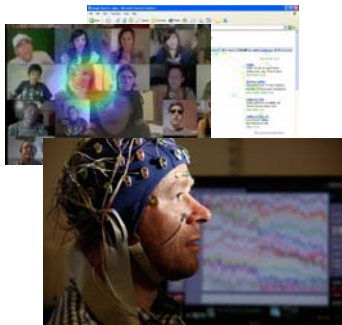


case studies in design informatics

Lecture 9: The Harmonium Project



design
informatics

NRlabs
neuropolitics research



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Edinburgh ethos



The Harmonium Project

- Launch event of the 2015 Edinburgh International Festival (EIF)
- To celebrate the 50th anniversary of the Edinburgh Festival Chorus
- Opening performance of the Royal Scottish National Orchestra

Project links

- Edinburgh International Festival
 - <http://www.eif.co.uk/harmonium>
- Blog piece about the data collection
 - www.eif.co.uk/blog/2015/harmonious-data
- Facebook
 - <https://www.facebook.com/events/1606688436231504/>
- 59 Productions
 - http://59productions.co.uk/project/the_harmonium_project
- Press
 - <http://www.scotsman.com/lifestyle/culture/usher-hall-to-be-lit-up-for-festival-show-1-3851942>

Conception

- New director of the EIF (Fergus Linehan)
- A free, public, open-air extravaganza to kick off the Festival
 - in the end 19,500 attended the live event
 - twice the expected crowd
- Project a modern visual accompaniment to the audio onto the outside of the Usher Hall (where the actual performance took place)

Background



Critical link

The visualisations were to be inspired and based on data generated from members of the chorus.

Data that did not exist at the time...



John Adams's Harmonium

- Modern (1981) choral symphony
- Technically challenging
- Based on three poems:
 1. "Negative Love" by John Donne
 2. "Because I could not stop for Death" by Emily Dickinson
 3. "Wild Nights" by Emily Dickinson

Project partners

- Edinburgh International Festival
- Edinburgh Festival Chorus
- Royal Scottish National Orchestra
- 59 Productions
- University of Edinburgh
- Centre for Design Informatics

Wild nights → wild promises

- **Objective:** “exploring transformations that bring data to life, or capture lives in data”.
- **Question (April 2015):** “What data can you generate for this?”
- **My response:** foolish answer promising too much using too many untested combined techniques (but potentially cool academic challenge). Usual problem.

Research opportunity

- Reading and performing music with multiple harmonious parts.
- Synchronisation of performance by 130 chorus members (plus an orchestra).
- Synchronisation of different biophysical channels.

Beyond the individual

The whole is greater than the sum of its parts.

- Aristotle, *Metaphysics*, Book 8 1045a
(modern paraphrase)
[also links with Gestalt psychology]

Case study

- Traditional human interaction enhanced with advanced technology.
 - Choirs + orchestra singing/performing together – highly controlled group work.
 - Error control: one person's mistake can create a tsunami effect.
- Art & science combined product.
- Example of data gathering and data visualisation.
- Biophysical, biometric and social data suitable for affective/emotional analysis.
- Performance data fed back into the performance.

Harmonious data

Four stages

1. In the wild (Hadi Mehrpouya and Larissa Pshcetz, Design Informatics)
 - Monitoring heart rate of chorus members during the rehearsal
 - Geo-tracking for a week after the rehearsal (co-mob iPhone app)
2. In the lab (more later)

Harmonious data (2)

3. Computational analysis of the text (Claire Llewellyn, Informatics)
 - Analysis based on each word of each poem.
4. Harmonium Experience App (Martin Parker, Sound Design at ECA)
 - Recording the audience perspective during the show.

