

Cognitively Motivated Lifelog Software

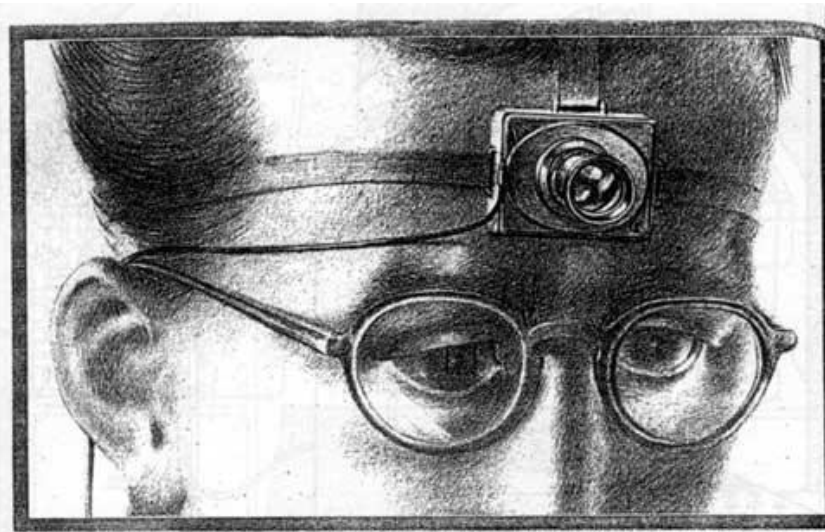
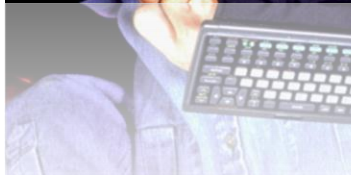
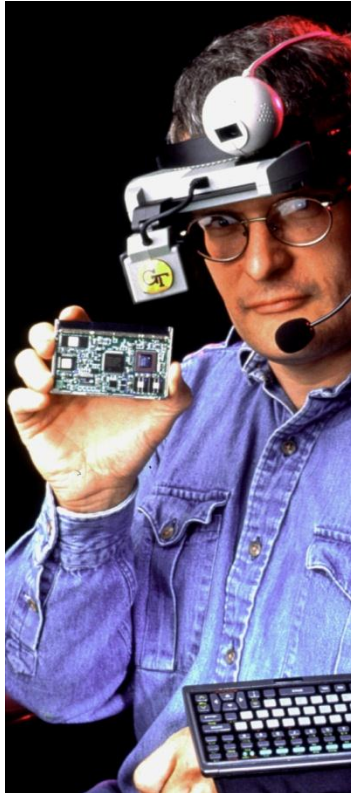
What works and what frustrates?

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Personal life archives...



A SCIENTIST OF THE FUTURE RECORDS EXPERIMENTS WITH A TINY CAMERA FITTED WITH UNIVERSAL-FOCUS LENS. THE SMALL SQUARE IN THE EYEGASS AT THE LEFT SHOWS THE GEAR

AS WE MAY THINK

A TOP U. S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD
IN WHICH MAN-MADE MACHINES WILL START TO THINK

by VANNEVAR BUSH

DIRECTOR OF THE OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

Condensed from the *Atlantic Monthly*, July 1945

This has not been a scientists' war; it has been a war in which all have had a part. The scientists, burying their old professional competition in the demand of a common cause, have shared greatly and learned much. It has been exhilarating to work in effective partnership. What are the scientists to do next?

For the biologists, and particularly for the medical scientists, there can be little indecision, for their war work has hardly required them to leave the old paths. Many indeed have been able to carry on their war research in their familiar peacetime laboratories. Their objectives remain much the same.

It is the physicists who have been thrown most violently off stride, who have left academic pursuits for the making of strange destructive gadgets, who have had to devise new methods for their unanticipated assignments. They have done their part on the devices that made it possible to turn back the enemy. They have worked in combined effort with the physicists of our allies. They have felt within themselves the stir of achievement. They have been part of a great team. Now one asks where they will find objectives worthy of their best.

