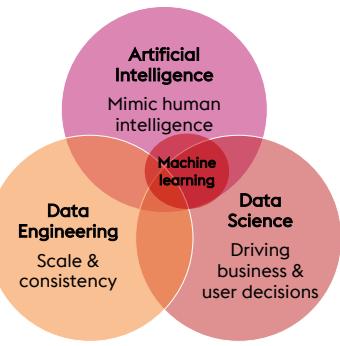




BUZZWORD BINGO



APPLICATIONS OF AI @ RTL



Personal Content Experience



Deeply Understand our Content



Optimize & Scale Business Processes



BERTELSMANN



- ▶ 475 M€ Revenue
- ▶ 650 employees



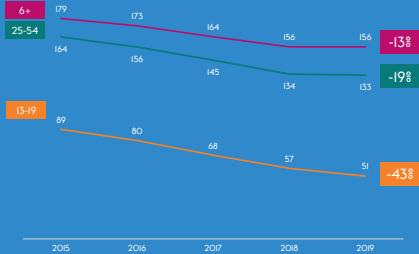
8.9 million
Daily TV viewers
779 million
Online views per month

We make the difference with unmissable stories for the Netherlands that touch the heart and mind.



TV ON DECLINE

VIEWING TIME IN MINUTES



OUR TEAM

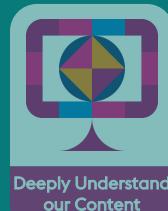
Data Scientists



APPLICATIONS OF AI @ RTL



Personal Content Experience



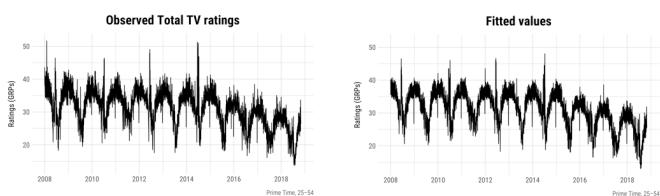
Deeply Understand our Content



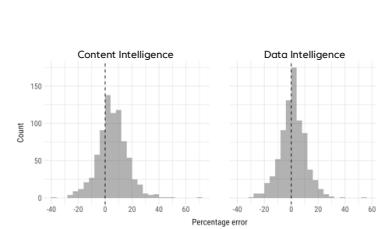
Optimize & Scale Business Processes



TV TOTAL FORECASTING



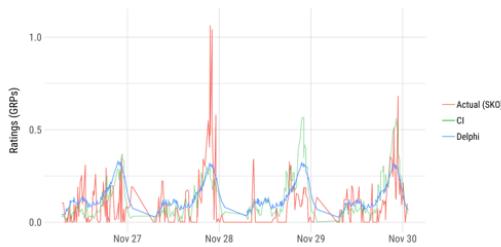
TV TOTAL PERFORMANCE



	CI	DI	Percentage change (from CI to DI)
Mean Error	0.93	0.29	-68%
Mean Percentage Error	5.48	1.38	-77%
Mean Absolute Error	1.63	1.27	-22%
Mean Absolute Percentage Error	9.58	7.38	-23%



