

# Information Visualization Lecture 5



IVIS15 Skylake ([link to project](#), [link to video](#))



**VICSTHLM**  
VISUALISATION INTERACTION COLLABORATION

Mario Romero 2016/02/02

# Proposal for Skylike



IVIS15 Skylike proposal on Feb 13, 2015: “make night sky constellations from your network of friends.”

# Feedback to Proposal: link to presentation [PDF](#)



**Diana, Andrés, Willie, Tomáš, Johanna:** Your proposal is ambitious in some aspects and unclear in others. It is ambitious in its plan to compute constellations from network graphs. What is a constellation mathematically? You will need graph theory, a sophisticated data transformation. How many stars and links for a typical constellation? Why? Are there families of constellations? How do you represent the constellations within the network? What are the view transformations? How do you provide overview, zooming, filtering, details on demand? You need to focus. Who is your user? What are the tasks? Where do you get your raw data? You need refine your ideas. Using the 4K screen with the kinect may work.

# Skylikes feedback to "Hello World" Demo

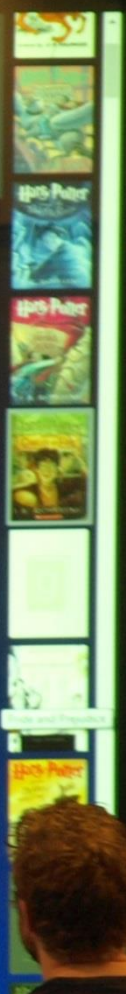


**Diana, Andrés, Willie, Tomáš, Johanna:** Your choice of focusing on Goodreads is wise. Your Hello World demo worked very well and it gave your classmates a concrete opportunity to provide actionable feedback. Good work. Your challenge remains the graph theory to compute reasonable constellations in the number of stars and edges and their location. For example, should you strive for planar graphs? How many nodes and edges? Where do you place the cut off? Also, you have to think about your query system and the permanence of the constellations across users, sessions, and networks of friends. How do you learn to recognize your constellations? How do you use your constellations? Recommendation systems? What are the tasks? There are a few questions you must continue to raise. Also, the 4K screen is the perfect place for you to record your video for the C-Awards. You can Wizard of Oz the interaction. Additionally, you must manage a balanced workload. As with other groups, you have significant more reading to do, for example: [Community structure in complex networks](#), [maritime constellations](#), [Deciphering Network Community Structure by Surprise](#), [community detection](#), and [Probabilistic Similarity Networks](#).

# [Link to final Presentation of SKYLIKE](#)



Harry Potter and the Goblet of Fire (Harry Potter, #4)  
Author: J.K. Rowling  
Friends who read: 15  
Your rating: 4  
Goodreads rating: 4.48



# Visual Mappings & Structures

Center of the sky: you



Star: your friend in Goodreads

Inner radial area: books belonging to communities

Outer radial area: books belonging to communities

Distance from center: number of common books

Book shelf: your read books

Size of star: number of read books





# Prelude Videos

- Liszt Hungarian Rhapsody 2 (8:58)– [link](#)
- Rimsky-Korsakov -- Flight of the Bumblebee (1:27) – [link](#)
- Precision Information Environments Envisioning the future of emergency management (4:38) – [link](#)
- Skylikes – IVIS15 project (3:22) – [link](#)



# IVIS16 Schedule

					<b>DUE:</b>
<b>5.</b>	<b>Tuesday</b>	<b>02.2</b>	<b>13:15</b>	<b>Lecture 5</b>	<b>Reading 2</b>
6.	Tuesday	09.2	13:15	Lecture 6	Reading 3
7.	Friday	12.2	<b>08:30</b>	Lectures 7, 8 (labs)	Project 2, Proposal
9.	Friday	19.2	<b>08:30</b>	Lecture 9	Reading 4
10.	Tuesday	23.2	13:15	Lecture 10	Reading 5
11.	Friday	26.2	<b>08:30</b>	Lectures 11, 12 (labs)	Project 3, Hello World!
13.	Tuesday	01.3	13:15	Lecture 13	Reading 6
14.	Friday	11.3	<b>08:15</b>	Lecture 14	Reading 7
15.	Friday	18.3	<b>08:30</b>	Final Demo (exam)	Project 4 Final Demo
16.	Thursday	14.4		C-Awards	

# Outline

1. Project 2
2. Project 4 Proposals
3. The Challenger case
4. Adriá presents Project 1
5. Visualization Pipeline based on P1
6. Break
7. Test Reading 2 (5 minutes!)
8. Users
9. Tasks
10. Datatypes in Visualization

# Project 2

[Link to P2](#)

## Visualizing the World Through its Own Worldview

You have been hired as an Online Visualization Engineer by the World Values Survey. Congratulations!

<http://www.worldvaluessurvey.org/wvs.jsp>

Read about it. What is it? What type of data do they show?

Learn to use their visualization tools.

<http://www.worldvaluessurvey.org/WVSONline.jsp>

You create and document (text and images) an analytic trail, that is the story of your analysis, from exploration to conclusions, including data processing, visual mappings, visual structures, view transformations, and acquired insights. Then you give your colleagues a brief and constructive presentation with criticism to the WVS tools focusing on their limitations. Remember, perhaps one of your new colleagues or bosses created them, so be positive and constructive. It has been hard work for decades to get here and there are (hopefully) good reasons why they hired you.

