

Smart Social Systems

Ramesh Jain
jain@ics.uci.edu

With Several Collaborators

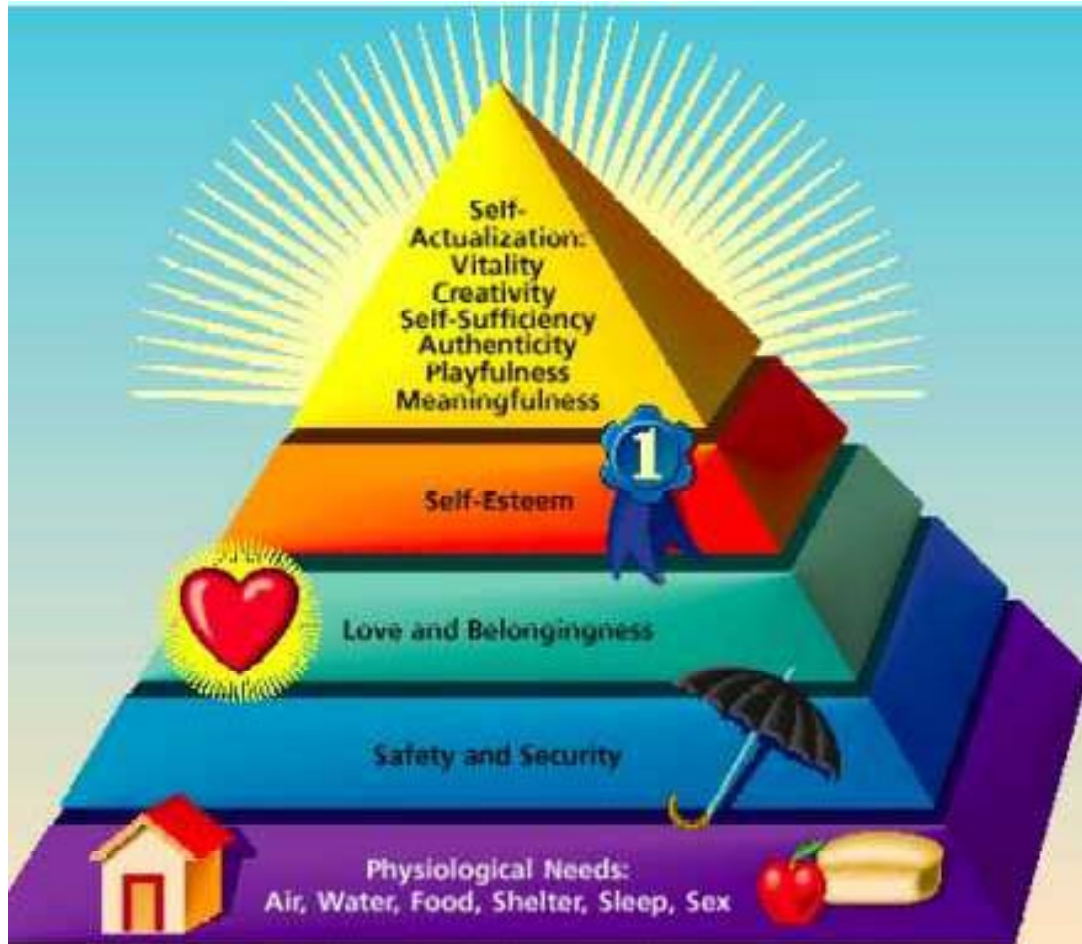
MOST FUNDAMENTAL *PROBLEM* FOR SOCIETY:

***Connecting People's Needs to
Resources Effectively, Efficiently,
and Promptly
in given Situations.***

Major transformation in human history are a chronicle of

How People's need are connected to Resources.

Maslow's Need Hierarchy



Human Needs remain the same.

Resources and distribution methods are invented.

How can we define Needs?

Need = f(person, context)

Society exists only as a mental concept; in the real world there are only individuals.

-- Oscar Wilde

Technology Keeps Changing the World.



Humans keep inventing resources and distribution methods.

We Live in Dynamic World.



Fundamentals don't change.

Published first in 1942

CYBERNETICS

or Control and Communication
in the Animal and the Machine

SECOND EDITION

Norbert Wiener

Theory of Control and Communication in

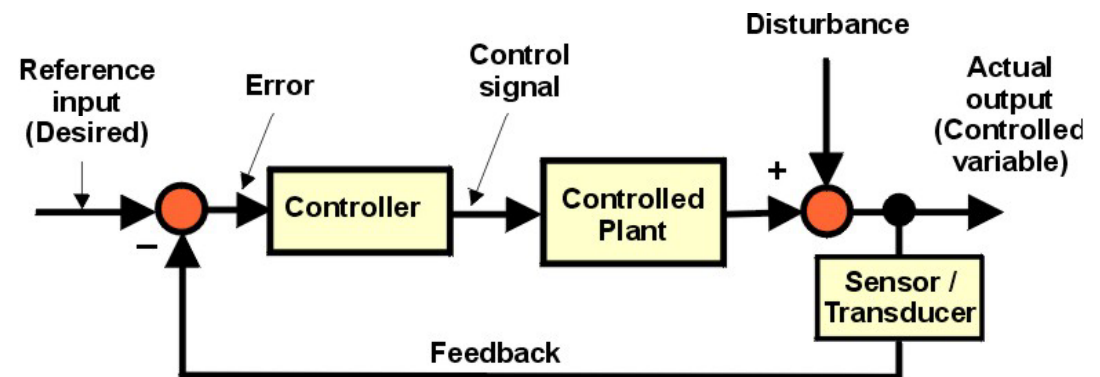
Animals

Machines

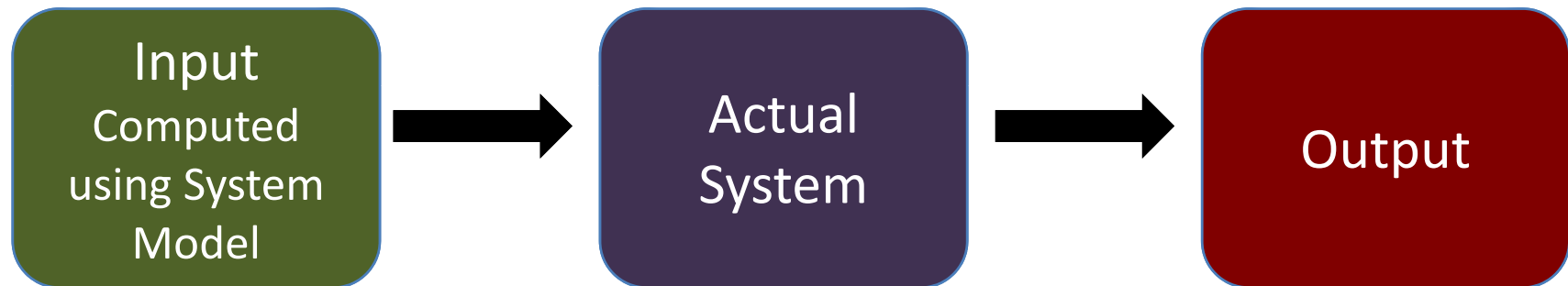
Societies

Cybernetics 101

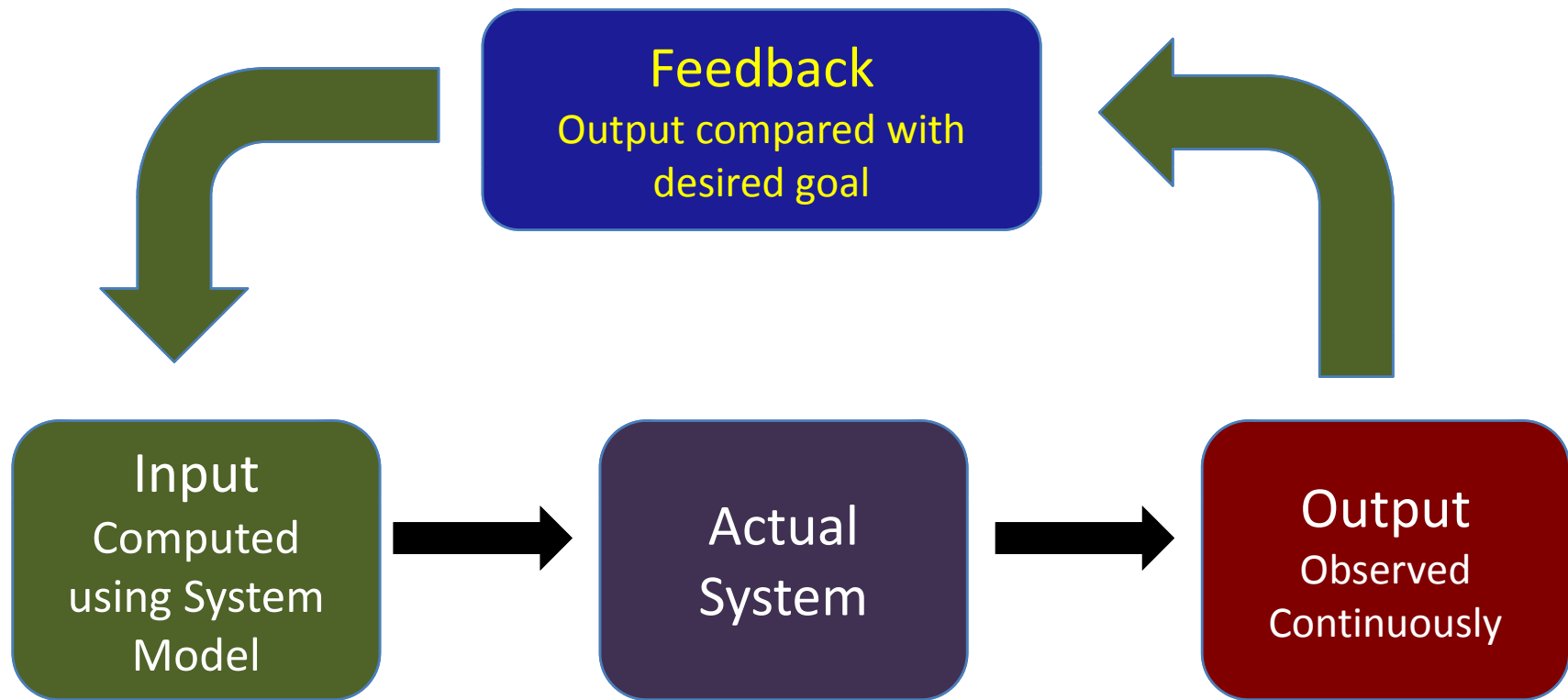
- **Desired state (Goal)**
- **System model and Control Signal (Actions)**
- **Current State (using observations)**