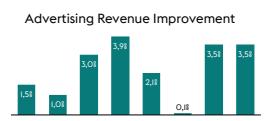
FORECASTING SMALLER CHANNELS



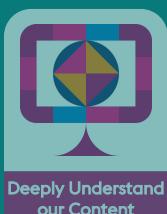
FLOOR PRICE OPTIMIZATION



>20 million auctions per day
>75 Gb per day of bid data



APPLICATIONS OF AI @ RTL



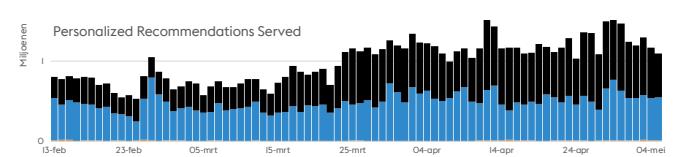
PERSONALIZATION

rtl.nieuws

Domain
Content
Model
Impact

rtl.BOULEVARD

VIDEOLAND
by rtl





rtl

rtlnieuws

Topnieuws

- Twee slachtoffers dood onder punt vonden plekken na explosie centrum Antwerpen
- Bus met schoolkinderen rijdt tegen paal en gewond
- Spoorbrake december kwam dooroor ProRail kent niet wenselijk voor
- Roddelers en bullenlasters: peuters zijn de middelbare school
- Noordwest Australische regering reidert Great Barrier Reef krijgt hoge beloning
- Criminelen hebben vrij spel op kleinere vliegvelden

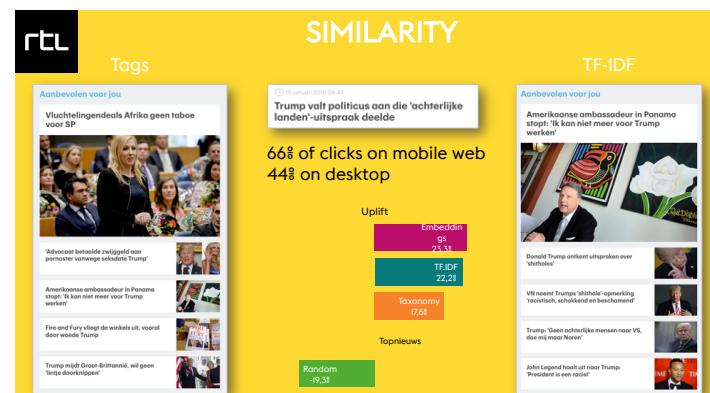
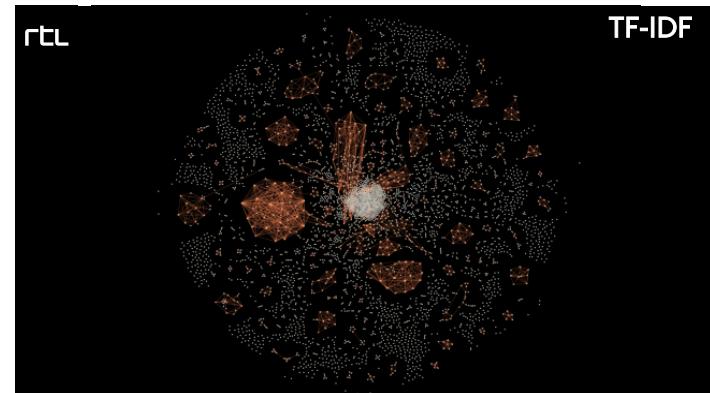
Trump valt politicus aan die 'achterlijke landen'-uitspraak deelde

Trump: 'Geen achterlijke mensen naar VS, doe mij maar Noren'

Trump houdt Iran-deal nog intact staande in stand

Donald Trump ontikt uitspraken over 'whitholes'

Seán Penn: Trump is vijand voor mensheid

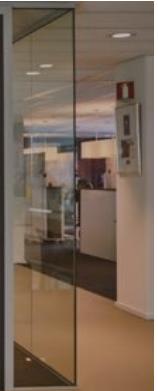
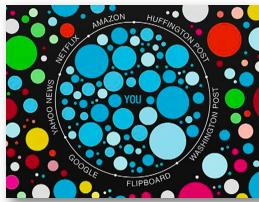




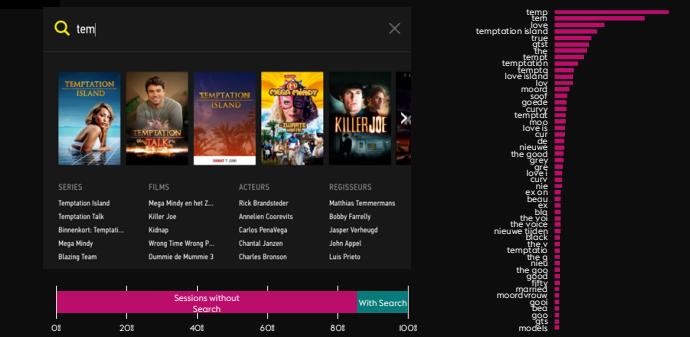
FILTER BUBBLES: REAL?