There is a growing mountain of research. But there is increased evidence that we are being bogged down today as specialization extends. The investigator is staggered by the findings and conclusions of thousands of other workers—conclusions which he cannot find time to grasp, much less to remember, as they appear. Yet specialization becomes increasingly necessary for prog-

ress, and the effort to bridge between disciplines is correspondingly superficial.

Professionally our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose. If the aggregate time spent in writing scholarly works and in reading them could be evaluated, the ratio between these amounts of time might well be startling. Those who conscientiously attempt to keep abreast of current thought, even in restricted fields, by close and continuous reading might well shy away from an examination calculated to show how much of the previous month's efforts could be produced on call.

Mendel's concept of the laws of genetics was lost to the world for a generation because his publication did not reach the few who were capable of grasping and extending it. This sort of catastrophe is undoubtedly repeated all about us as truly significant attainments become lost in the mire of the incosequential.

Publication has been extended far beyond our present ability to make use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading the tape of the conquest have to the momentarily important item is the same as was used the days of square-rigged ships.

But there are signs of a change as new and powerful instrumentalities come into use. Photocells capable of seeing things in a physical sense, advanced photography which can record what is seen or even what is thermionic tubes capable of controlling potent forces under the guidance

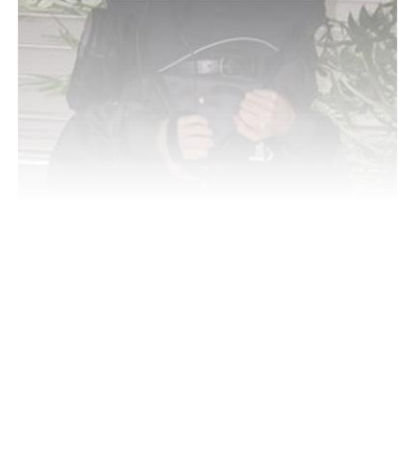
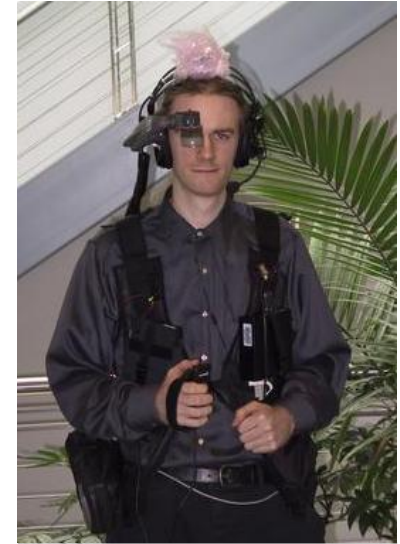
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「LIFE」1945年9月10日号に特集された「AS WE MAY THINK」のページ

「LIFE」1945年9月10日号より引用

「AS WE MAY THINK」From the *Atlantic Monthly*, July 1945

Gurrin & Donerty – DCU (2011)



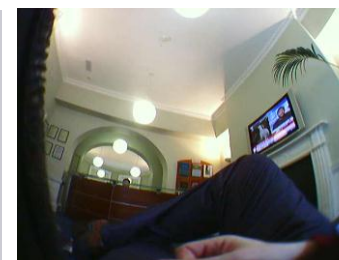
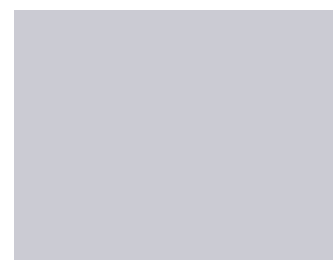
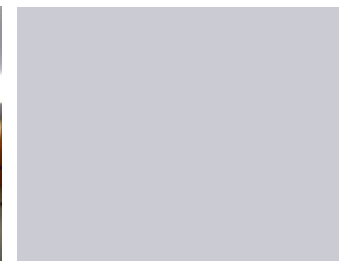
Our wearable sensors