At this point, you decide to use D3 (Data Driven Documents)

<http://d3js.org/> to significantly improve the visualization tools of the WVS. You ask yourself: Can you visualize multiple variables at once? Can you contextualize them in their geographical locations and still provide focus on individual variables? Can you show long-term periods of evolving world values?

Next, to show off your skills to your new bosses, you decide to combine WVS data with the open data from Gapminder <http://www.gapminder.org/> for the countries that have data from both sources. You are careful not to get too much data that is difficult to pair up. But now you are able to put your code where

your mouth is. You backup your previous criticism with actual working visualizations that show insight beyond the limitations of the original tools. You are immediately promoted. Congratulations again!

Your boss asks you to create and document (text and images) a new analytic trail that goes deeper into your research questions.

You decide to create a URL (webpage with a permanent link) with the running d3 code, images, and text describing your research questions, the two analytic trails, the results, and your learning in under 300 words. (I will not lower your grade for more words. I will simply stop reading.)

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**Back to our class: please submit *\*only\** the URL here at the KTH Social Assignments page by February 12, 2016, 08:00.**

### Grading Criteria:

**F** - submit nothing or submit late without a life-changing circumstance (total sickness, major accident, ...).

**E** - Submit one analytic trail from WVS in your URL.

**D** - E and a failed plan to get D3 to work, but with some static screen shots of your visualizations showcasing your thinking and your partial analytic trails.

**C** - D and working D3 code with two clear analytic trails. The D3 code is not interactive. Tool tips and small interactive elements do not count. The user must be able to do at least do one of: sorting, zooming, filtering, flipping, etc.

**B** - C with interactive D3 code.

**A** - B with Gapminder data combined.

## Project 4 Proposals

- Due Next Friday Feb 12
- Start early!
- [Proposal Template](#)
- Ideas through [Links](#)
- Present 10 minutes
- Discuss 5 minutes
- Link to your slides on FB Feb 12 by 8:20!