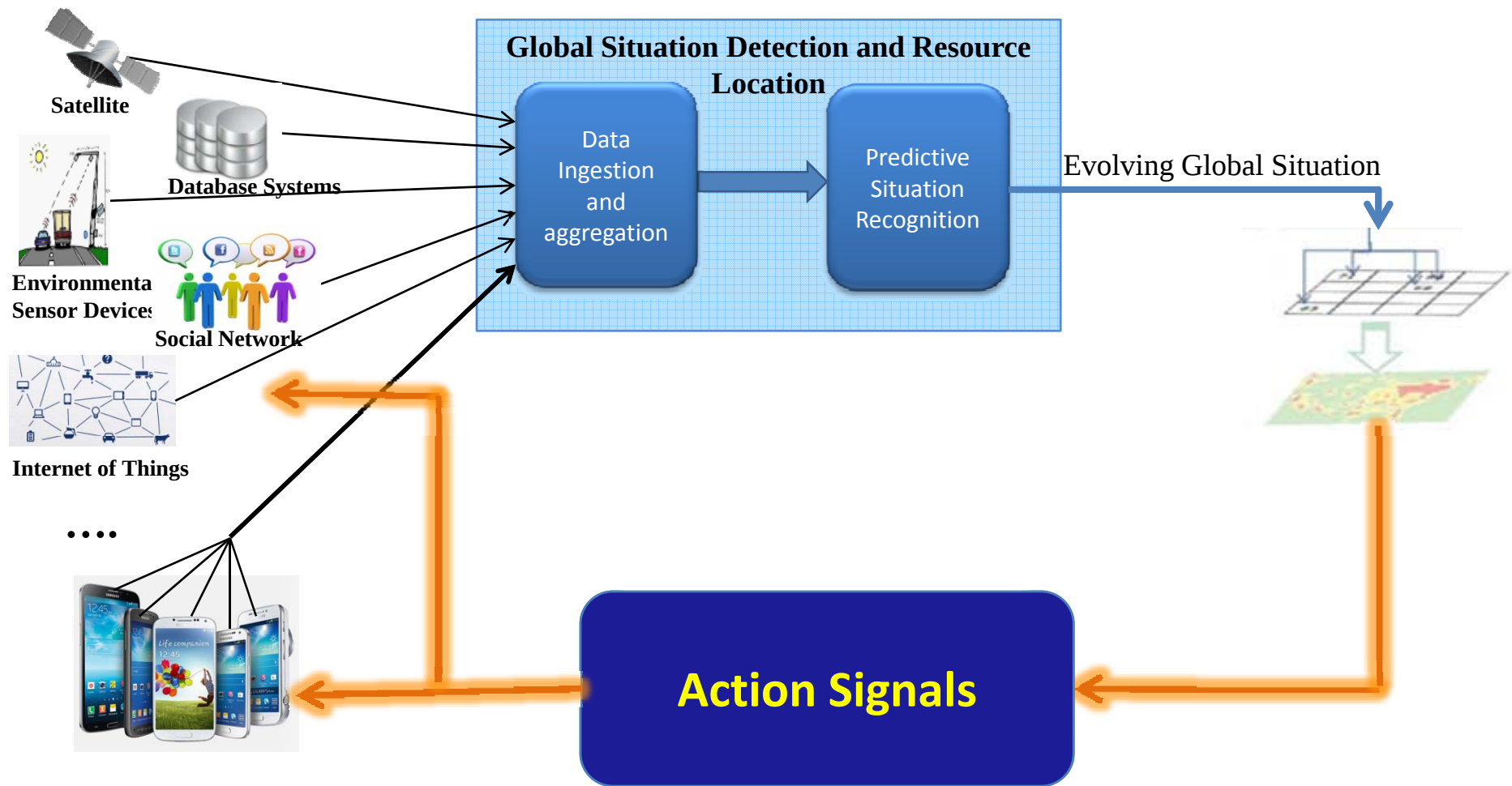
Open Loop Control Systems



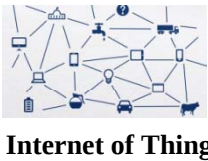
In Smart Systems, Feedback is the Key



Resource Loop: EventShop

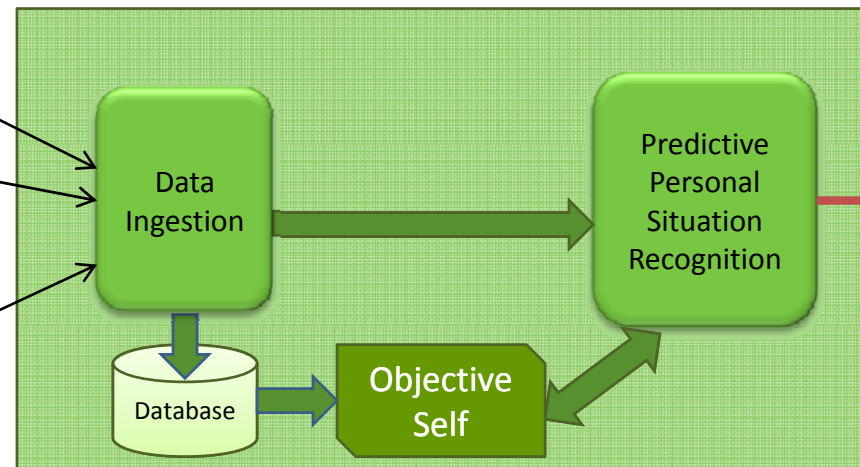


Needs Loop: Personal EventShop

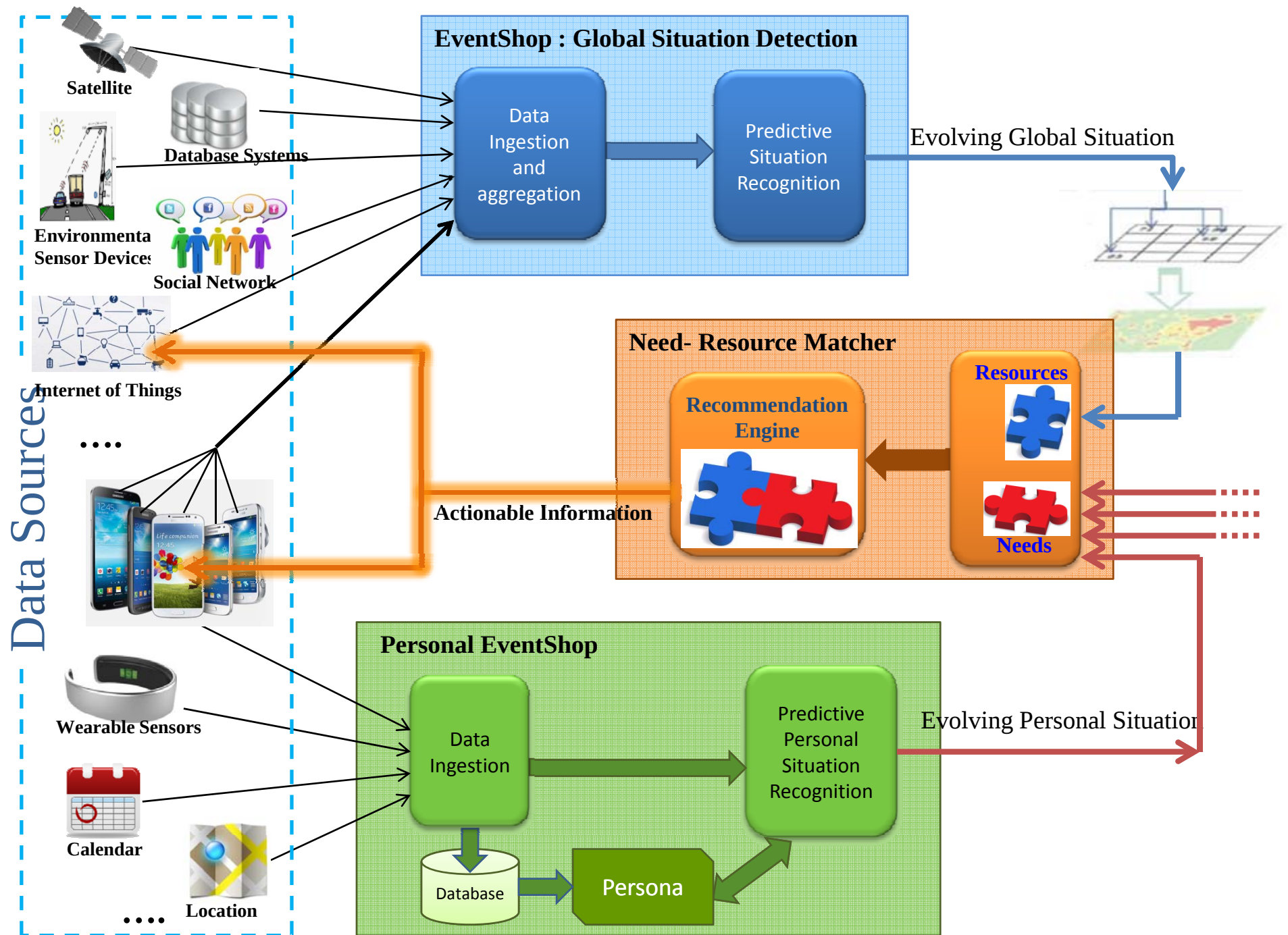


**Actionable
Information**

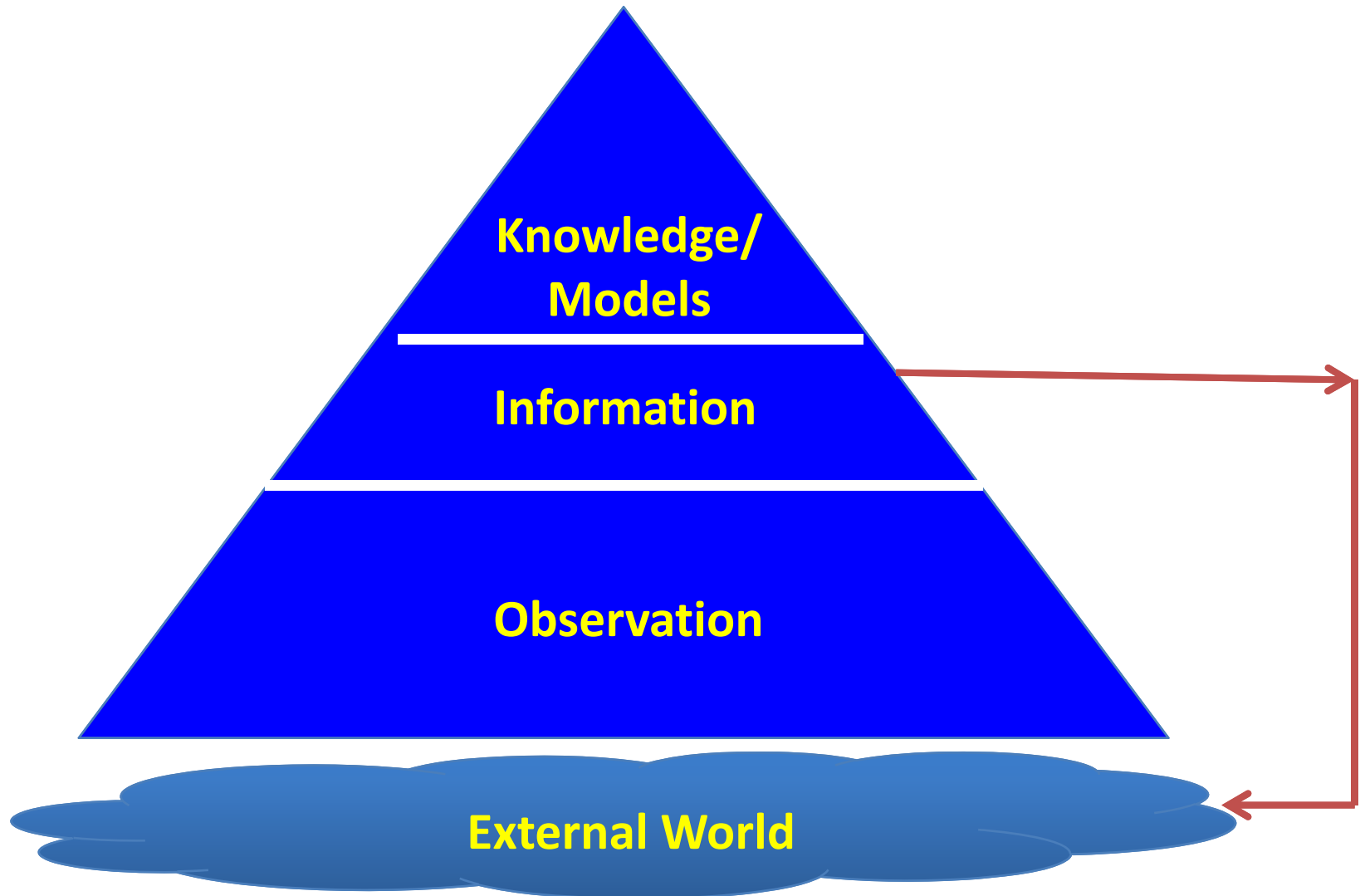
Actionable Signals



**Evolving Personal
Situation**



Models are Essential



Eventshop

Billions of data sources.

Environment for

Selecting, and

Combining

appropriate sources to detect situations.

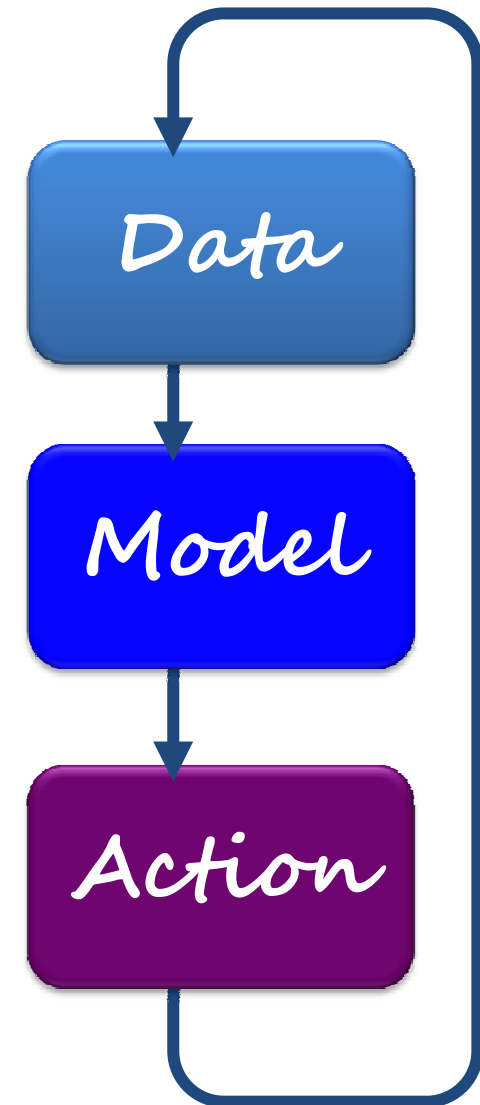
Prediction for Pro-active actions

Interactions with different types of Users

Inspired by Photoshop

Basic EventShop

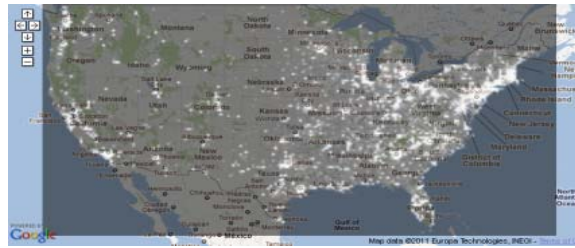
- **Tie in the terabytes of data** generated by different sources, sensors and humans on a plane of space and time in grid structure called E-mage (Event Image).
- **Provide a platform for researchers and analysts** to detect situations, patterns such as natural disasters, social movements, business planning etc.
- **Take action** on the analyzed data to the right audience through mails, tweets, SMS and other channels.



Challenge: Unifying Multimodal Big Data



(a) Pollen levels (Source: Visual)



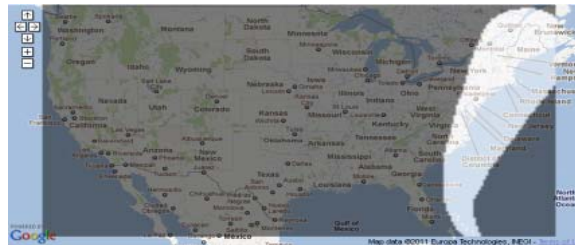
(b) Census data (Source: text file)



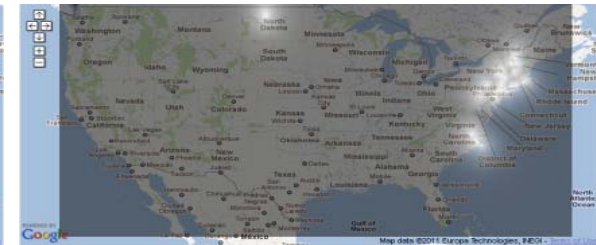
(c) Reports on 'Hurricanes' (source: Twitter stream)



(d) Cloud cover (Source: Satellite imagery)

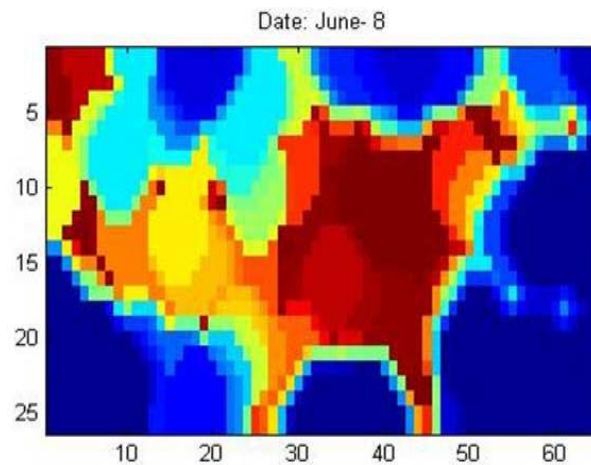


(e) Predicted hurricane path (source: KML)



(f) Open shelters coverage(Source: KML)