- SenseCam is a Microsoft Research Prototype... now the Vicon Revue
 - Contains a camera and various sensors
 - Addition of GPS and Bluetooth
 - Takes about 5,500 photos per day
- Our own smartphone App
 - Integrates all sensors above
 - Can connect to external capture devices
 - Uploads to a server in real-time

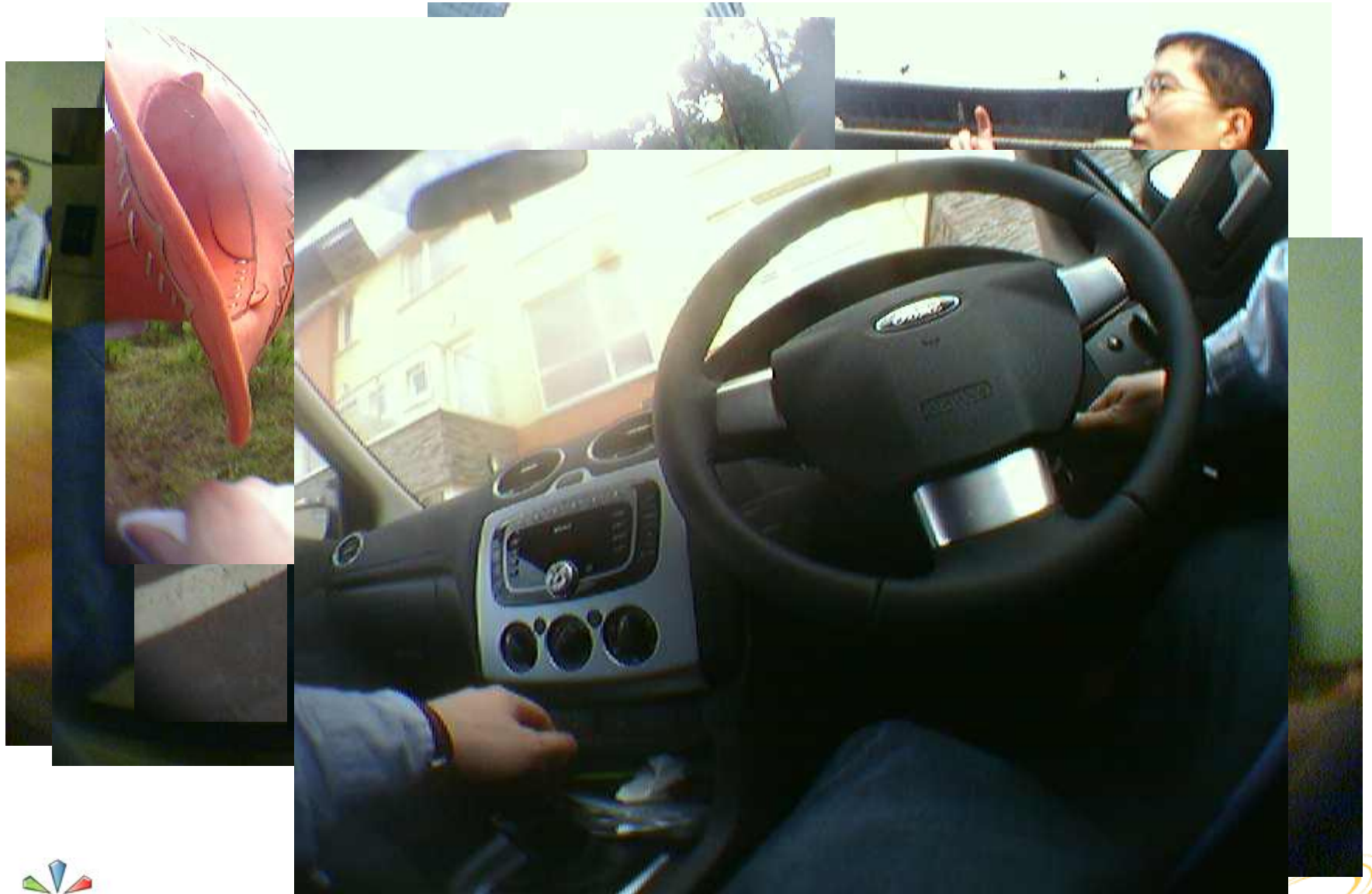


What is in an E-memory Archive?