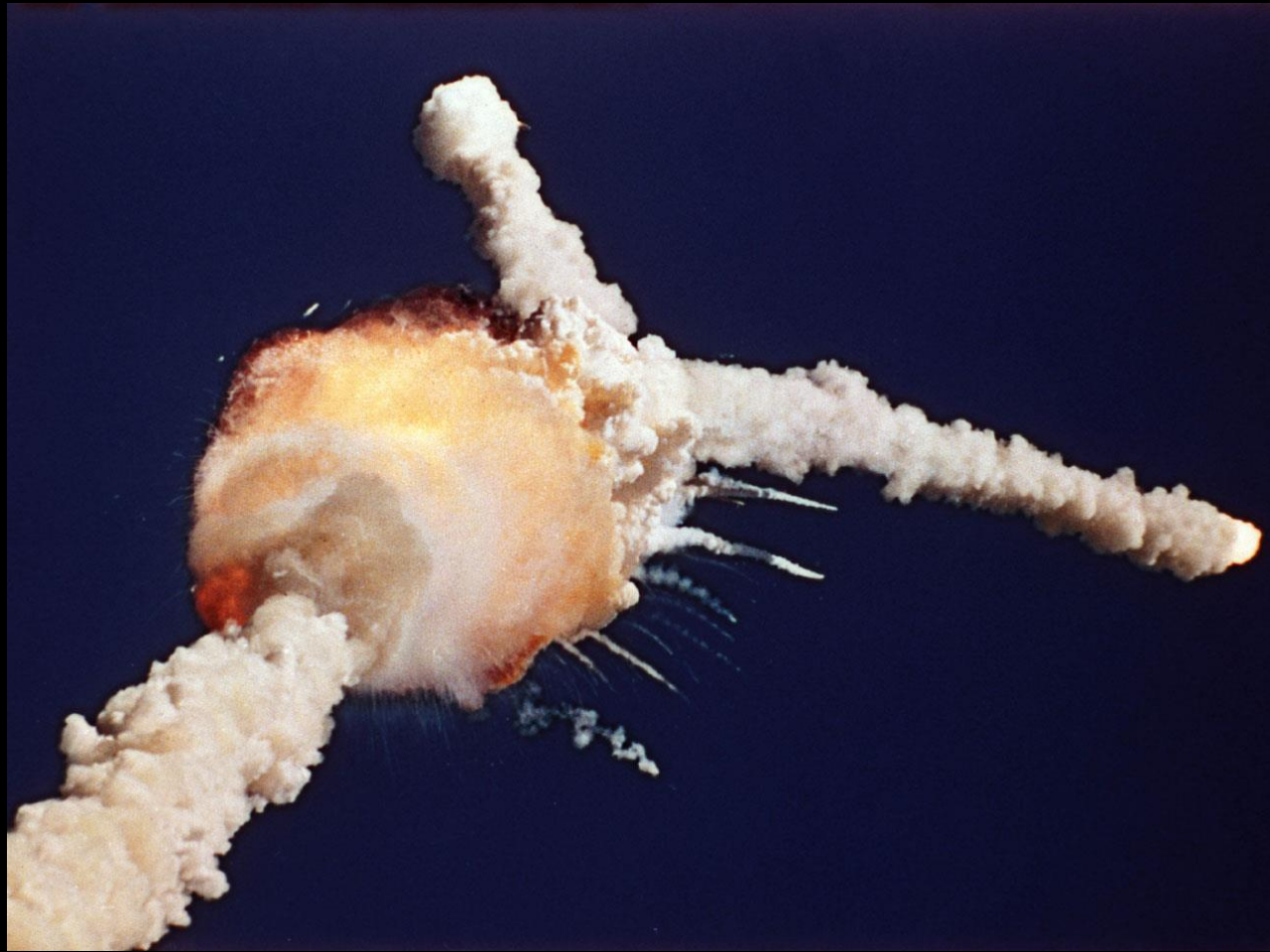
## The Challenger Case



## The Challenger Case



## The Challenger Case



# The Challenger Case

## 30 Years After Explosion, Challenger Engineer Still Blames Himself

Updated January 28, 2016 - 8:25 PM ET  
Published January 28, 2016 - 8:25 PM ET

HOWARD SERIES

Listen to the Story

All 18mp Downloaded

Download Embed Transcript



The Challenger flew off on Jan. 28, 1986, from a launchpad at Kennedy Space Center, 73 seconds before an explosion killed its crew of seven.

Bob Howard/NPR/Getty Images

Thirty years ago, as the nation mourned the loss of seven astronauts on the space shuttle Challenger, Bob Ebeling was steeped in his own deep grief.

The night before the launch, Ebeling and four other engineers at NASA contractor Morton Thiokol had tried to stop the launch. Their managers and NASA overruled them.

That night, he told his wife, Darlene, "It's going to blow up."

When Challenger exploded 73 seconds after liftoff, Ebeling and his colleagues sat stunned in a conference room at Thiokol's headquarters outside Bingham City, Utah. They watched the spacecraft explode on a giant television screen and they knew exactly what had happened.

Three weeks later, Ebeling and another engineer separately and anonymously detailed to NPR the first account of that contentious pre-launch meeting. Both were despondent and in tears as they described hours of data review and arguments. The data showed that the rubber seals on the shuttle's booster rockets wouldn't seal properly in cold temperatures and this would be the coldest launch ever.

Ebeling, now 89, decided to let NPR identify him this time, on the 30th anniversary of the Challenger explosion.

"I was one of the few that was really close to the situation," Ebeling recalls. "Had they listened to me and wait[ed] for a weather change, it might have been a completely different outcome."

He spoke in the same house, kitchen and living room that we spoke in 30 years ago, when Ebeling didn't want his name used or his voice recorded. He was afraid he would lose his job.

"I think the truth has to come out," he says about the decision to speak privately then.

"NASA ruled the launch," he explains. "They had their mind set on going up and proving to the world they were right and that's how that situation ended. But they didn't."



Bob Ebeling at his home in Bingham City, Utah.

SHARE





HISTORY OF O-RING DAMAGE ON SRM FIELD JOINTS

1161

Oct 30, 1985  
8-  
y

AFT

61A LH Center Field\*\*  
61A LH CENTER FIELD\*\*  
51C LH Forward Field\*\*  
51C RH Center Field (prim)\*\*\*  
51C RH Center Field (sec)\*\*\*

41D RH Forward Field  
41C LH Aft Field\*  
41B LH Forward Field

July

SRM No.	Cross Sectional View			Top View		Clocking Location (deg)
	Erosion Depth (in.)	Perimeter Affected (deg)	Nominal Dia. (in.)	Length Of Max Erosion (in.)	Total Heat Affected Length (in.)	
22A	None	None	0.280	None	None	36° -- 66°
22A	NONE	NONE	0.280	NONE	NONE	338° -- 18°
15A	0.010	154.0	0.280	4.25	5.25	163
15B	0.038	130.0	0.280	12.50	58.75	354
15B	None	45.0	0.280	None	29.50	354
13B	0.028	110.0	0.280	3.00	None	275
11A	None	None	0.280	None	None	--
10A	0.040	217.0	0.280	3.00	14.50	351
2B	0.053	116.0	0.280	--	--	90

\*Hot gas path detected in putty. Indication of heat on O-ring, but no damage.  
\*\*Soot behind primary O-ring.  
\*\*\*Soot behind primary O-ring, heat affected secondary O-ring.

Clocking location of leak check port - 0 deg.

OTHER SRM-15 FIELD JOINTS HAD NO BLOWHOLES IN PUTTY AND NO SOOT NEAR OR BEYOND THE PRIMARY O-RING.

SRM-22 FORWARD FIELD JOINT HAD PUTTY PATH TO PRIMARY O-RING, BUT NO O-RING EROSION AND NO SOOT BLOWBY. OTHER SRM-22 FIELD JOINTS HAD NO BLOWHOLES IN PUTTY.

1 of 13 pages of material faxed to NASA by Morton Thiokol

## BLOW BY HISTORY

### SRM-15 WORST BLOW-BY

- 2 CASE JOINTS (80°), (110°) ARC
- MUCH WORSE VISUALLY THAN SRM-22

### SRM 22 BLOW-BY

- 2 CASE JOINTS (30-40°)