Co-mob location tracking

1	datetime	lat	lon	accuracy	uid	timestamp	alt	grp	altacc	msg
2	2015-05-26 08:47	55.94418	-3.18764	65	GifxblFv68Rl4ak_har3	1432629980	83	harmonium	42.91522	come back all
3	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630031	85.27257	harmonium	22.53736	come back all
4	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630040	85.27257	harmonium	22.53736	come back all
5	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630040	85.27257	harmonium	22.53736	come back all
6	2015-05-26 08:47	55.94439	-3.18763	65	FrT3Dw0fOGpbkE_har8	1432630047	83	harmonium	34.81358	
7	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630040	85.27257	harmonium	22.53736	come back all
8	2015-05-26 08:47	55.94426	-3.18724	65	FrT3Dw0fOGpbkE_har8	1432630049	83	harmonium	28.48921	
9	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630040	85.27257	harmonium	22.53736	come back all
10	2015-05-26 08:47	55.94426	-3.18724	65	FrT3Dw0fOGpbkE_har8	1432630049	83	harmonium	28.48921	
11	2015-05-26 08:47	55.94418	-3.18759	65	GifxblFv68Rl4ak_har3	1432630040	85.27257	harmonium	22.53736	come back all
12	2015-05-26 08:47	55.94398	-3.18773	65	QL0UMZTqKQ3NJY_har5	1432630041	83	harmonium	41.66858	
13	2015-05-26 08:47	55.94426	-3.18724	65	FrT3Dw0fOGpbkE_har8	1432630049	83	harmonium	28.48921	
17753	2015-05-29 17:22	40.40942	-3.70424	65	nXUvGimEevgVNI_har7	1432920148	644.8969	harmonium	10	In Madrid enjoying sunny weather
17754	2015-05-29 17:22	51.45751	-0.16775	65	9PnF57X0RkxkLNs_ibtm	1432920157	8	harmonium	13.63411	
17755	2015-05-29 17:22	40.40942	-3.70424	65	nXUvGimEevgVNI_har7	1432920148	644.8969	harmonium	10	In Madrid enjoying sunny weather
17756	2015-05-29 17:22	51.45751	-0.16775	65	9PnF57X0RkxkLNs_ibtm	1432920157	8	harmonium	13.63411	
17757	2015-05-29 17:22	51.45789	-0.16791	65	nVva4CTNG7vMxhw_tenor1	1432920182	16.31846	harmonium	10	now in London! drinking wine
17758	2015-05-29 17:22	40.40942	-3.70424	65	nXUvGimEevgVNI_har7	1432920148	644.8969	harmonium	10	In Madrid enjoying sunny weather
17759	2015-05-29 17:22	51.45711	-0.16749	50	9PnF57X0RkxkLNs_ibtm	1432920170	17.56518	harmonium	4	
17760	2015-05-29 17:22	40.40942	-3.70424	65	nXUvGimEevgVNI_har7	1432920148	644.8969	harmonium	10	In Madrid enjoying sunny weather
17761	2015-05-29 17:22	51.45789	-0.16788	65	nVva4CTNG7vMxhw_tenor1	1432920175	16.42216	harmonium	10	now in London! drinking wine
17762	2015-05-29 17:22	40.40942	-3.70424	65	nXUvGimEevgVNI_har7	1432920148	644.8969	harmonium	10	In Madrid enjoying sunny weather
17763	2015-05-29 17:22	51.45777	-0.16788	65	nVva4CTNG7vMxhw_tenor1	1432920175	16.45602	harmonium	10	now in London! drinking wine
17764	2015-05-29 17:22	51.45748	-0.16791	50	9PnF57X0RkxkLNs_ibtm	1432920182	17.38817	harmonium	4	

Lab work

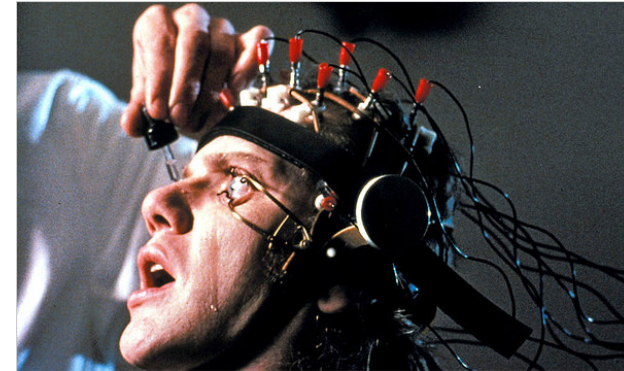
Active (while singing from a score)

- Head-free eye-tracking
- Electroencephalography (EEG)
 - (simple one-channel MindWave)
- Heart rate
- Facial movements (Microsoft Kinect)
- Ultrasound