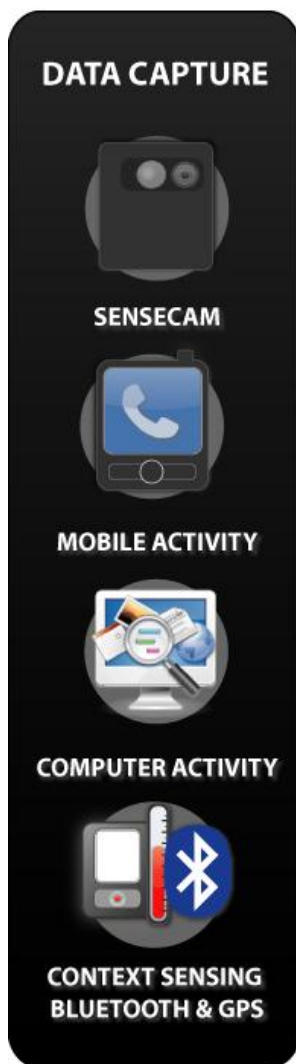
- We use sensors to capture and understand life activities
 - Physical and virtual sensors
- We gather
 - Visuals (photo or video)
 - Locations (GPS and setting detection)
 - Activities (acceleration)
 - Person Interactions (bluetooth)
 - my communications
 - my media consumption
 - but no audio...
- My archive is now 4.5 years in size with over 7,000,000 photos.