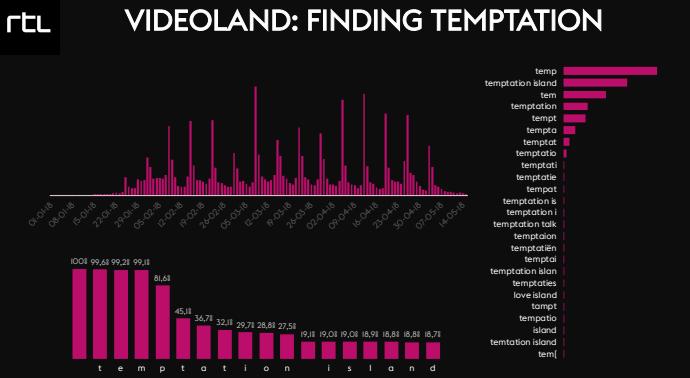
Academic results at best marginally positive (Flaxman et al. 2016, Puschmann 2017, Zweig 2017, Barker 2018); **most of them contradict the existence of filter bubbles** (Nguyen et al. 2014, Bakshy et al. 2015, Zuiderveen et al. 2015, Haim et al. 2017, Möller et al. 2017, ...)



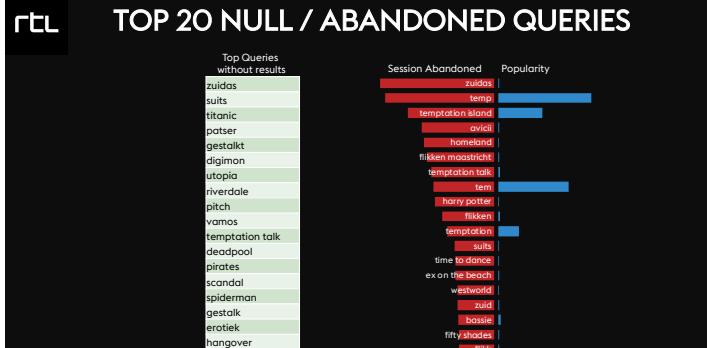
VIDEOLAND: SEARCH ON WEB



VIDEOLAND: FINDING TEMPTATION



TOP 20 NULL / ABANDONED QUERIES



rtl VIDEOLAND: HOMEPAGE

VIDEOLAND | HOME | TV SERIES | FILM | KIDS | PROGRAMMA'S | KERSTLIST

AANBEVOLEN VOOR JOU

MATRIX FACTORIZATION

Movie

```
1000001000000111000100
00000100000100000001110
0010101000000100000100
000100001000000000000000
000000000000011001000000
000000010001010000000000
000001000001000000000000
000001000001000000000000
001000010000000000000000
000100000000000000000000
0000000010001100001000
000000010001010000000000
```