Unified Basic Representation is an E-mage



- Spatial Representation – 2-D or 3-D Grid
- Intuitive query and mental model
- Visualization

Functional and System Requirements

- **Domain Independent**
- **Uniform Data Model**
- **Expressive Operators**
- **Declarative Design**
- **Streaming Data**
- **Continuous Queries**
- **Real-time Processing**
- **Large Number of Streams**
- **Large Number of Queries**

Eventshop: Interaction Environment

The screenshot shows the Eventshop web application interface. The browser window title is "jsLINB AJAX Builder -- jsLinb Examples - Mozilla Firefox". The address bar shows "auge.ics.uci.edu/eventshop/".

a) Data-source panel: A table listing data sources with columns "Source Name", "Source ID", and "Status".

Source Name	Source ID	Status
Twitter-Obama	0	Available
Twitter-Happy	1	Available
Twitter-Sad	2	Available
CSV-Population	3	Available
Visual-Pollen	4	Available
Visual-Infrared	5	Available
Visual-AQI	6	Available
Twitter-Asthma	7	Available
KML-HurForecast	8	Collecting
KML-Shelters	9	Available
Twitter-Hurricane	10	Available
Visual-Flood	11	Available
Visual-HurStorm	12	Available
Visual-Fire	13	Available
Simulator-Hurricane	14	Available

Buttons: "View Data Source", "Add New Data Source".

b) Operators panel: A row of icons representing different operators (funnel, pie chart, bar chart, globe, etc.) and buttons "Execute" and "Take Action!".

c) Intermediate query panel: A text input field containing the query "spsmarching.fromFile_ds14".

d) Registered queries: A table listing registered queries with columns "QID", "Status", and "Query String".