Visuals are Powerful Memory Clues

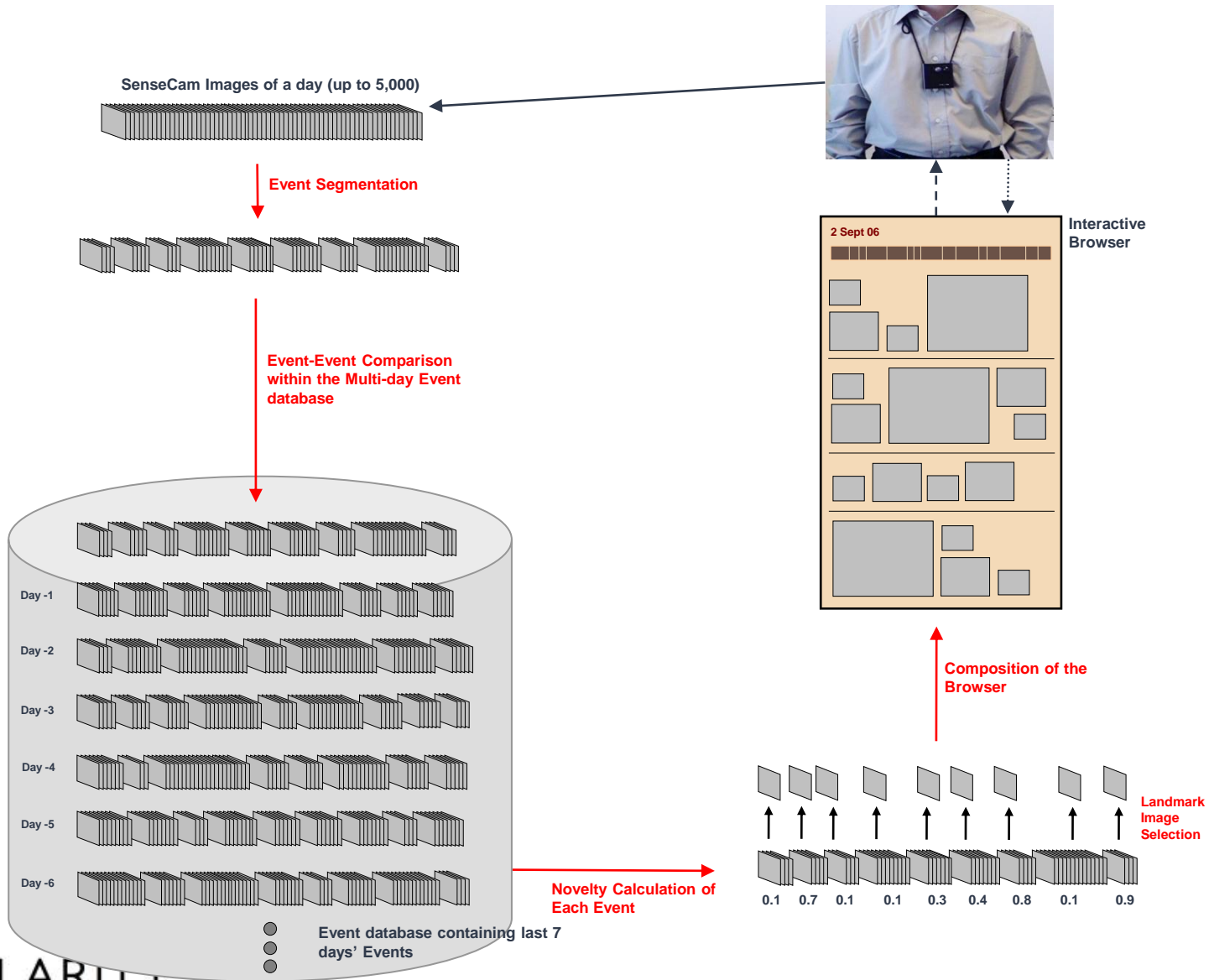


In one year we typically collect...