### SRM-13A, 15, 16A, 18, 23A 24A

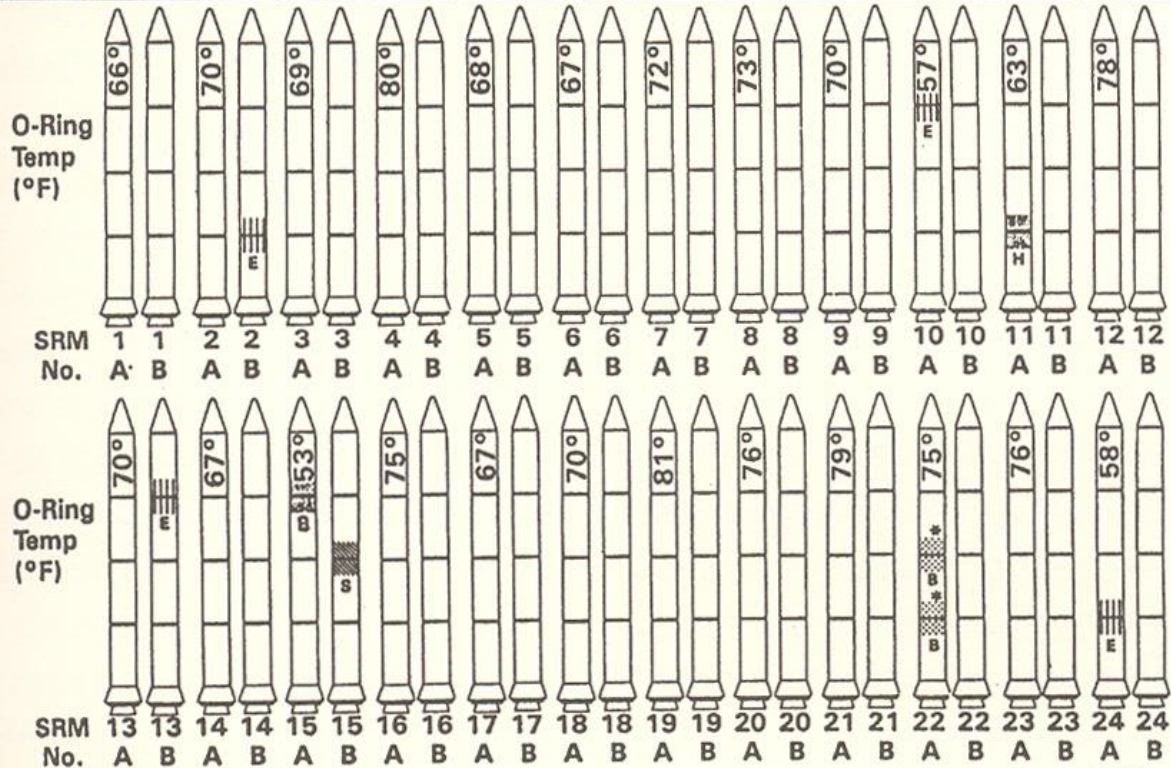
- NOZZLE BLOW-BY

## HISTORY OF O-RING TEMPERATURES (DEGREES - F)






<u>MOTOR</u>	<u>MBT</u>	<u>AMB</u>	<u>O-RING</u>	<u>WIND</u>
DM-4	68	36	47	10 MPH
DM-2	76	45	52	10 MPH
QM-3	72.5	40	48	10 MPH
QM-4	76	48	51	10 MPH
SRM-15	52	64	53	10 MPH
SRM-22	77	78	75	10 MPH
SRM-25	55	26	29 27	10 MPH 25 MPH

1 of 13 pages of material faxed to NASA by Morton Thiokol

# History of O-Ring Damage in Field Joints (Cont)



**Code**

-  = Heating of Secondary O-Ring
-  = Primary O-Ring Blowby
-  = Primary O-Ring Erosion
-  = Heating of Primary O-Ring
-  = No Damage

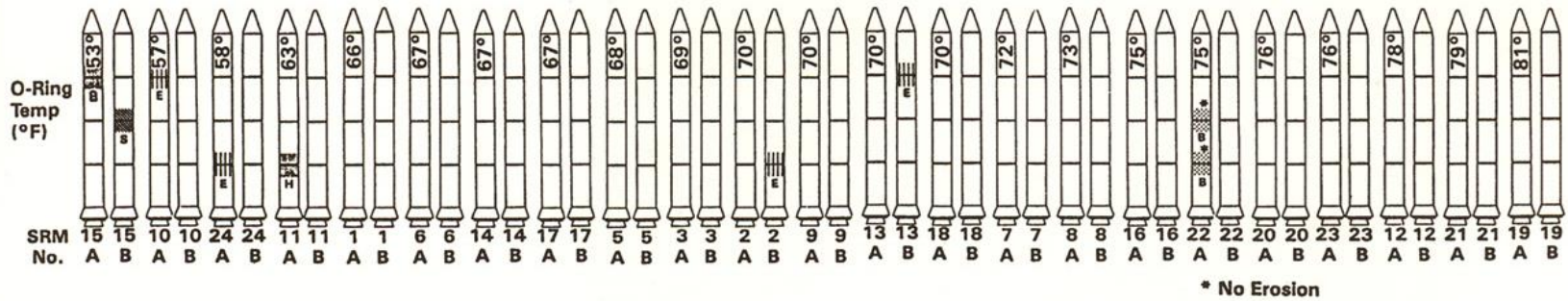
MORTON THIKOL, INC.  
Wasatch Operations