QID	Status	Query String
4	stopped	grouping(agg.AggsUM(filter_c
13	stopped	agg.AggsDIV((spchar.sptsum
14	running	spsmarching.fromFile_ds14

Buttons: "Execute", "Stop".

e) Results panel: A map of the United States showing a red location pin. Below the map is a timeline and a numeric output display.

Timeline: "Sat Oct 1", "Sun Oct 2", "Mon Oct 3", "Tue Oct 4".

Numeric value: "0.784084".

Map data: "Map data ©2011 Europa Technologies, INEGI - Terms of Use".

Zoom: "14 5d 1m 3m 6m 1y Max".

Value: "Value 0.78 | 11:45 October 04, 2011".

Buttons: "Hide Visualization", "Disable maps", "Hide Timeline".

EventShop: Thai Floods

jsLINB AJAX Builder -- jsLinb Examples - Mozilla Firefox

File Edit View History Bookmarks Tools Help

jsLINB AJAX Builder -- jsLinb Examples

localhost:8080/eventshop/

Registered Queries

☐	QID	Status	Query String
☐	4	stopped	grouping(agg.AggsSUM(filter_c
☐	13	stopped	agg.AggsDIV((spchar.sptsum(

Execute Stop

Data Source Panel

☐	Source Name	Source ID	Status
☐	Twitter-Thair		Available
☐	Twitter-Sad	2	Available
☐	CSV-Population	3	Available
☐	Visual-Pollen	4	Available
☐	Visual-Infrared	5	Available
☐	Visual-AQI	6	Available
☐	Twitter-Asthma	7	Available
☐	KML-Flood	8	Available
☐	KML-Shelter	9	Available
☐	Visual-Flood	10	Collecting..
☐	Visual-HurStorm	12	Collecting..
☐	Visual-Fire	13	Collecting..
☐	CSV-Traffic	14	Available

View Data Source

Add New Data Source

Operators

Query

Classify (Flood level - Shelter)