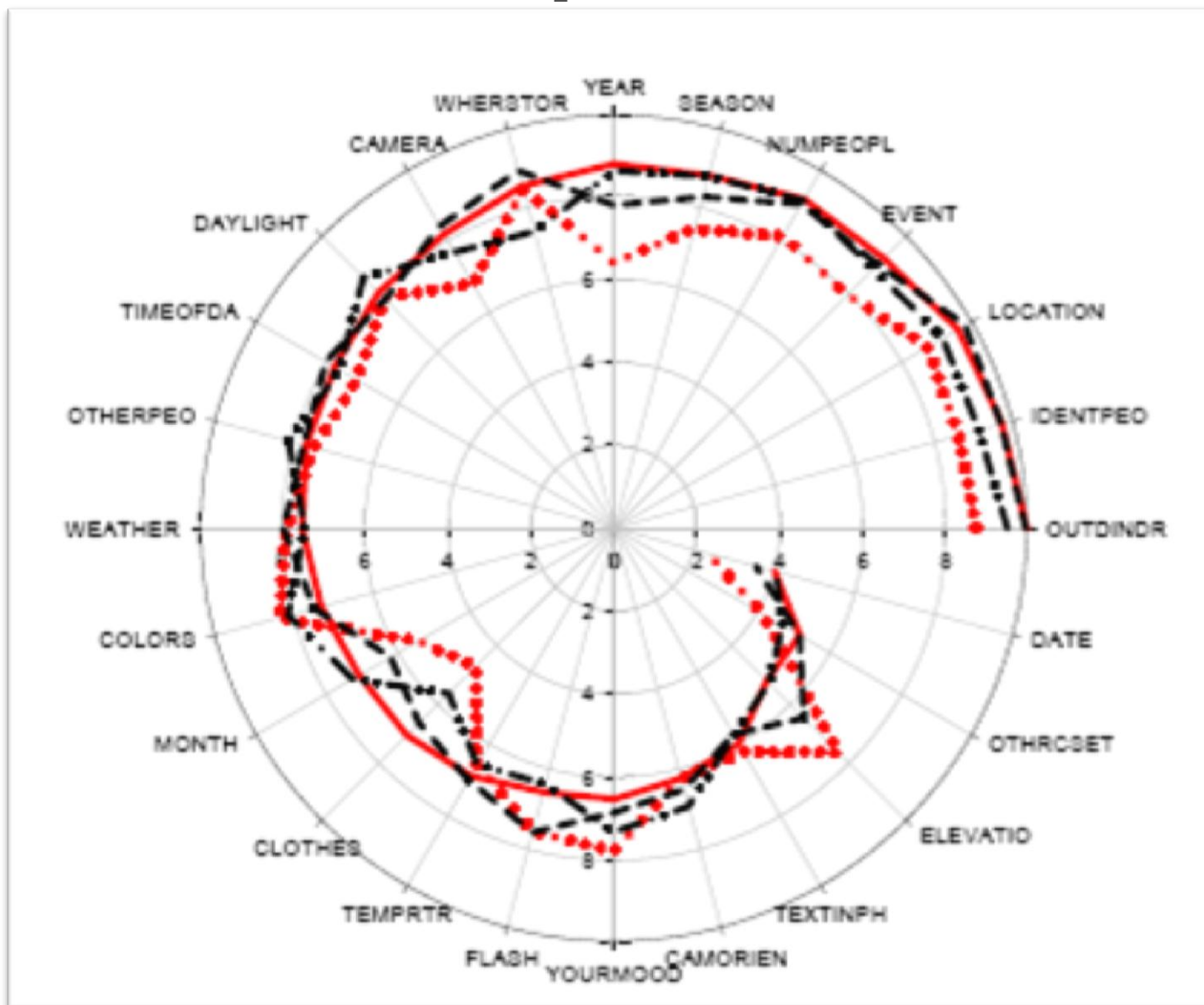


- 394,000 minutes if an 18 hour day
- 12,500 events or moments
 - 120 images or 31 minutes of video each
- 20 million accelerometer and temperature and compass readings
- 2.3 million GPS points
- 25,000 unique Bluetooth encounters
- ... and so on...

How to organise it all?



Applying 12 years of video/image search experience...



CALENDAR

◀ MAY ▶ 2006

S	M	T	W	T	F	S
30	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

DURATION ▶

CAPTION SEARCH

WEEKLY SUMMARY

Selected day is shown below in the context of whole week. Move mouse cursor over to see other similar Events in the week

S

M

T

W

T

F

S

29 May 2006 19

Drag the slider bar to adjust the number of Important Events

Events

I was chatting with Gareth on the conference today. Quite a few chats today!

ADD TO FAVE FIND SIMILAR

My FAVOURITE EVENTS

25 Favourite Events are shown below. Click on the photo to replay all photos within the Event.

1 | 2 | 3 |

Important Events

- 13:45 (Duration: 14m 05s)
14 APR 2006 ▶
- 10:02 (Duration: 23m 56s)
13 APR 2006 ▶
- 14:39 (Duration: 15m 30s)
12 APR 2006 ▶
- 11:25 (Duration: 06m 21s)
12 APR 2006 ▶
- 09:52 (Duration: 01m 03s)
12 APR 2006 ▶

Search

Search Lifelog

Results...

Location search

Flexible time search

Search automatically identified activities

People

Number People 0 1 > 1

Physical

Location

Altitude less 50M 50-120M 120+M

Day/Night Day Night

Bright/Dark Bright Medium Dark

Temperature less 5C 5-15C 15+C

Time

Year 2006 2007 2008

Season Spr Sum Aut Win

Month Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Day Mon Tue Wed Thur Fri Sat Sun