User

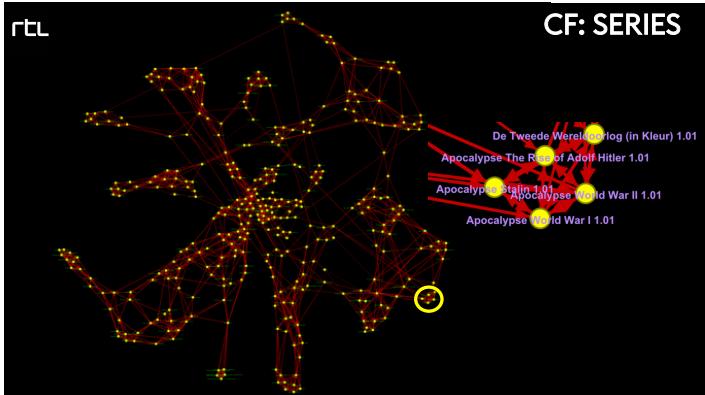
|500 x 500K = 750M

User

X Movie

50 x 1500 = 75K

50 x 500K = 25M



rtl VIDEOLAND: SIMILARITY

VICKY CRISTINA BARCELONA

★★★★★ 2008 | 130 min | ROMANTIEK, FILMUS

Vicky en Cristina zijn twee Amerikaanse vrouwen die de zomer in Barcelona doorbrengen en ontmoeten bij een vriendelijke schrijver en diens vrouw, maar tegen het einde van de zomer moet ze terugkeren naar haar mannelijk avontuur dat voor sommigen van hen een tragedie en voor andere een wonder is.

APPELLEN | TRAILER | TOEGANGEN KUNSTLIJST

Genre: Romantiek, Filmus
Acteurs: Rebecca Hall, Javier Bardem, Scarlett Johansson
Regisseur: Woody Allen
Dur: 92 min
Taal: Engels

VERGELIJKBARE TITELS: Collaborative Filtering

VERGELIJKBARE TITELS: Popular within Genre

VERGELIJKBARE TITELS: Content

VERGELIJKBARE TITELS: Blended

rtl VIDEOLAND: HOMEPAGE

VIDEOLAND | HOME | TV SERIES | FILM | KIDS | PROGRAMMA'S | KERSTLIST

AANBEVOLEN VOOR JOU

rtl VIDEOLAND: HOMEPAGE

Editorial vs Personalized

30 minutes more viewing time per active user per month



VIDEOLAND: HOMEPAGE

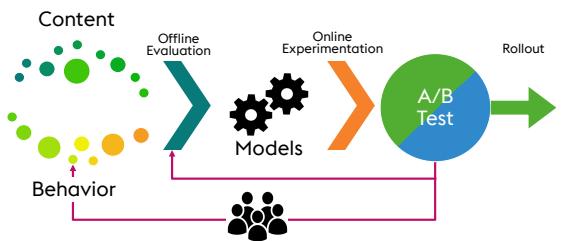
VIDEOLAND BY RTL + **rtlxl.**

HOW TO MIX
MOVIES, SERIES, TV PROGRAMS,
SHORT CLIPS & LIVESTREAMS?

WE NEED TO EXPERIMENT



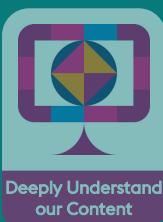
OPTIMIZED THROUGH EXPERIMENTATION



APPLICATIONS OF AI @ RTL



Creating Fans



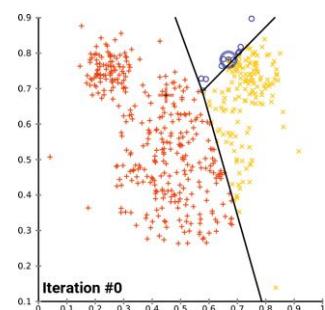
Deeply Understand our Content



Optimize & Scale Business Processes



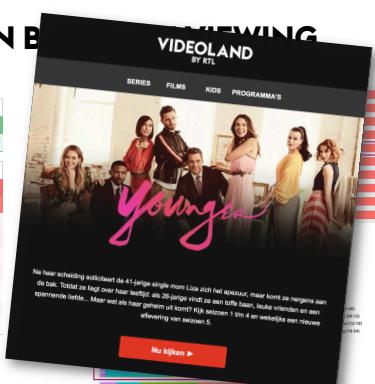
K-MEANS CLUSTERING



SEGMENTATION

Genre or language	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Nederlands	■	■	■	■	■	■	■	■	■	■
Engels	■	■	■	■	■	■	■	■	■	■

Genre or language	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Drama	■	■	■	■	■	■	■	■	■	■
Thriller	■	■	■	■	■	■	■	■	■	■
Programma	■	■	■	■	■	■	■	■	■	■
Film	■	■	■	■	■	■	■	■	■	■
Misdad	■	■	■	■	■	■	■	■	■	■
Komedie	■	■	■	■	■	■	■	■	■	■
Actie	■	■	■	■	■	■	■	■	■	■
Reality	■	■	■	■	■	■	■	■	■	■
Kinderserie	■	■	■	■	■	■	■	■	■	■