Date: 0.0 3.0

POWERED BY Google

Map data ©2011 Google, Inc. All rights reserved. Terms of Use

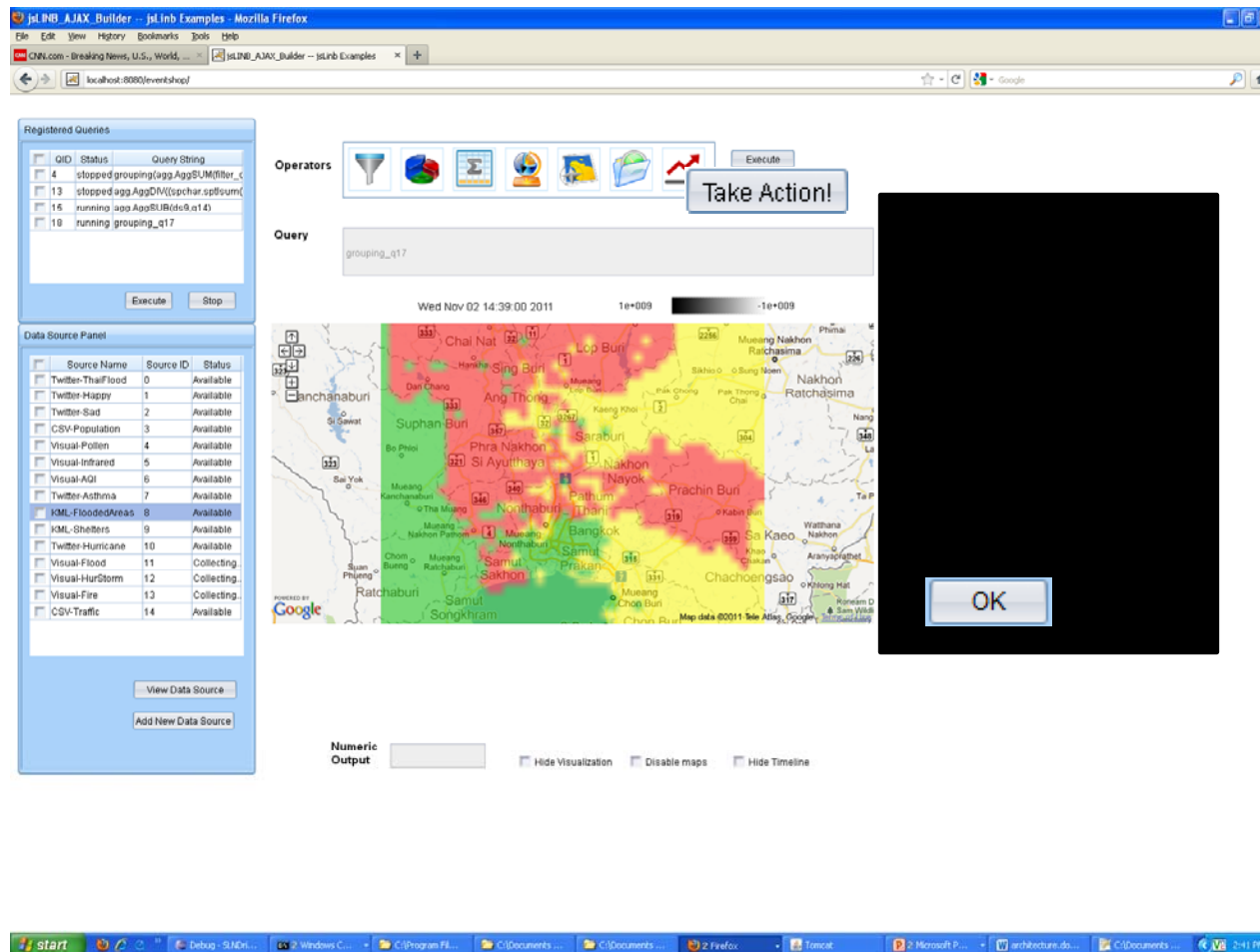
Numeric Output

Hide Visualization

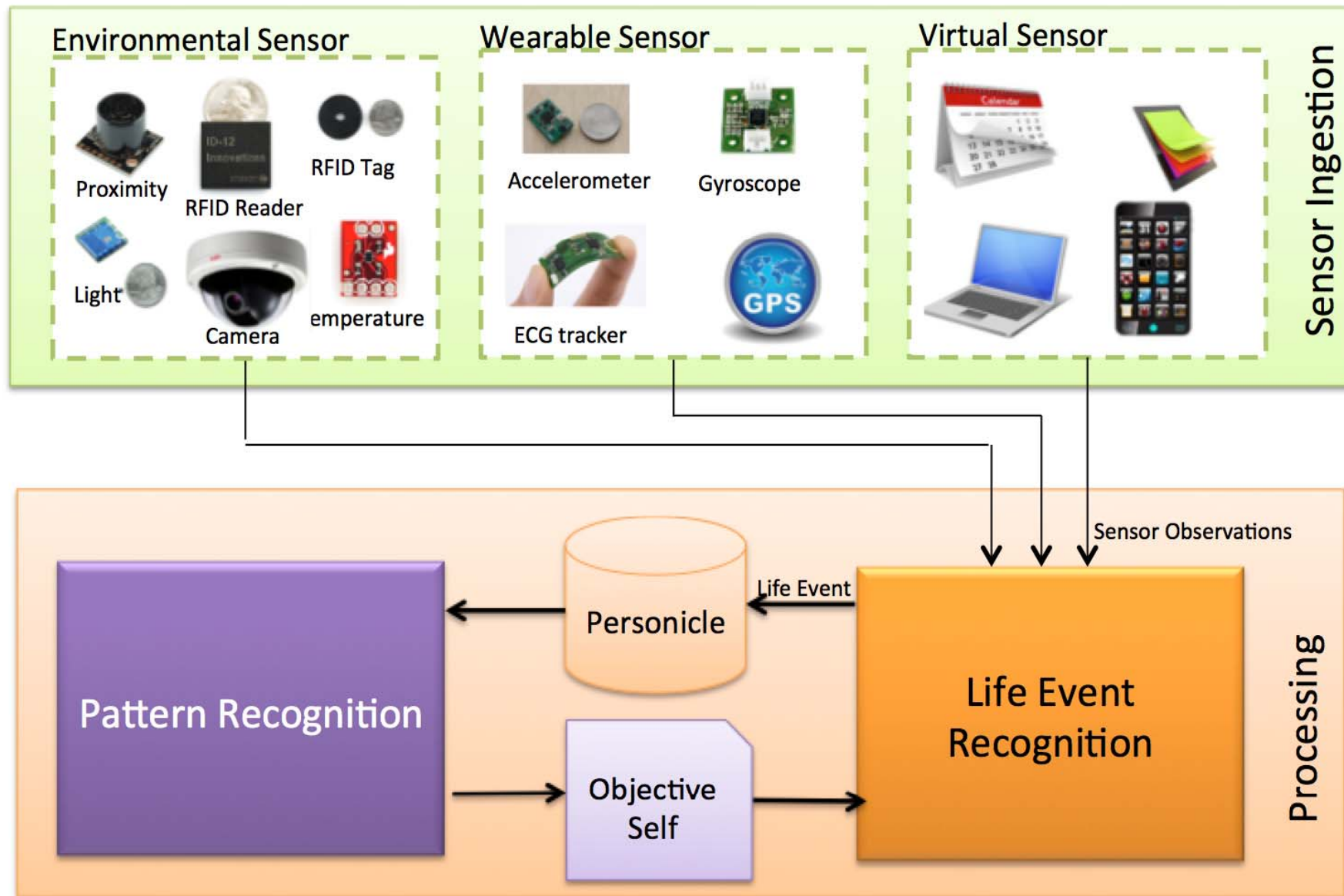
Disable maps

Hide Timeline

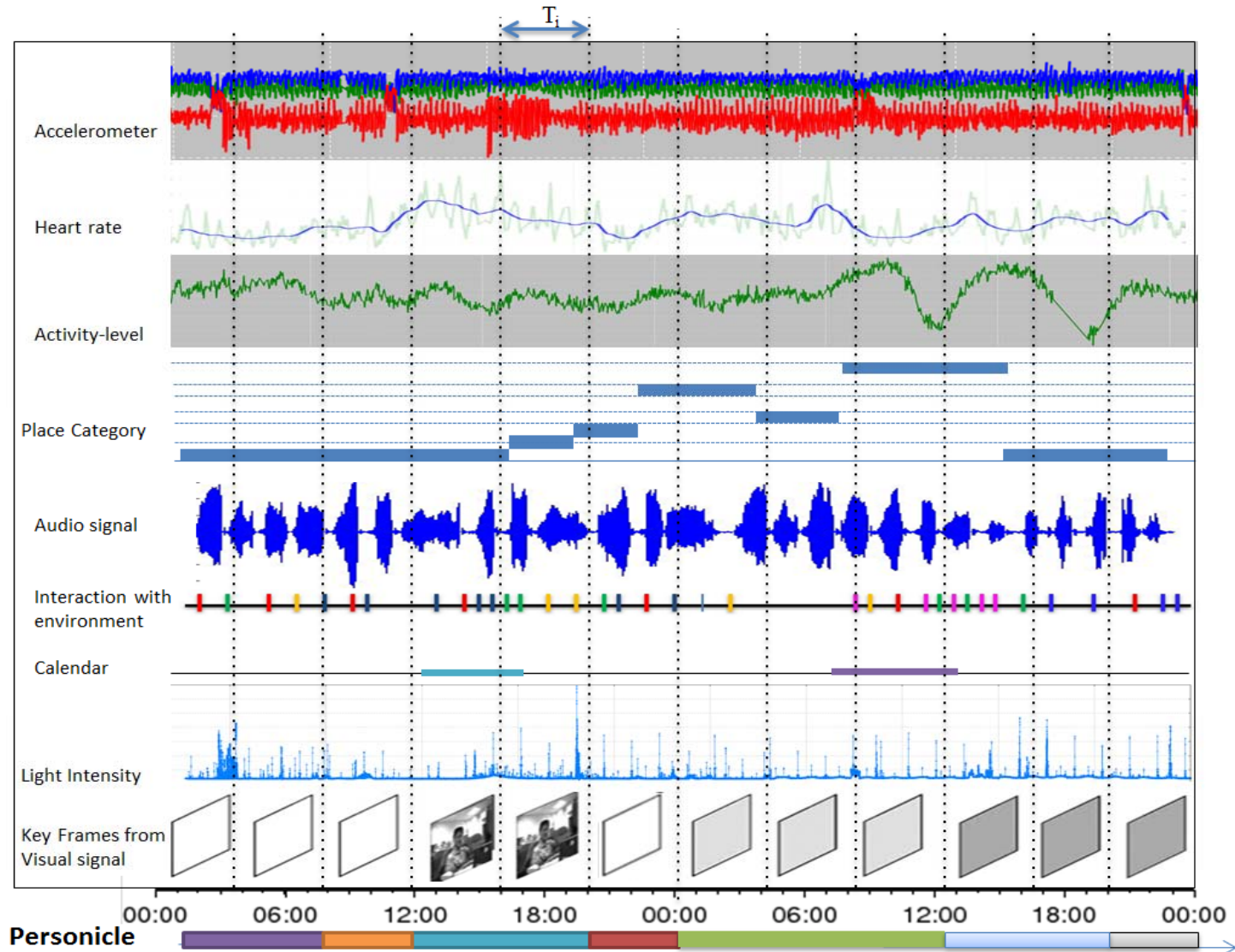
Taking personalized actions



Objective Self Architecture



Life Events Emerge From Streams.



Computational Model of Events.



Personicle

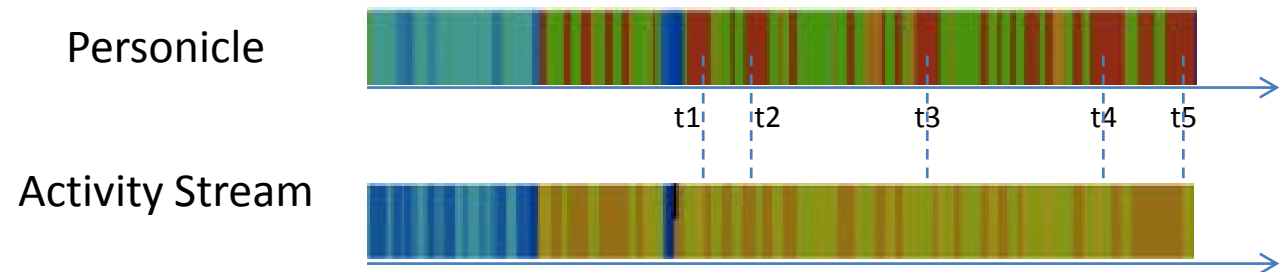


Temporal: { "start-time": "2014-01-01T09:00:00" ; "duration": 65 }
Spatial: { "lat": 33.5748; "lon": -127.6479 ; "location-name": "Aldrich Park"; "location-type": "park" }
Informational: { "event-id": "LE001" ; "motion": "jog" ; "category": "jogging" ; "intensity": "high" ; "steps": 4987 ; "calories-burned": 646 }
Structural: { "sub-event-of": "exercise" }

Temporal: { "start-time": "2014-01-01T12:00:00" ; "duration": 60 }
Spatial: { "lat": 33.5748; "lon": -127.6479 ; "location-name": "DBH building"; "location-type": "university" }
Informational: { "event-id": "LE005" ; "motion": "sit" ; "category": "meeting" ; "participants": [{ "pid": "p005", "pname": "jain" }, { "pid": "p007", "pname": "laleh" }] }
Structural: { "sub-event-of": "work" }

Insight: Exercise Triggers My Asthma

- **Red**: “Severe asthma attack”.
- **Orange**: High activity level.
- **Exercise triggers my asthma!**



Finding Insights

- **Blue:** Shortness of breath. The lighter the color, the worse the symptom.
- **Green:** Low air pollution.
- **Red to Purple:** High and very high air pollution
- ***Exposure to polluted air is a risk factor of asthma attack within X hour?***