Time of Day Overnight Morning Afternoon Evening

Visual

Importance Important Routine

Concepts Looks Like

- buildings
- door
- eating**
- face
- grass

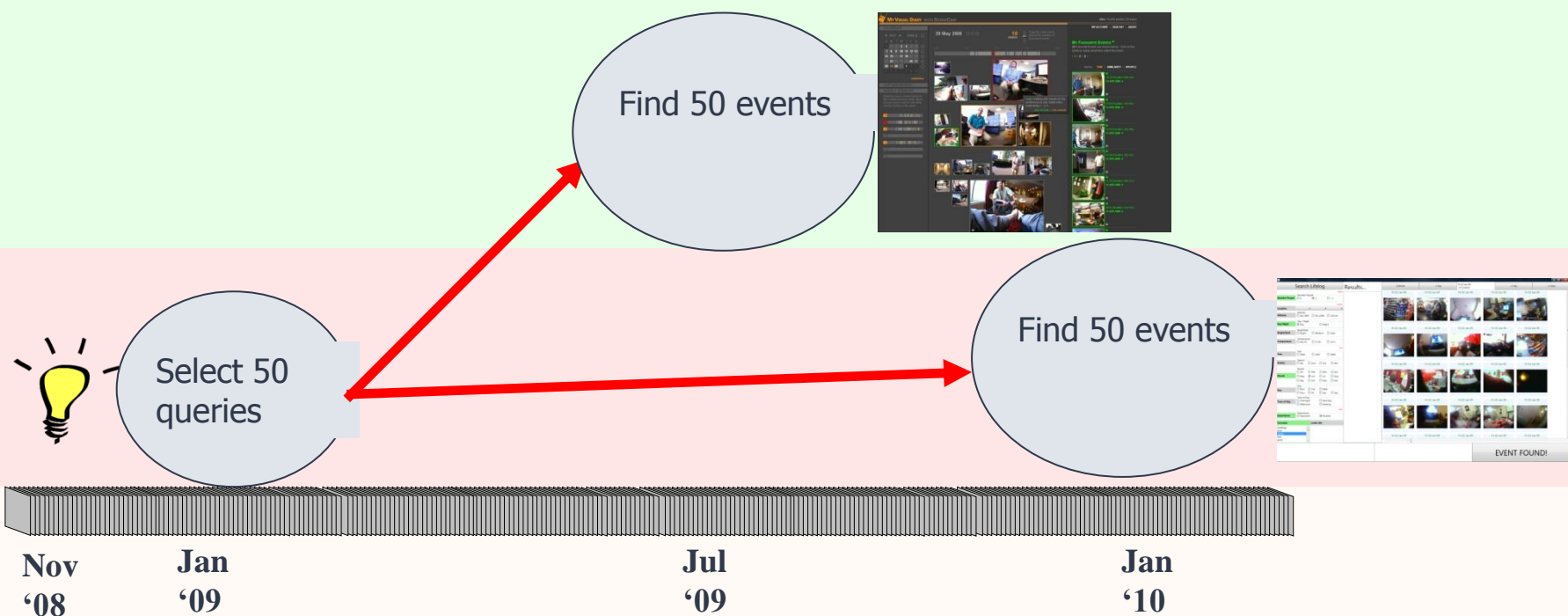
Calendar -1 day Fri 02 Jan 09 (37 events) +1 day +2 days

Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09
Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09
Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09
Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09	Fri 02 Jan 09

EVENT FOUND!

Experimental Timeline

- 1 healthy subject -> 2.5 years of SenseCam images (May '06 – Dec '08)
2,579,455 images (3,080/day) = 29,301 events (35/day)
- average daily duration = 14 hours 22 minutes