APPLICATIONS OF AI @ RTL



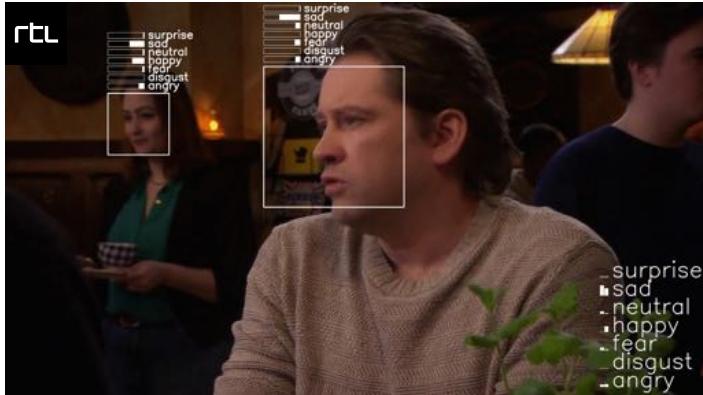
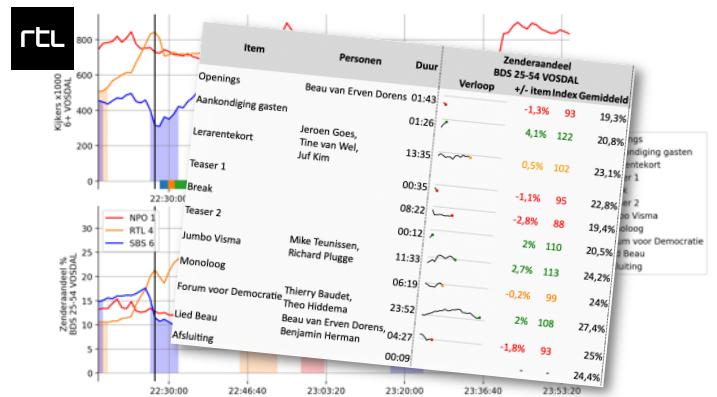
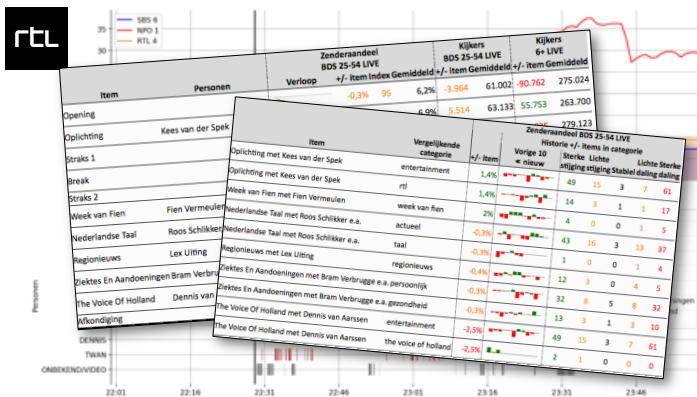
Personal Content Experience



Deeply Understand our Content



Optimize & Scale Business Processes



APPLICATIONS OF AI @ RTL

Personal Content Experience

Deeply Understand our Content

Optimize & Scale Business Processes

APPLICATIONS OF AI @ RTL

Personal Content Experience

Optimize our Content

Optimize & Scale Business Processes

THE FORMULA TO LOCAL NEWS

+
=

5000+ Unique Stories

ADAM
Automatic Data Article Machine

rtl

5000+ UNIQUE STORIES

ADAM
Automatic Data Article Machine

rtl

5000+ UNIQUE STORIES

ADAM
Automatic Data Article Machine

MAN OR MACHINE?