Personicle case



Environmental factors



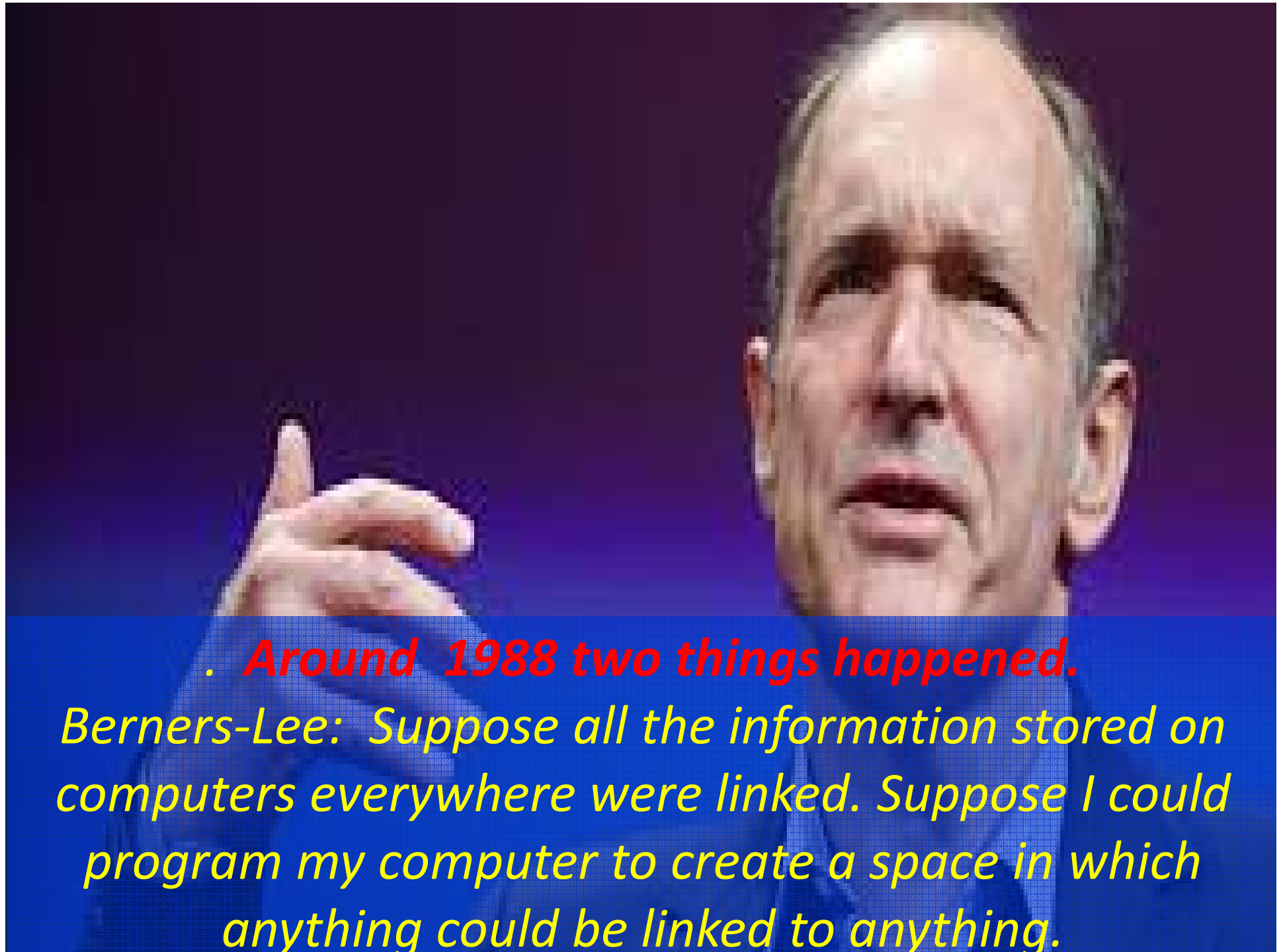
Causality and Correlation

- **All about Building Models.**
- **Data driven Vs Reasoning Based**

**A New Project:
Weaving the Visual Web**

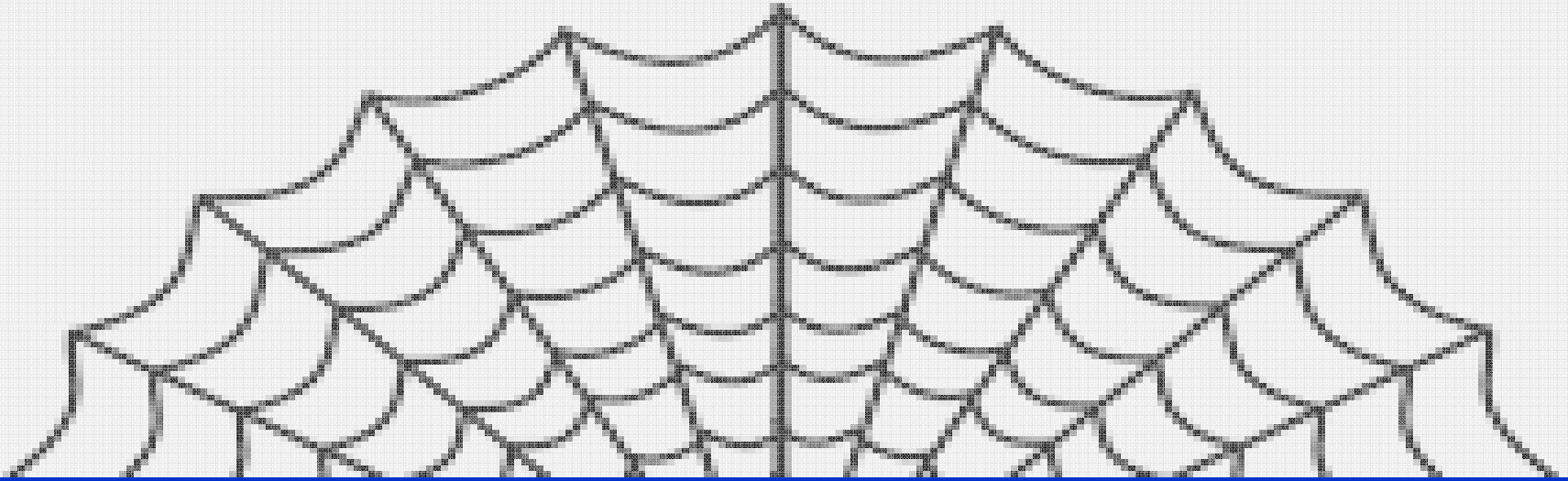
Krumb's: Building Visual Web



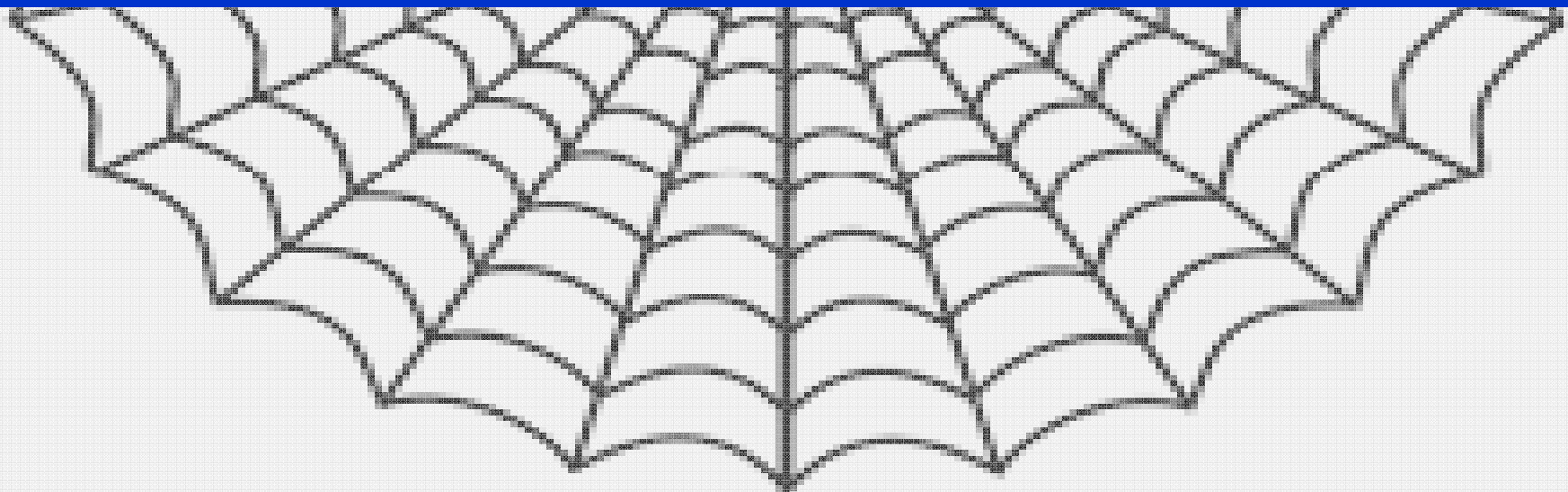


. Around 1988 two things happened.

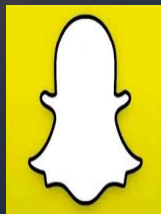
Berners-Lee: Suppose all the information stored on computers everywhere were linked. Suppose I could program my computer to create a space in which anything could be linked to anything.



**Web: Human experiences, knowledge,
and understanding captured using
associative links.**



Photos are New Popular Documents.



Imagine if every photo and video were connected to every other.

Visual Information Spectrum

- Ephemeral
- Short term
- Everlasting

Creating a space in which visual and other information and experiences are interlinked.

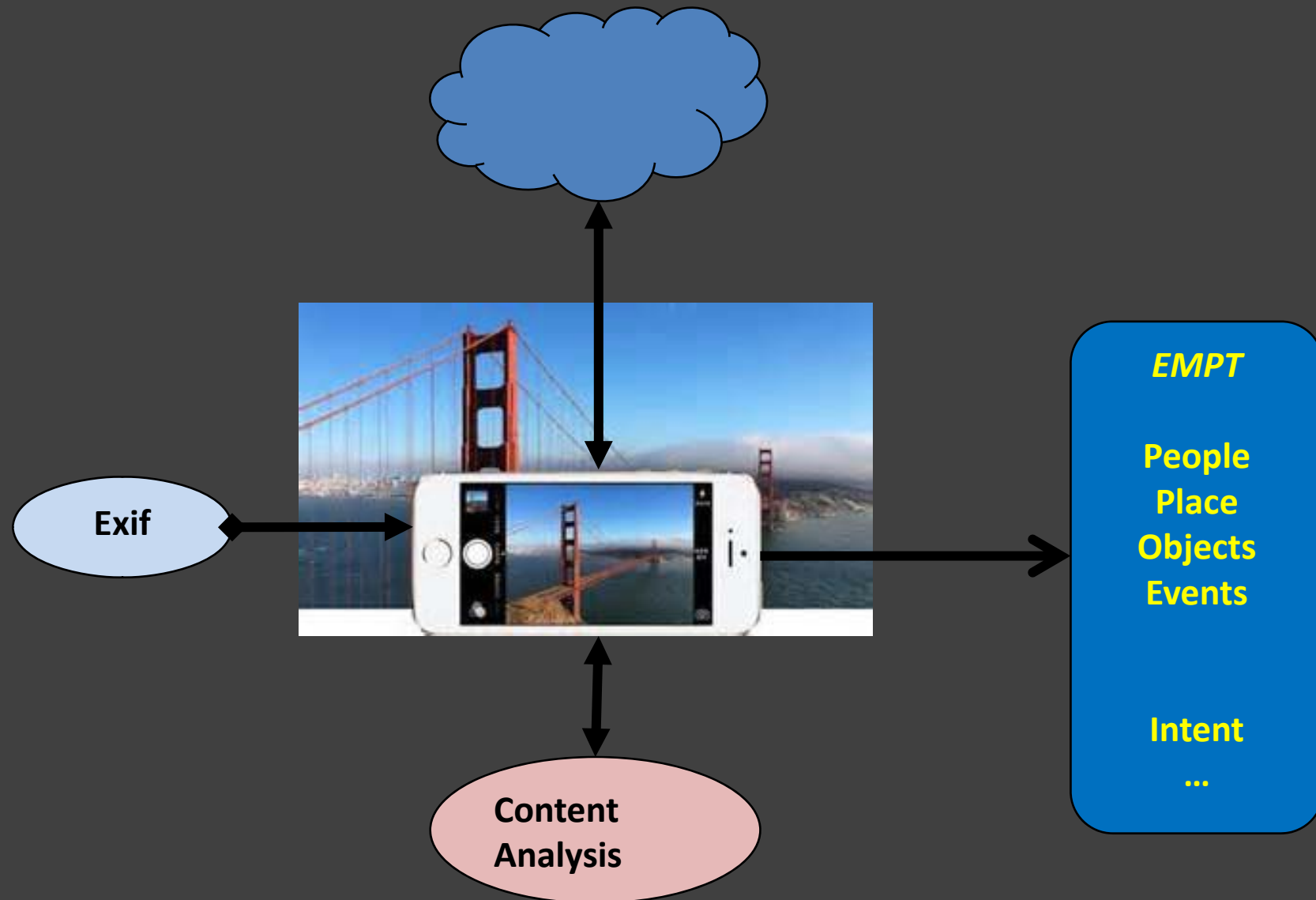
- **Creating Linked Photos**
 - **Navigation Environment**
 - **Photo Ranking**
 - **Personalized Search**

Content without Context is Meaningless.