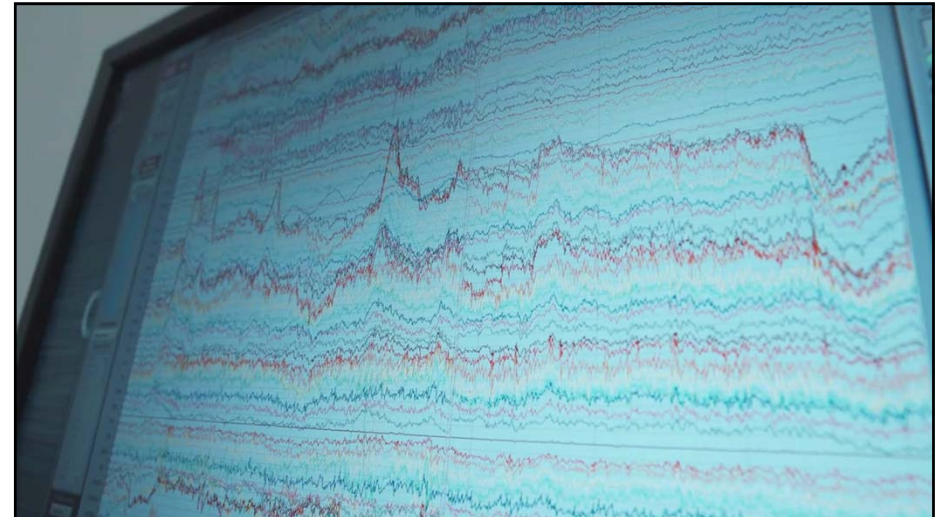
Passive (listening to Harmonium)

