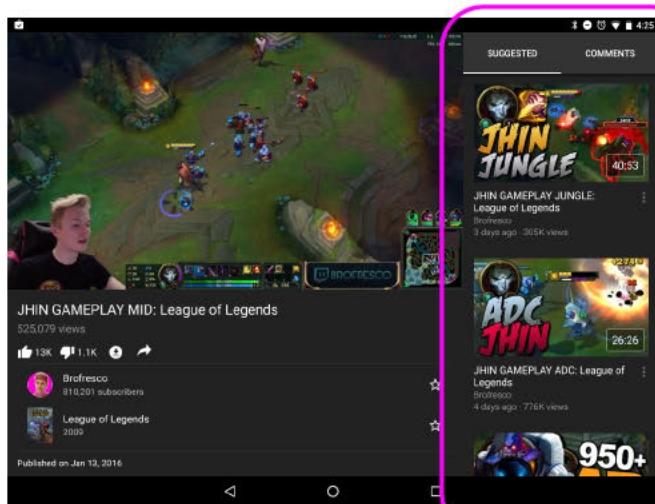
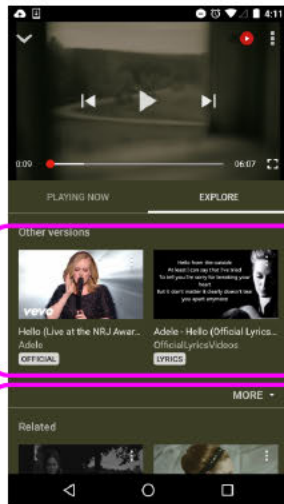


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YouTube

One of the new discovery mechanisms for embeds

## Watch Next: Verticals



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YouTube

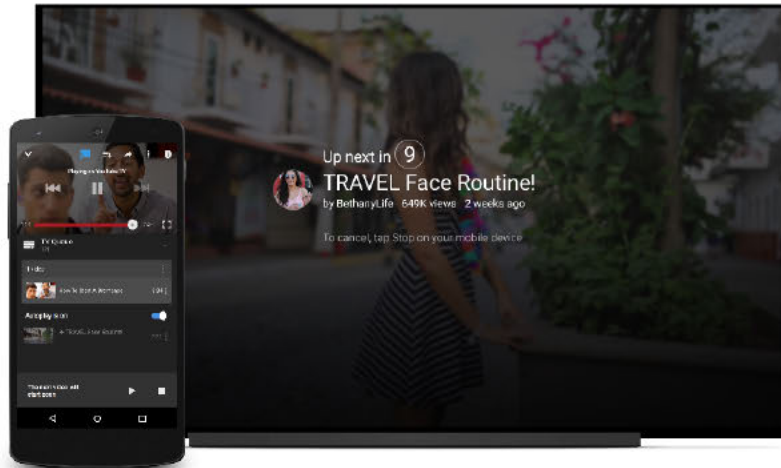
## Autoplay on Desktop

The screenshot shows a YouTube video player interface. The main video is titled "What is the Worst Thing You Ever Heard Your Mommy Say?" by Jimmy Kimmel Live. A large "Up Next" overlay is centered on the video, featuring a play button icon and the word "Cancel". Below the video, the title "Kimmel Asks Kids 'Do You Know Any Naughty Words?'" is displayed, along with the channel name "Jimmy Kimmel Live", a "Subscribed" button, and a view count of 4,775,286. The video progress bar shows 3:08 / 3:06. To the right of the main video, a "Up Next" sidebar lists several suggested videos, including "What is the Worst Thing You Ever Heard Your Mommy Say?", "Mix - Kimmel Asks Kids 'Do You Know Any Naughty Words?'", "YouTube Challenge - I Gave My Wife or Girlfriend A Terrible Gift For Valentine's", "Have You Ever Smoked Pot?", "Five Year Old Genius Arden Hayes on Jimmy Kimmel Live", and "Mother's Day 2014 -- What's the Most Shocking Thing Your Kids Don't Know". The "Autoplay" toggle is turned on.

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YouTube

## Autoplay + MDx



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## What's the big deal?