Technology for Building Visual Web

- **Visual Authoring Environment: HTML for Visual Data.**
- **Content Analysis**
 - Deep Contextual Reasoning: From Smartphones, sensors, IoT, personal history, social, personal and all other events.
 - Event Clustering and recognition.
 - Photo Ranking
 - Combine with Deep Learning based Content Analysis
- **Visual Navigation**
- **Cross sharing and integration with other Platforms.**
- **Combine Algorithmic and Interactive tools.**

EMPT: Extractable Mobile Photo Tags





Searching *'For a Photo'*
and
Searching *'From a Photo'*.



Photos

People

Groups



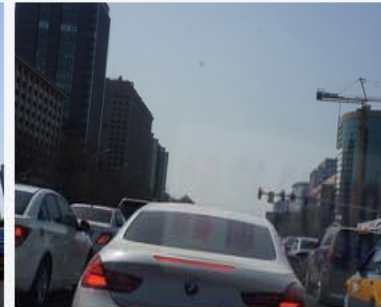
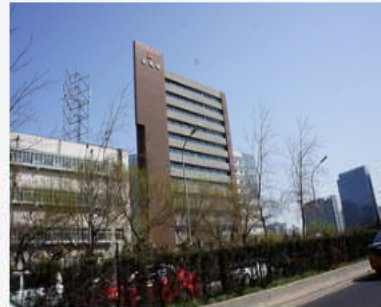
Relevant ▾



Advanced

Your photos

[View all 2,996](#)



From people you follow

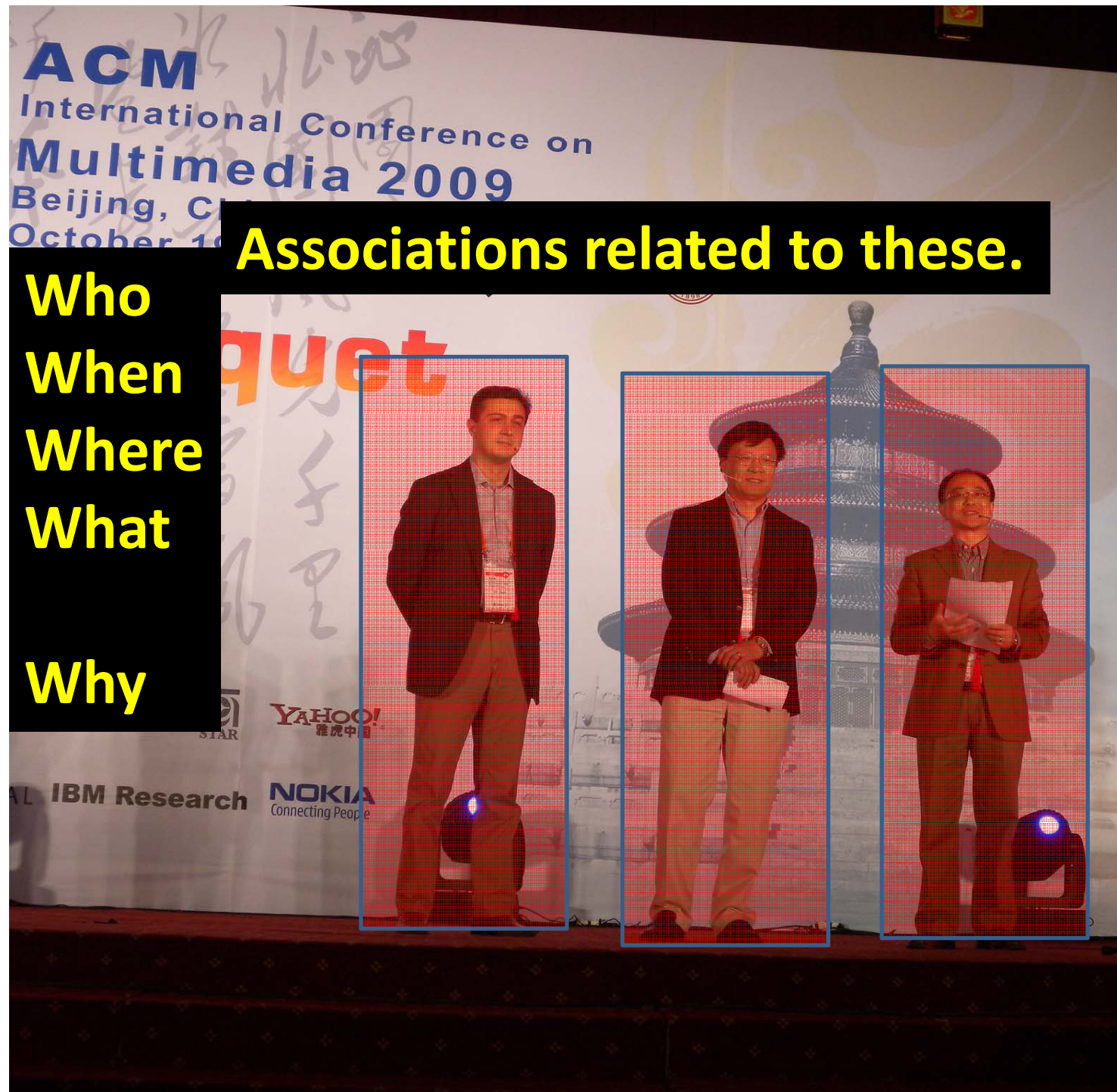
[View all 276](#)



Everyone's photos

[View all 3,199,065](#)





ACM

International Conference on
Multimedia 2009
Beijing, China
October 10-14, 2009

Associations related to these.

Who
When
Where
What
Why

quet

YAHOO!
雅虎中国

IBM Research

NOKIA
Connecting People

What DO you like to do with
Photos?

What DO you like to do with
Photos?