- BioSemi 64-channel EEG

Tried to avoid this



Instead



Heart rate

```

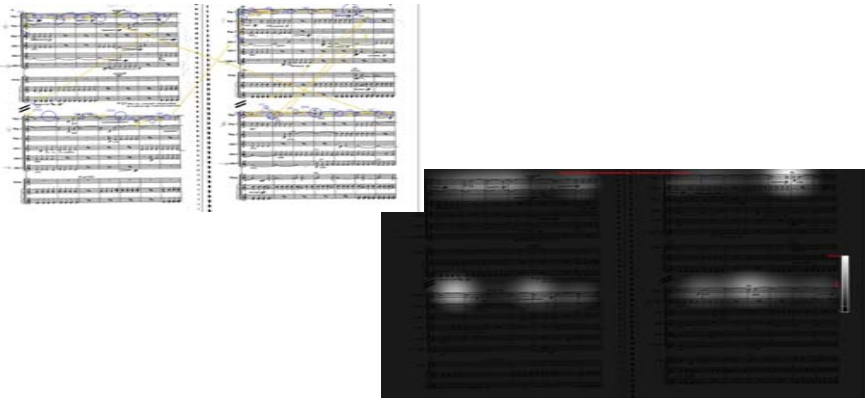
4 comments
5 File created by Wahoo Fitness (iPhone App)
6
7 sensor present smec zeroavg model
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9 spd no no no n/a
10 cad no no no n/a
11 hr yes no no n/a
12 footpod no no no n/a
13 gpr no no no n/a
14 workout starttime running pausestr wheelidist cadavg spdavg pavg purPedah hravg stridestrate strideidist gdist smoothre manualidist
15 1 0 1120.282 0 0 0 0 0 0 0 0 0 111 0 0 0 0 0 0 0 0 0 0 0 0
16
17 interval starttime running pausestr wheelidist cadavg spdavg pavg purPedah hravg stridestrate strideidist gdist smoothre manualidist
18 1 0 1120.282 0 0 0 0 0 0 0 0 0 111 0 0 0 0 0 0 0 0 0 0 0 0
19
20 time pur_accid pur_cade pur_sped pur_totp pur_mstp pur_right pur_left spd_accid spd_mstly cad_cader hr_heartd disp_sbm disp_atfti disp_term gpr_attfu gpr_lat gpr_lon gpr_dist gpr_speed_acc
21 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
22 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
23 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
24 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
25 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
26 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
27 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