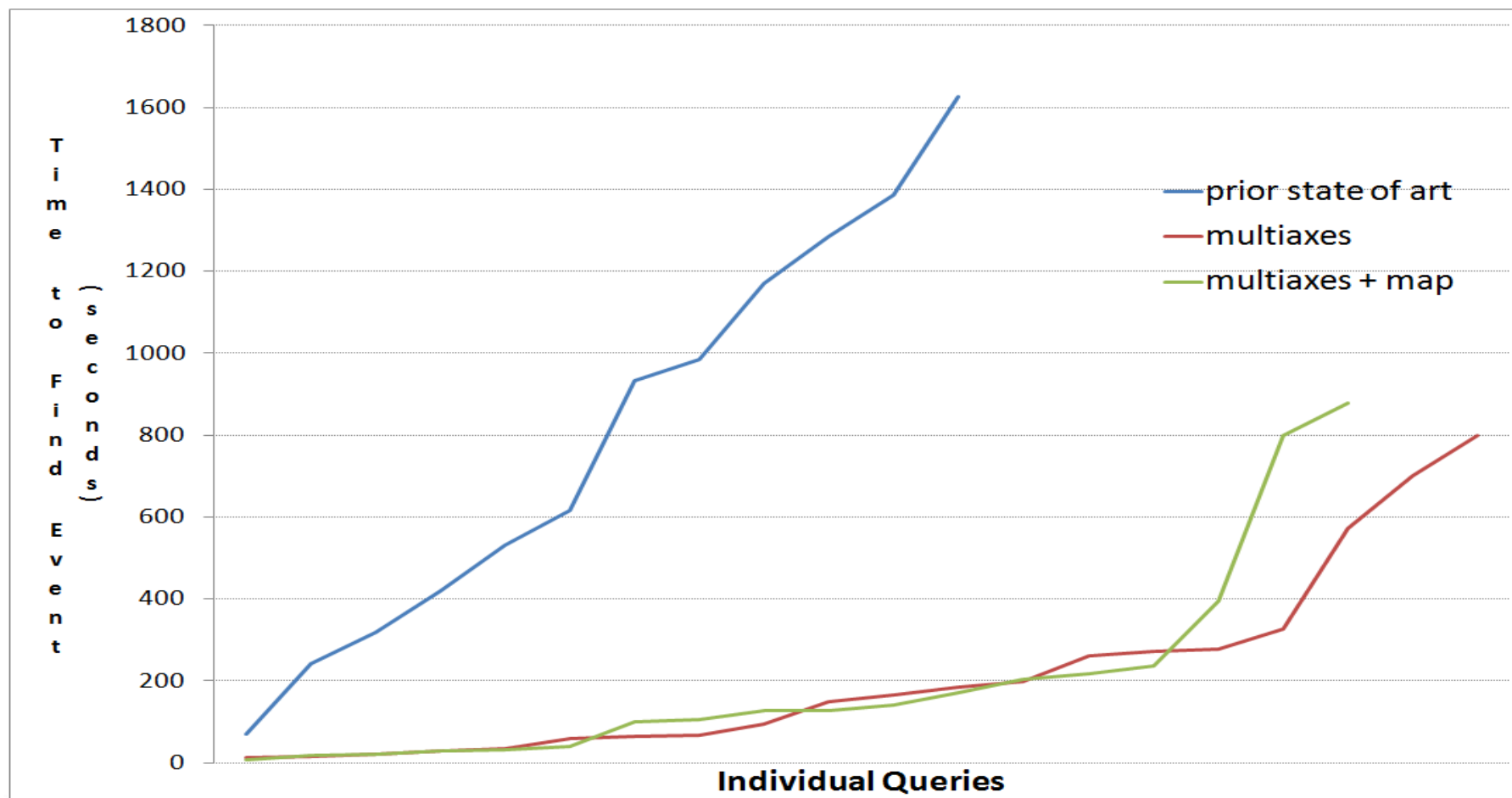


“Multiaxes” browser – better search

Finding one event in 30,000 over past 2.5 years:

Original efforts = 12m 54sec on average!

Multiaxes browser = 2m 7sec on average



A more broad reflection

- Some initial “guesses” were good
 - Segmenting material into events
 - Boosting distinct events
- Search by location appears helpful
 - May be an artefact due to the volume of travel Cathal is involved in, so events likely to be more distinct by locations
- We’re still struggling with linking
 - Visually associating events is best, but still not good enough
- Slick UI is very important
 - Even expert users get overwhelmed with too many features on offer

Cognitively Motivated Software

What works and what frustrates?

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CLARITY: Centre for Sensor Web Technologies, Dublin City University

sincere thanks to: Science Foundation Ireland, Microsoft Research Cambridge, University of Oxford, Irish Health Research Board, EU FP7 Marie Curie Mobility Fellowships



What our team of 18 are working on...

- ~40 publications available at <http://www.cdvp.dcu.ie/SenseCam/publications.html>
- **Psychological aware retrieval**
- Lifestyle analysis of lifelogs for **health & marketing applications**
- Visual lifelogging on **cell phone**
- We're always open to **collaboration!!**