45% of YT Watch Time  
+5.1% last year

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Breakdown by platform too.

## What's the big deal?

Exposure for other features (p13n, Mix, paid movies, live events, playlists, ads)

Perception of YouTube: what kind of videos do we have?

Brand image for Creators on "their watch page"

A foot into embeds

Related graph data for Ads, p13n, Legos, researchers, etc.

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Other features which could drive DAV's and long term effects

## Mission

Help every user find another compelling video to watch next at scale.

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We used to call ourselves “related videos” (and some folks still say that), but we don’t want to limit the mission to serving just strictly related results. We want to suggest any next video that we think the user will be interested enough in to continue their journey.

# History, team, 2015 highlights

Looking backwards

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## Brief history

C. 2006: related videos retrieved through search queries

- 230M watch pages served, 12M videos indexed

C. 2007-2012: cowatch (collaborative filtering)

- hand-tuned signals, optimized for clicks.

C. 2011: large scale machine learning

C. 2012: optimization for watch time rather than views

C. 2013: simplified to a very large Related Signals Table (2.3T rows)

C. 2014: machine learning in offline candidate generation pipeline

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It's been around for a while.

One way it provides value is through processing a lot of data and learning from a lot of data. Smarter and Efficient Infrastructure investment

The system evolved from search-based to using cowatch, a simple-form of collaborative filtering. The art came into hand tuning signals to optimize for clicks. The system grew evolutionarily to something quite complex and eventually became difficult to modify, difficult to experiment with.

██████████, along with ██████████, introduced machine learning in 2011. In 2012, related videos made the dramatic change to optimize for watchtime, rather than views. Video length starts to increase.

██████████ and ██████████ embark on a large effort to replace the complex, tightly coupled cowatch system with one based on a very large Bigtable, simplifying, speeding it up, enabling experiments.

## Today

- 300 kqps at peak ([viceroy](#))
- ~330M hours daily (1/9/2016, [video-analytics](#))
  - Incorporates Recs, Search, Legos, Mix, Series
  - Amplifies contributions from viewer entry points
- Index:
  - 1.9B watch pages with cowatch candidates
  - 1.8B unique candidates served as cowatch (video or playlist)
  - More served through fallback measures such as keyword search
- Significant investments in infrastructure:
  - Faster updates to primary signals
  - Less complex, easier to maintain (serving, Sibyl feature extraction)
  - Efficient resource usage

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Watch Next is now a compilation of candidates from our own pipelines, candidates from other sources across YouTube Search and Discovery. Since it encourage viewers to watch more videos, it amplifies effects from other entry points, such as search and the homepage. Similarly, if WN results are not good for videos an entry point sends the viewer to, that can be a problem. For example, if search improves the ranking of fresh content such that more people click on fresh search results, but Watch Next has poor suggestions for fresh videos, that can lead to a search experiment that is watchtime negative.

## Some 2015 highlights

- Autoplay launched, **+8%** viewtime/visitor on desktop
- Stricter next episode promotion, **+0.3%** site-wide viewtime/visitor.
- Mobile/tablet data+features incorporated in the WN sibyl, deep retrieval model (multiple launches)
  - **+0.4%** mobile viewtime/visitor, **+0.7%** tablet viewtime/visitor, **+0.4%** desktop viewtime/visitor
- UI changes that allow more related items to show by default (if users see them, they will click)
  - Increased mobile/tablet suggestion to 12, **+0.3%** on mobile, **+0.5%** viewtime/visitor on tablet
  - Removed “Suggestions” title on mobile, **+0.3%** app-wide viewtime/visitor
- Freshness: caching, cowatch pipeline, intraday sessions (from 65 hours to 32 hours)
- Live events in Watch Next panel
- Corpus-specific suggestions for Kids, Gaming, Music
- **+9.4%** coverage of unique video ids by using mobile/tablet logs in the cowatch pipeline
- Autoplay using Mix candidates for music
- Support MDx autoplay (**+42%** MDx watchtime)
- Increased infrastructure reliability and scalability by upgrading the experiment framework, indexing, topics pipeline, InnerTube support/migration

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As we improve quality, can feel comfortable with showing it more often.