\* No Erosion

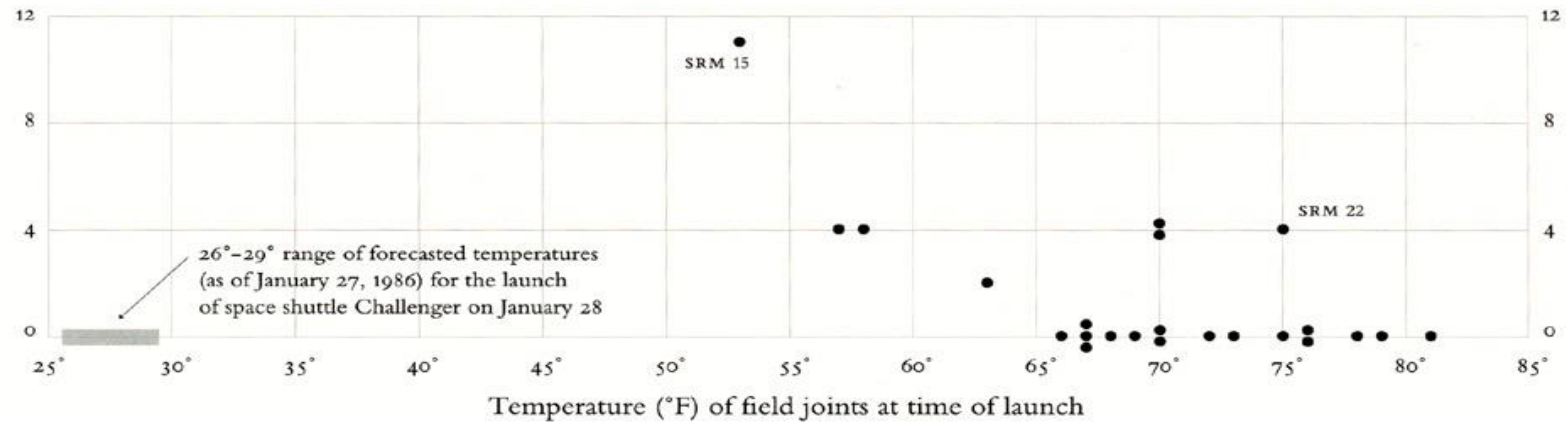
00400-14

INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION

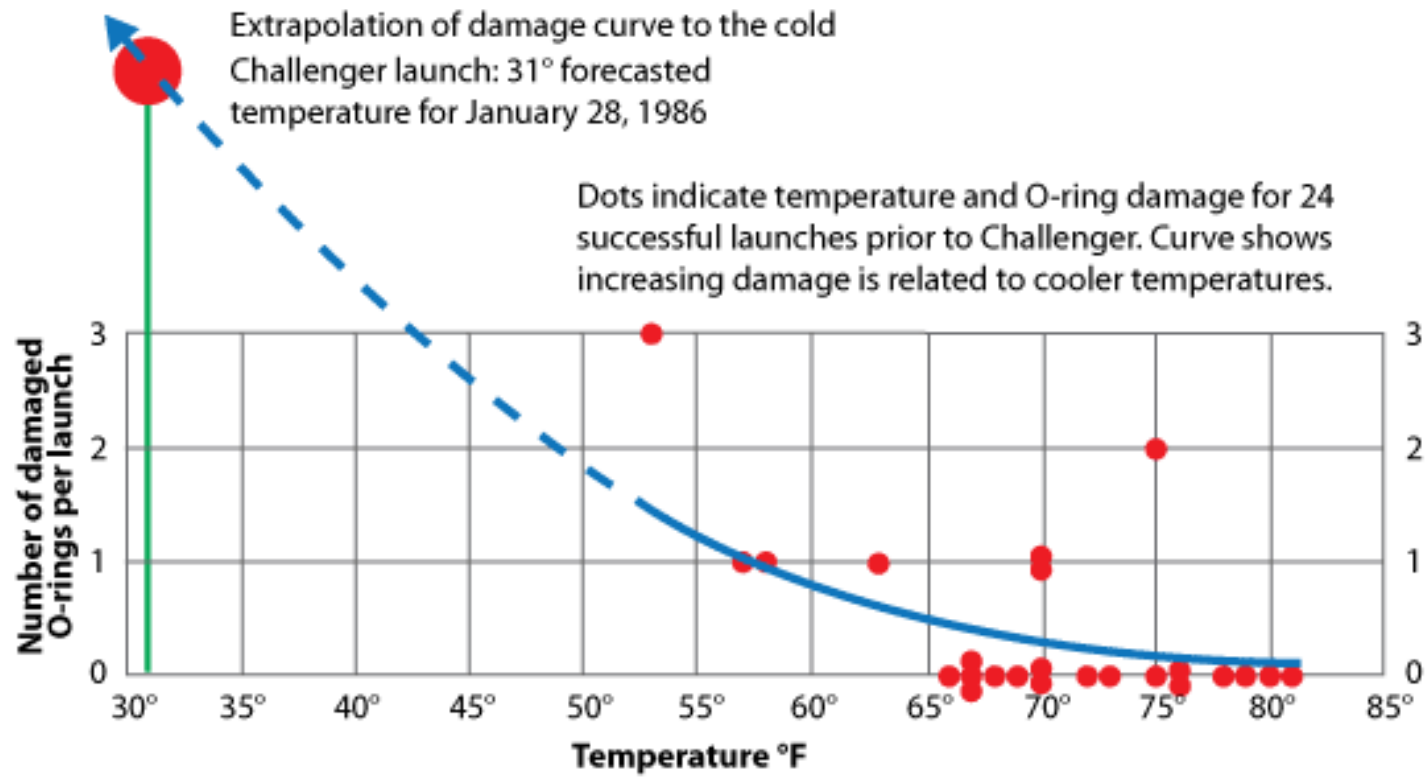
E. Tufte, pp. 46-47, Visual Explanations