28 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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30 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
31 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
32 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
33 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
34 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
35 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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37 17 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    
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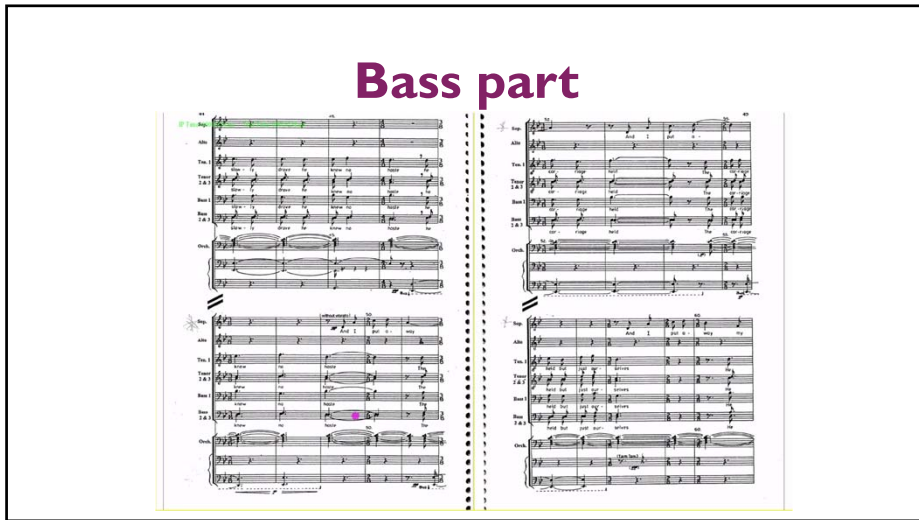
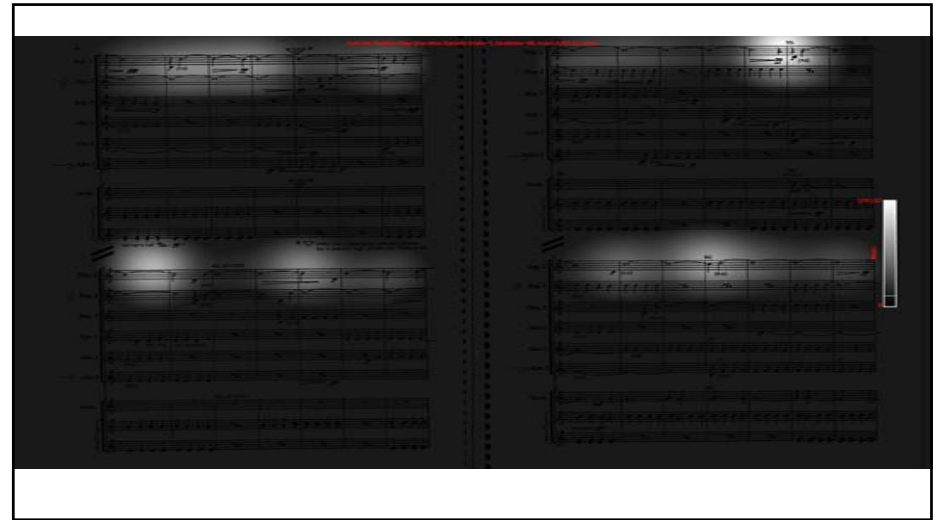
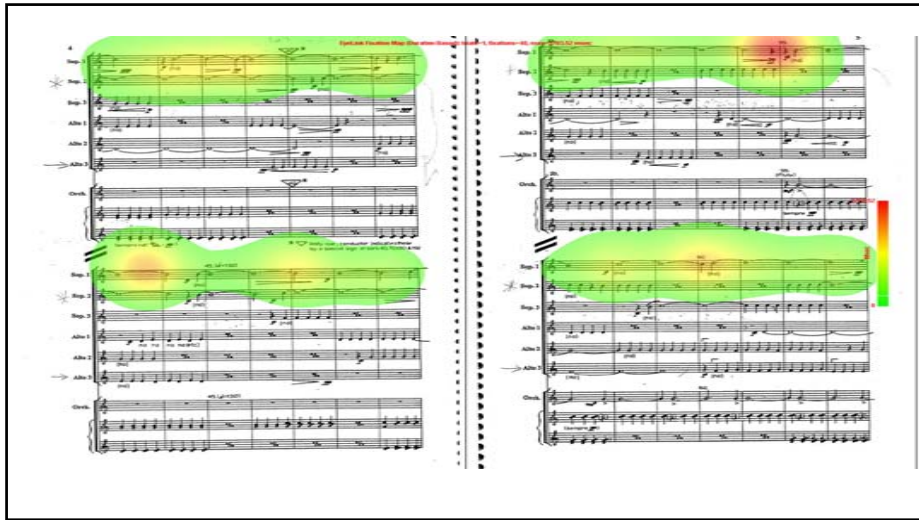
Mindwave EEG

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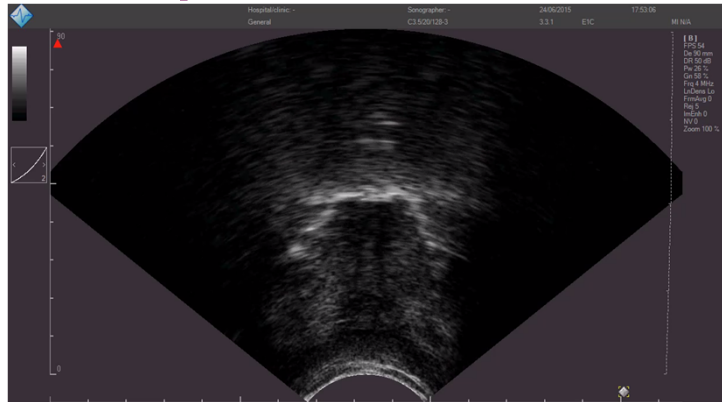
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32
    
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Example eyetracking data

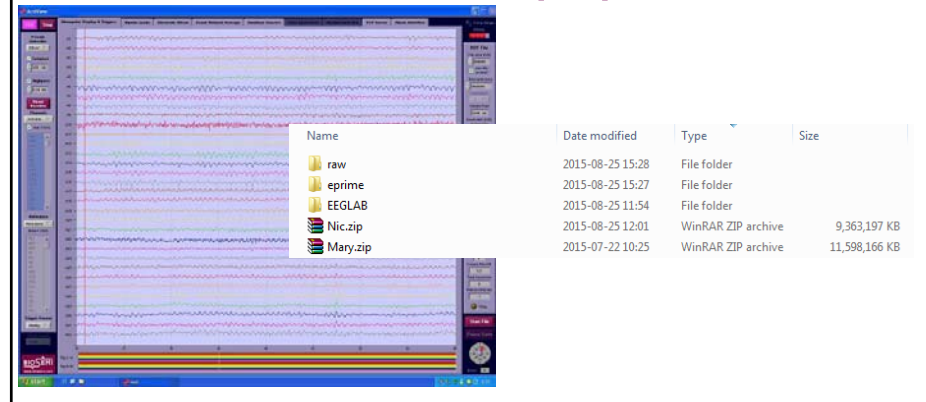




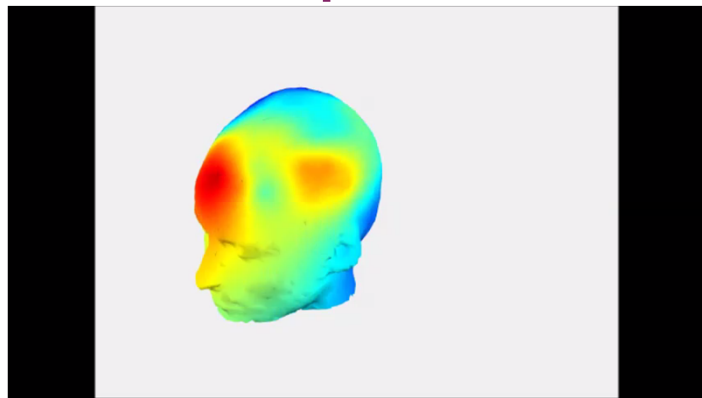
Sample vocal ultrasound



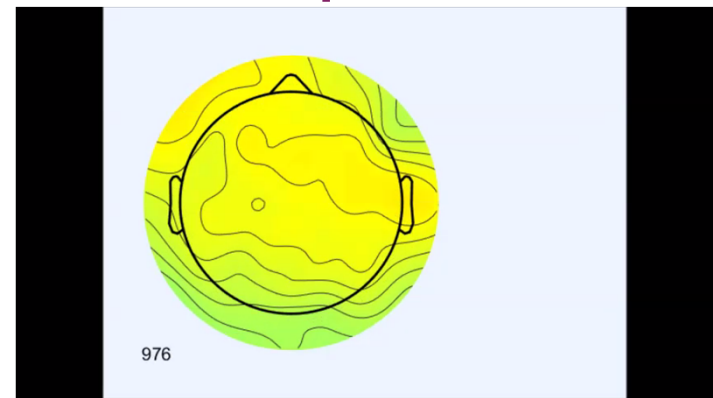
Multichannel (64) EEG



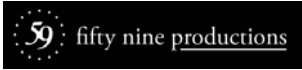
Sample EEG



Sample EEG



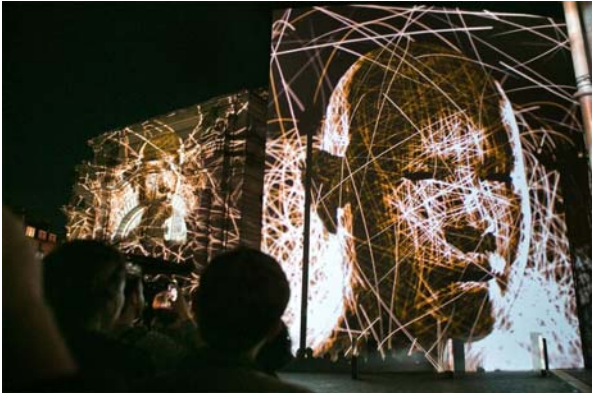
Data dump



The "Go" button



Kinect mapping





The official experience



2016 Deep Time (trailer)