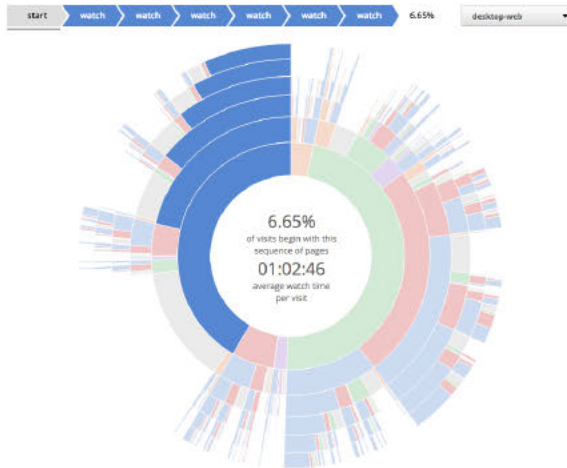
## User experience

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Something about scanning being hard?

## Watch Next rabbit hole



### Top entry points

- Click on a link to watch page (from a friend, from a 3P site)
- Homepage → click on a recommendation, channel page, or subscription
- Search (broad or navigational)

Watch next is a primary navigation tool for users on YouTube

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YouTube

Watch Next has been referred to as a “rabbit hole”.

## User needs (go/ytneeds)

### Information

- e.g. searched for “how to poach an egg” on YT or Google
- Explore best, most tightly related videos
- Continuation of viewer’s search process
- Depth-first, refinement

### Entertainment

- E.g. enjoy a favorite show or relax/laugh
- Exploration of broadly related topics or topics of interest to the user
- Good opportunity to introduce other YT features: channels, live events, etc
- Variety may be helpful

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Good to think about how these users use watch next differently

## What we've learned

Showing suggestions *by default* helps people watch more.

- E.g., Going from 3 suggestions to 6 on mobile was +2% watchtime on mobile ([ariane](#)), even though the user could click "More".

User perception is formed not from their average experience, it's from their best, worst, last experience ([peak-end rule](#)), so it's important to do our best for every video

- E.g., Racy filtering makes a big difference to YouTube brand even if most videos users encounter are not racy. ([ariane](#))

YouTube has a lot of data to leverage

- E.g., +5% watchtime from applying Sibyl, current model trains on 135B samples

## What we've learned

### Biggest wins for WatchTime

- Leveraging massive amounts of data,
- adding new features to the ML model
- Autoplay & showing more suggestions by default
- Putting viewer first in policy rules

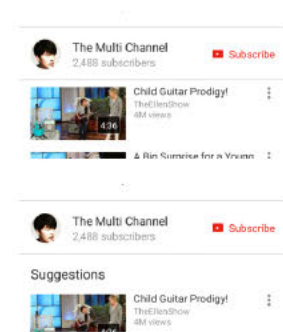
### Biggest wins for improving perception (from mturk, sxs's)

- Racy filtering
- Rooting out WTF's

### Low impact / negative

Many researchers interested in experimenting with Watch Next, only a few successful

Hiding Watch Next (e.g. inline player)



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YouTube

# Current Projects

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Looking forward

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## Autonav on mobile

### Timeline:

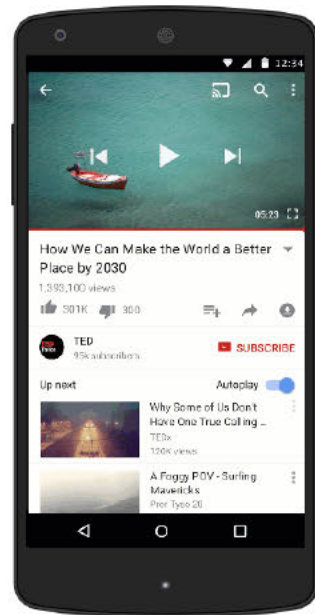
- Now: user studies
- Android: experiment end of Jan
- iOS: experiment beginning of Feb
- Capture 1 month of data + iterate
- Launch in Q2