O-ring damage index, each launch

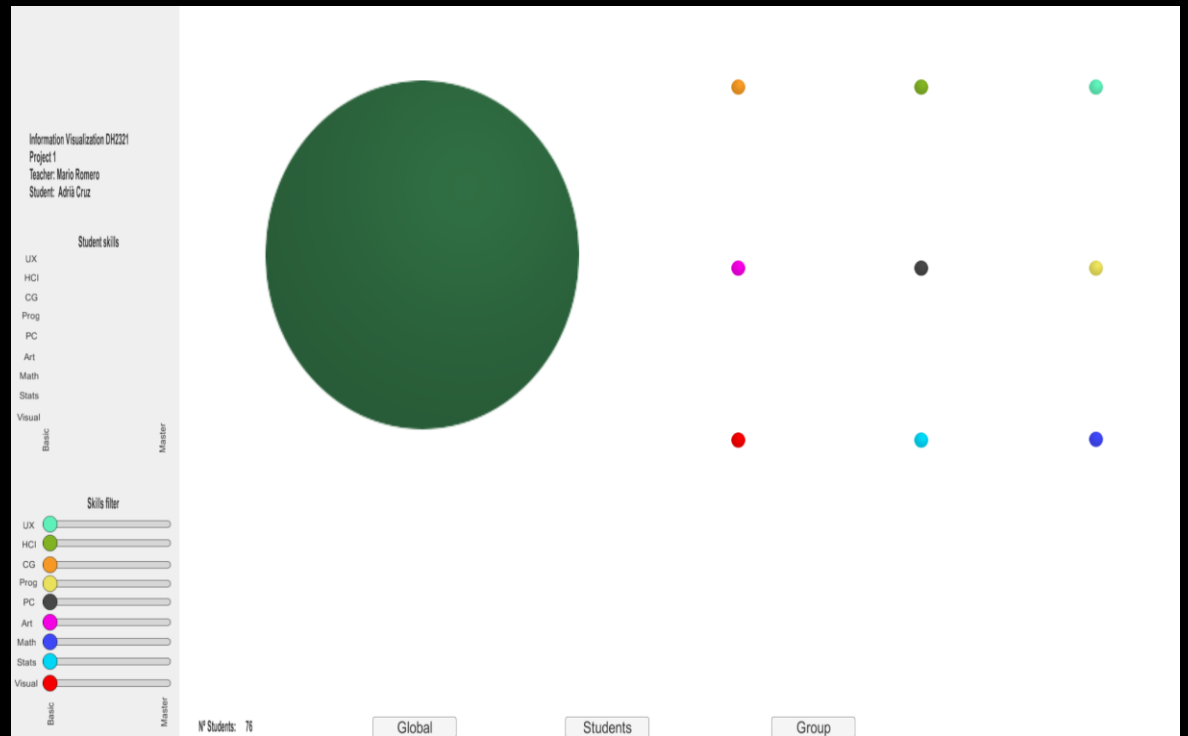


Redrawn by E. Tufte, p. 49 , Visual Explanations



# Project 1 from Adriá Cruz

Created with Unity



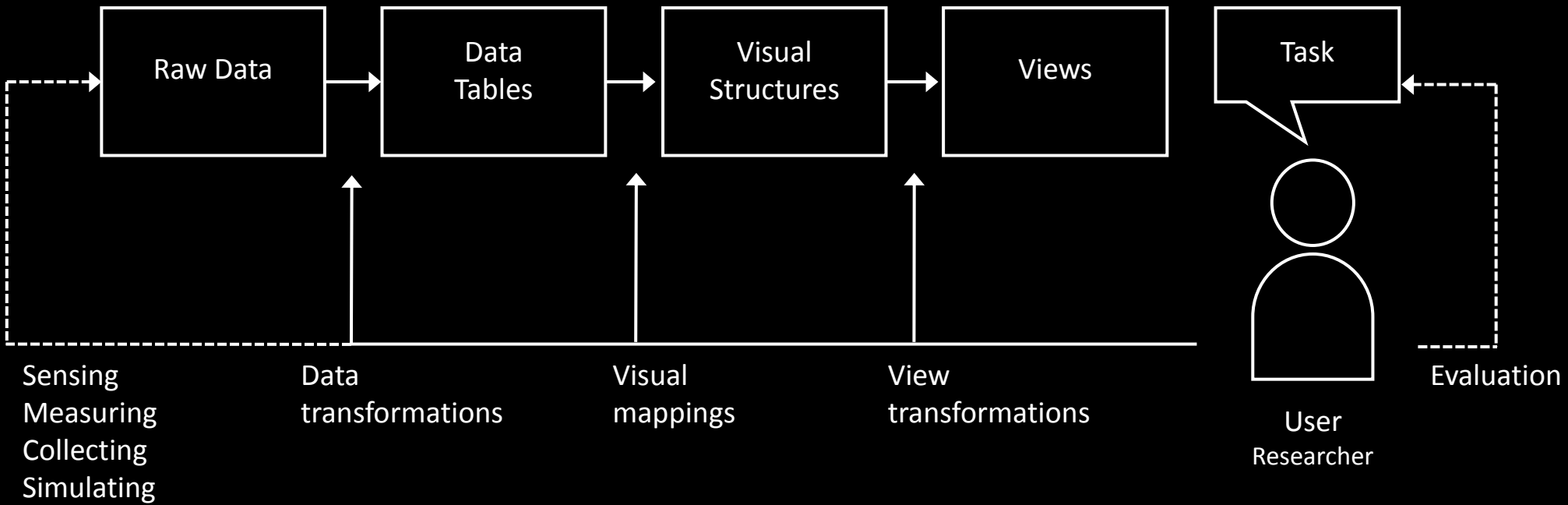
# Answer the following questions about P1

1. Who is the user?
2. What are the tasks?
3. What is the data?
4. What are the data transformations?
5. What are the visual mappings?
6. What are the visual structures?
7. What are the view transformations?
8. What are the views?
9. How does the demo support the tasks?
10. How can it be improved?