rtl7 //

rtl **PROMO GENERATION**

CBS NEWS
NEWS SHOWS LIVE

Coming soon to Netflix: Movie trailers crafted by AI

BY SARAH MIN
AUGUST 19, 2016 / 10:20 AM / MONEYWATCH

- Netflix is investing in technology to automate movie and television trailers, an executive said on a July earnings call.
- The technology could help Netflix lower the cost of creating trailers while adding personalization for its subscribers.
- In 2016, IBM's Watson made a promo spot for the 2016 thriller "Morgan" by categorizing emotional moments in the up.

rtl

AUTOMATIC FRAME SELECTION

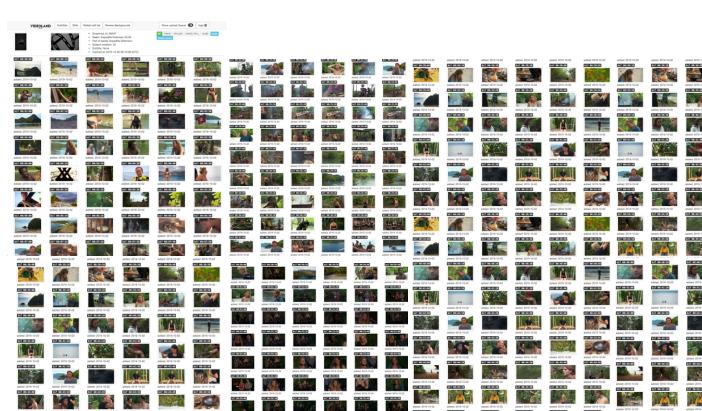
Seizoen 15

AI. 1 Photo Shoot Dispute

AI. 2 The Art of the Prank

AI. 3 Drop Dead Gorgeous

AI. 4 The Nightmare Before Christmas

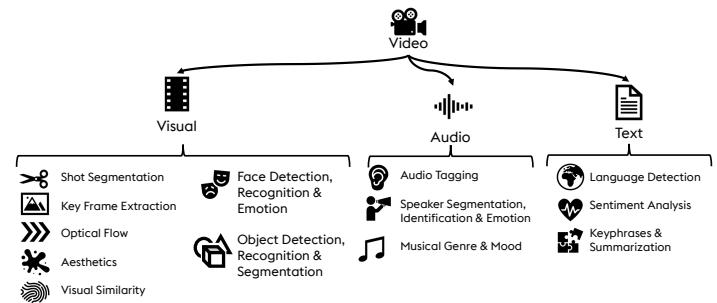


VIDEOLAND

smartvod_id	Image Options	Title	release_date
68285	TMDB Upload	Nieuwe Buren 1.01	2019-08-13
68794	TMDB Upload	Nieuwe Buren 1.02	2019-08-13
68795	TMDB Upload	Nieuwe Buren 1.03	2019-08-13
68796	TMDB Upload	Nieuwe Buren 1.04	2019-08-13
68797	TMDB Upload	Mocro Maffia 1.01	2019-08-13
68798	TMDB Upload	Mocro Maffia 1.02	2019-08-13
68799	TMDB Upload	Mocro Maffia 1.03	2019-08-13



VIDEPIPE



rtl

CHAPTERMARKING

The Voice of Holland – Battle I

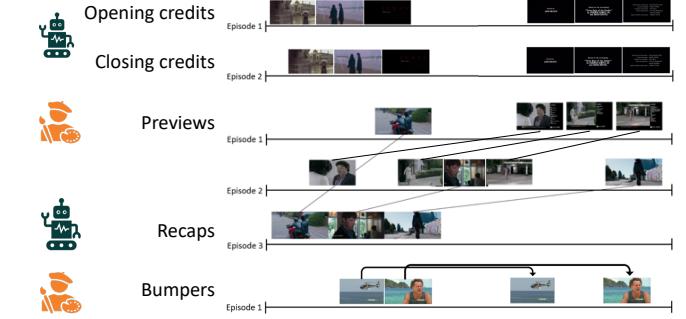
Video: Shows a video frame of the show.