### Expected site-wide impact: +1.5% watchtime

- Desktop experiment was +5%, with no way to turn it off.
- Assuming a 40% opt-out rate (double desktop rate)
- mobile = 50%

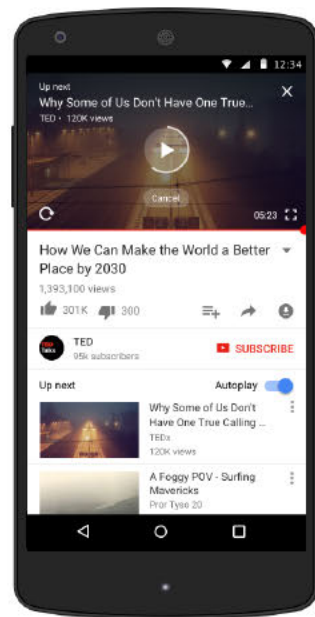
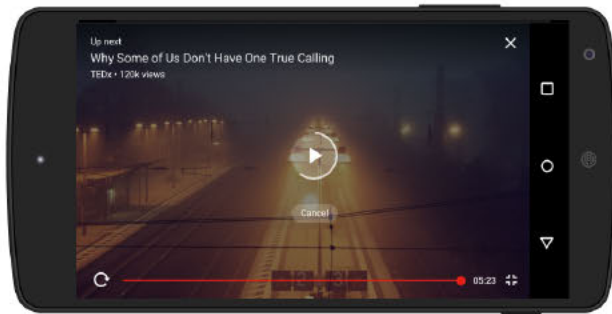
### Behavior

- The user starts a singleton video (i.e., a video that's not inside a playlist).
- When user reaches the end of the video, the autonav countdown starts. This countdown is visible, in both portrait and landscape view.
- The user has two ways to opt out of the feature—they can disable autonav for the device through the Autonav toggle at the top of Relateds, or they can cancel the countdown just for that video through the "Cancel" button in the countdown.
- At the end of the countdown, the next video starts playing.



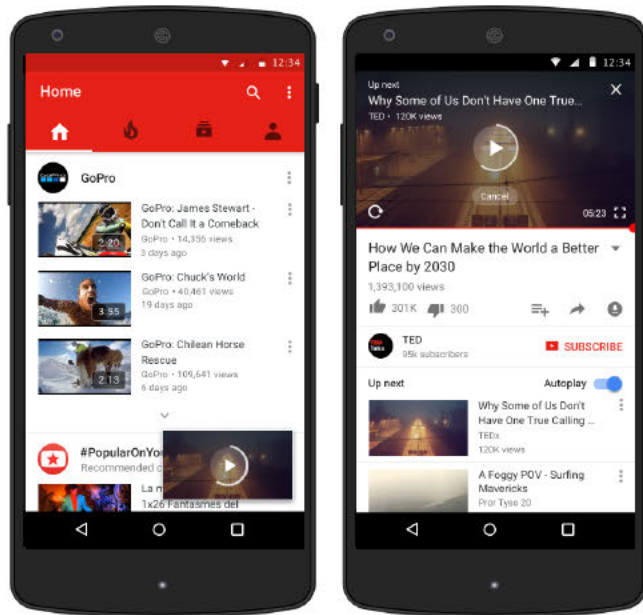
### Up next video countdown

As soon as the user reaches the end of the video, the autonav countdown begins to indicate that n seconds remain until the next video is autonaved. This countdown is visible, in both portrait and landscape view.



### Countdown on mini-player

When the up next video is counting down in mini-player, there is no affordance to cancel the autoplay directly from miniplayer. Tapping mini-player will bring back watch page.



# How you can help

Thank you!

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## How to help Watch Next

- Advocate for more suggestions to be shown by default to drive more engagement
- Support efforts for more complete, more reliable logging
- Build organizational alignment with other YouTube teams
  - Involve Watch Next early in new UI's, new verticals
  - Secure UI resources for improvements
- Evangelize our team and our importance beyond just watchtime
- Get clarity on balancing vertical priorities with main app priorities