# Information Visualization Pipeline

expanded from **Readings in Information Visualization: Using Vision to Think**

By Stuart K. Card, Jock D. Mackinlay, Ben Shneiderman, 1999





# Reading 2 Test

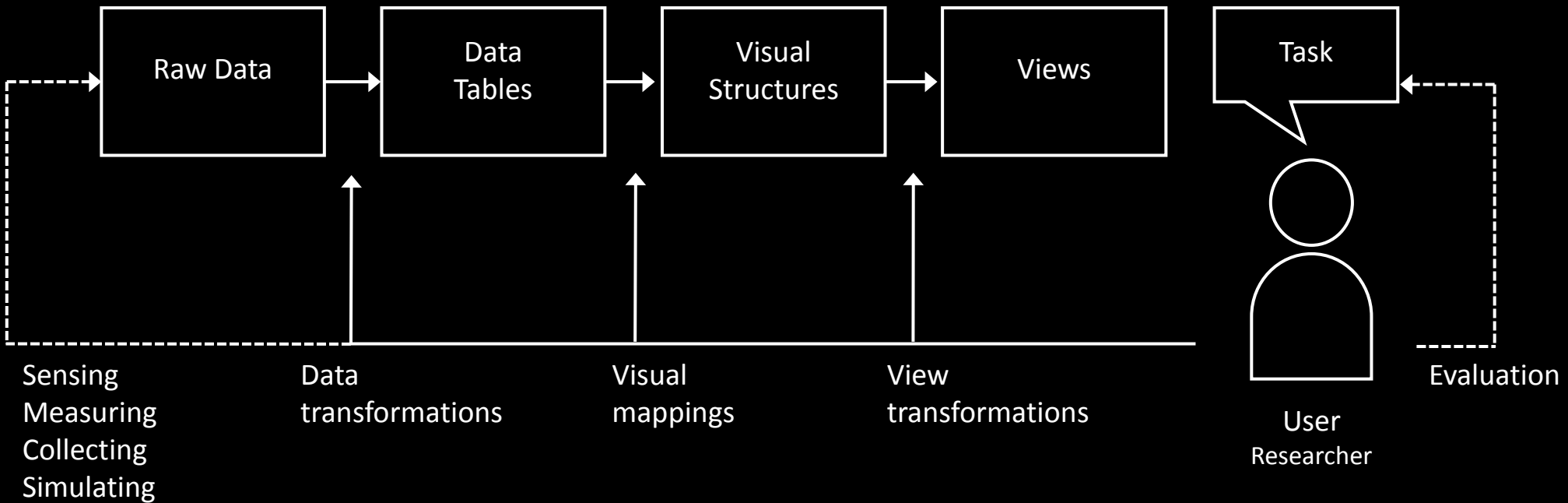
- <http://goo.gl/forms/8jrgMEPklw>
- You have 5 minutes!