Sound: Shows an audio waveform with three vertical pink markers indicating chapter points. Labels below the markers: 00:06:45,020 Emma Boertien, 00:17:39,460 Daredevils, 00:26:01,120 Anne Wilson.

AI Listening to audio: Shows a robot icon listening to an ear icon.



RECURRING CONTENT



rtl

LINEAR != VOD

rtl.viderland

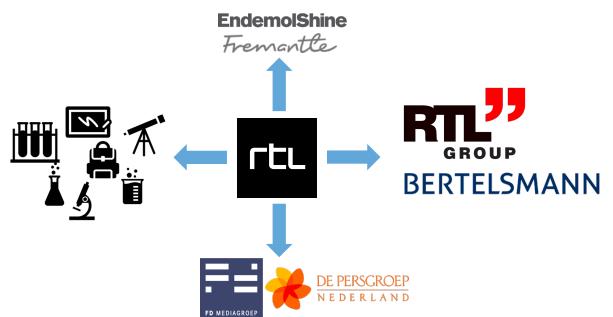
Shows two video frames: one with a red car and the text "MR.MERCEDES", and another with two men in swimwear.

Annotations at the bottom left: 01:08 + 01:29 opening credits + 00:45 closing credits = 03:22 total time wasted for bingewatcher.

Annotation at the bottom right: Content originally created for linear TV contains bumpers to lift viewers over commercial break.



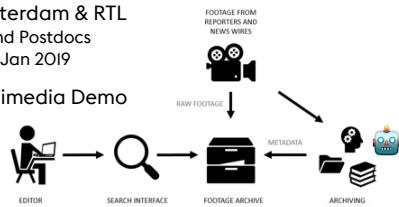
AI: A COLLABORATIVE EFFORT





CAPTIONING NEWS FOOTAGE

- Universiteit van Amsterdam & RTL
- Team of MScs, PhDs and Postdocs
- 1 week in Leiden: 21-25 Jan 2019
- Upcoming ACM Multimedia Demo



<https://ict-research.nl/ict-with-industry/ictwi2019/>



FIND ARCHIVAL MATERIAL

date	name	item	description
ma 3 dec.	Judith	Kia	meisje Sopoz raket
ma 3 dec.	Julia	Kia	Promovideo Uefa
ma 3 dec.	Julia	Kia	voorbereidingen voor de finale
ma 3 dec.	Pauw	Kia	item paap en snekklassiecaus
di 4 dec.	Olaf Kooms Z	remco	opening gaza airport 1994
di 4 dec.	Olaf Kooms	remco	hacking en dark web
di 4 dec.	Eduo / Canca	remco	telefoonnummer vriendje ooit in telegraaf
di 4 dec.	Kia Z	remco	telefoonnummer psycholoog voor Z
di 4 dec.	Kia Onderzoek	remco	landbouwers claim
di 4 dec.	Edwin	Karen	voorbereidingen voor intratuur
wo 5 dec.	saskia houttuin	remco	item tv-en
wo 5 dec.	... schrijfster	remco	voorbereidende gebruik beeld foto ultraart van iemand die al 7 jaar dood is
wo 5 dec.	... schrijfster	remco	unterlaaten buitenstaan
wo 5 dec.	jan smit	remco	geli heijse achtergrond voor pis
wo 5 dec.	Harm Houbregts	remco	voorbereid voorlezen schiphol
wo 5 dec.	Martin van Norel	remco	voorbereid iemand ziekte
wo 5 dec.	wouter	remco	pizzawerk veek
wo 5 dec.	... schrijfster	remco	zijdevoorkijken kvl 2 stuks
wo 5 dec.	schrijfsterschrijfsters	remco	vergrijpen standaard items klarzettien
wo 5 dec.	... schrijfster LN	remco	artikelen voorlezen
wo 5 dec.	hans schutte	remco	artikelen brexit
wo 5 dec.	amber LN	remco	7 filmpjes amstel