Share
Memories
Notes
Knowledge Creation



Popular

Selfie

Food

Social

Travel

Shopp





Popular

Selfie

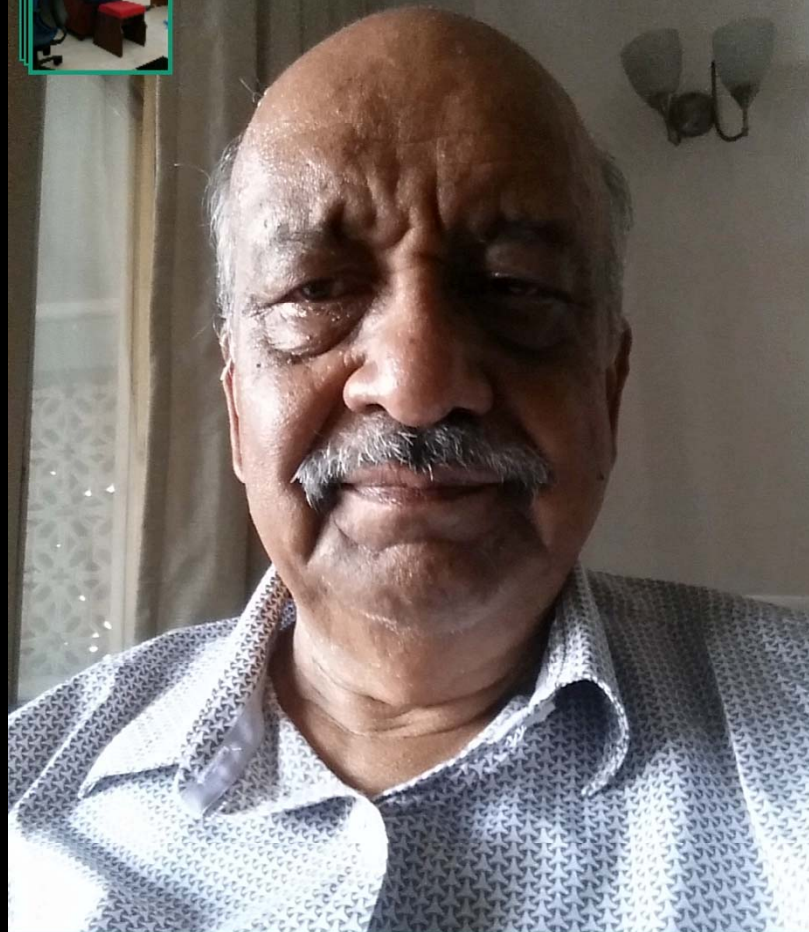
Food

Social

Travel

Shopp





Popular

Selfie

Food

Social

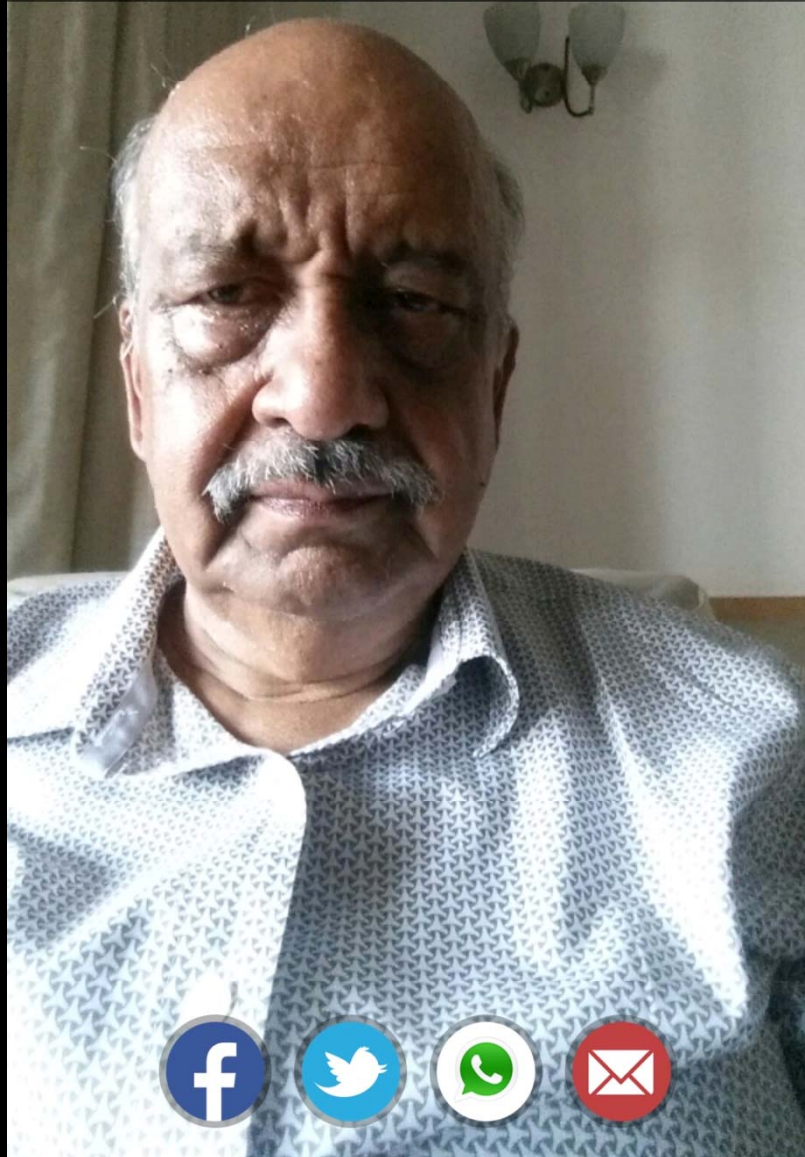
Travel

Shopp





Arrived, during keynote at IC3, at IIIT





Popular

Selfie

Food

Social

Travel

Shopping

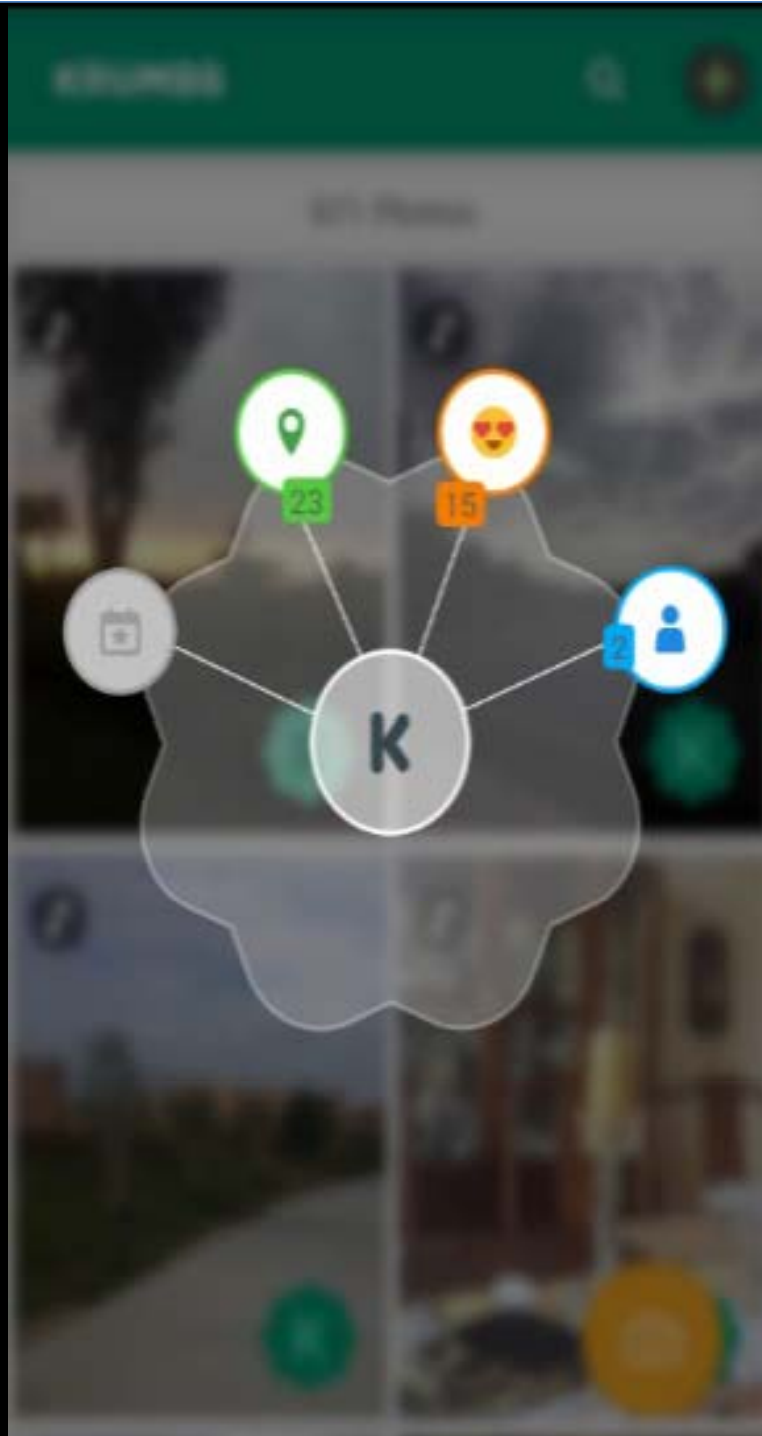


KRUMBS



971 Photos







1 of 971



Love, at Whistler, on Wed May 06



KRUMBS



Cee

Cees Snoek



cees



cees,Neil Jain



cees,Sudha Jain



Evening with Cees, Neil, Sudha



Q W E R T Y U I O P

A S D F G H J K L

↑ Z X C V B N M ↵

123 microphone space Done

Links for a Photo

- Photo Level
 - Automatic creation
 - Manual Annotation
 - Manual Creation
- Segment Level
 - Automatic Creation
 - Manual Creation

Links are about: Content

- Who:
 - People in photo
 - Photographer
- When
 - Timestamp
 - Event (Symbolic timestamp)
 - From some kind of Calendar
 - Inferred from time, location, and visual characteristics
 - From other data (accelerometer, heartrate, ...)
- What
 - Use Concept detectors
- Where
 - GPS Data
 - Personalized Reverse Geo

Links are about: Intent

- Why
 - Intent of the photographer
 - May depend on the context
- Has been difficult to computer or represent

Links can be

- Automatically assigned 'tag' (Computed)
 - Tags from a dictionary or ontology
- Manually assigned 'tag'
 - As above or personal.
- Connection to another URI (leading to a photo, a segment, a text, or any other valid entity)

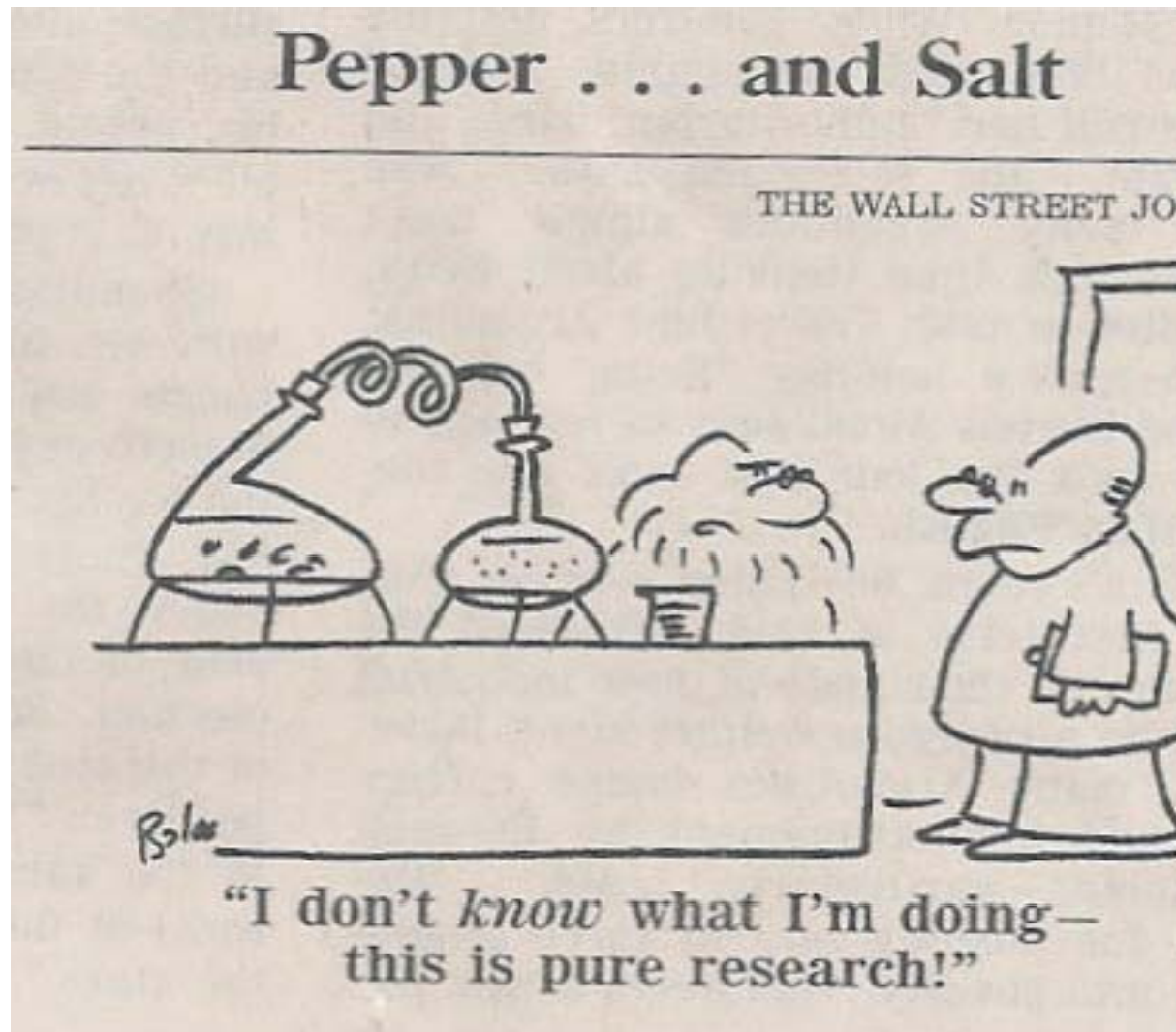
How can we make it happen under JPEG?

- Current JP Search motivated by 'Searching for Photos'
- Can we use it for 'Searching from Photos' also?

Exciting Times.

- Many opportunities.
- Equal opportunities for everyone.
 - No reason to make excuses.
- Would love to work with you.

Thanks for your time and attention.



For questions: jain@ics.uci.edu