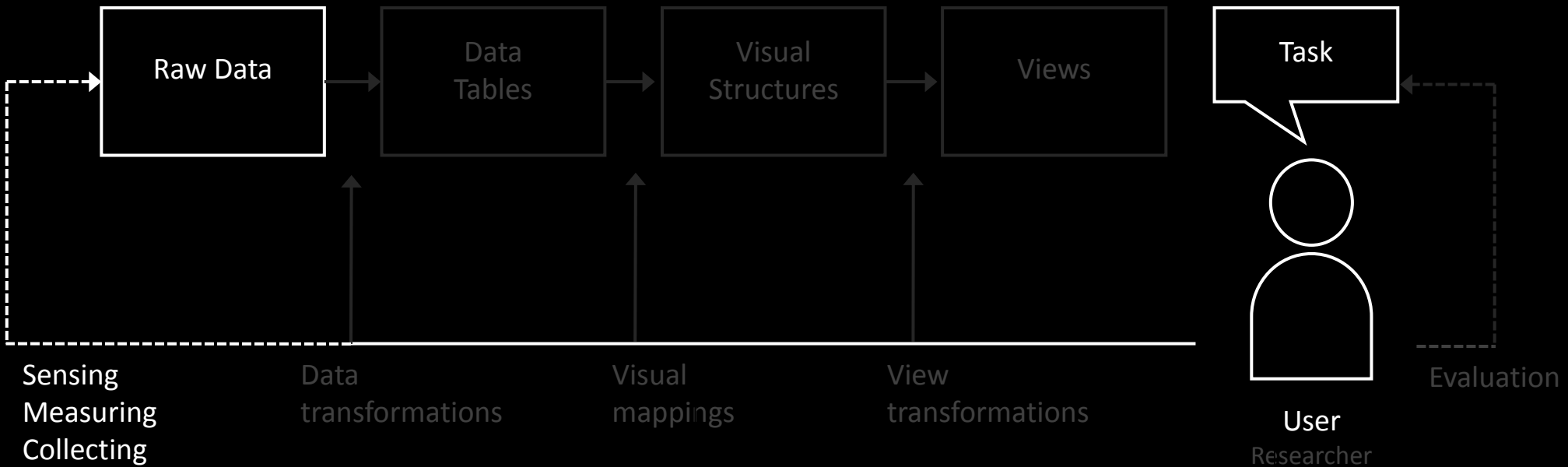
# Information Visualization Pipeline

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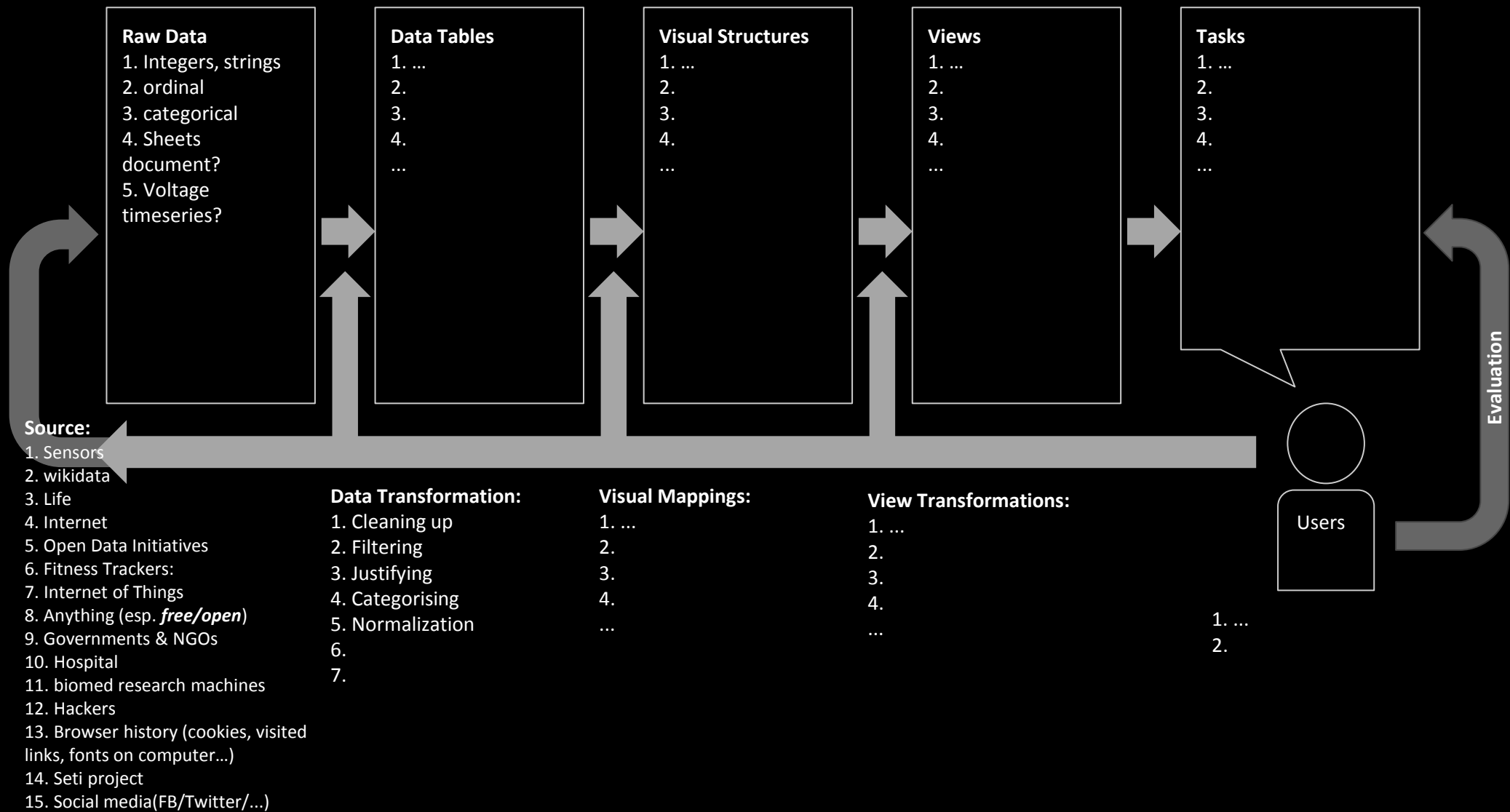
# Raw Data



From our collaborative document...

# Visualization Pipeline of Project 1 - AND OTHERS

Expanded from Readings in Information Visualization: Using Vision to Think ([link](#))  
By Stuart K. Card, Jock D. Mackinlay, Ben Shneiderman, 1999



## Reading Assignment 3

due Feb 9

- Watch and closely observe how Sweden's Rosling presents:
  - Hans Rosling's 200 Countries, 200 Years, 4 minutes - The Joy of Stats - BBC Four – [link](#)
  - Hans Rosling's Religions and babies, TED Talk - 13 minutes - [link](#)
  - Hans Rosling's Global population growth, box by box- 10 minutes – [link](#)
- Inselberg, Alfred, and Bernard Dimsdale. "Parallel coordinates." *Human-Machine Interactive Systems*. Springer US, 1991. 199-233. - [pdf](#)
- Hauser, Helwig, Florian Ledermann, and Helmut Doleisch. "Angular brushing of extended parallel coordinates." *Information Visualization, 2002. INFOVIS 2002. IEEE Symposium on*. IEEE, 2002. - [pdf](#)

# Thank you!

marior@kth.se