

Project 3

Data Visualization in 3D 360 Space

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Interaction Design
M.Des. 2015-17

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Approval Sheet

The Interaction Design Design Research Seminar titled “Data Visualization Storytelling” by Akvil Sakhare (Roll Number 156330013), is approved, in partial fulfillment of the ‘Master in Design’ Degree in Interaction Design at the Industrial Design Centre, Indian Institute of Technology Bombay.

Guide

Chairperson

Internal Examiner

External Examiner

Date

Declaration

I declare that this written document represents ideas in my own words and where others' ideas or words have been included, I have adequately referenced the original sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified any idea/data/ fact/source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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February 2017

Acknowledgements

Thanks to Prof. Venkatesh Rajamanickam, project guide, for his guidance, support and contributions. I am grateful to the interaction design faculty—Prof. Ravi Poovaiah, Prof. Anirudha Joshi, Prof. Jayesh Pillai and Prof. Girish Dalvi.

A special thanks to all my friends and classmates for all the motivation and support.

Most importantly, my family for all their love, patience and encouragement.

Akvil Sakhare

Abstract

Contents

Abstract

Introduction

Motivation
Objectives
Approach
Outcomes

Examples

Visualization

Technologies

Search for Datasets

Ideation

Analysis

Insights

Mind Map

Design Ideas

Interaction and Scenarios

Storyboard

Final Design

Evaluation

Conclusion

References

Introduction

Motivation

In last few years Virtual Reality (VR) has experienced advancement after years of hibernation. Most of these developments are centered around entertainment. VR has been used in media, architecture and even in therapy. But if a medium has to grow it has to be useful in a lot of situations^[1]. As a new medium of HCI, use of VR in data visualisation has not been explored much. Being different from traditional and current 2D screen based ways of data visualization, VR seems to be good for multidimensional, volumetric, spatial data that can use the quality of immersion which comes with it. But it has issues in Interactions, Ease of navigation, Accessibility, Legibility, Perceptual Accuracy etc.^[2] As the medium is new very few attempts have been made in VR / 360 degree data visualisation which creates a lot of scope for research in this field.

Objectives

With so many constraints and added dimensions of time and space different approaches of data visualisations will have to be tried out before we come up with any specific techniques for the medium. For this reason this project proposes to study interactive data visualization in 3D in a VR tool (like oculus or google cardboard) and come up with some methods to show data best with the existing methods and come up with ideas to best show data in ways we haven't been till now. It also proposes to figure out the kind of data best suitable for the medium and attempt creating data driven stories.

Approach

Data visualisation is a field with good history and a lot of work has been done in the field. So it makes sense to start with secondary research and understand the essence of visualising data that has been developed over time and with different mediums. After the history and uses are understood, reviewing existing methods and redesigning them so that they become context specific and effective in terms of the kind of datasets and the medium. For this, a set of data that can be effectively represented needs to be found. Then a series of visualisations will have to be created and evaluated for their effectiveness. Once the visualisations are made, making people use it, get feedback, develop insights and redesign implementing those insights that will make data visualisation more relevant in VR and 3D seems to be a good approach for now.

Outcomes

Following this approach will result in research on existing methods and a gallery of charts based on different uses. Documentation of this interactive tool and exploration of methods of dispersing information which is 3d data visualization. Starting with basic visualisation with simple data, the idea is to produce a series of prototypes with increasing complexity. For example, starting with basic bar graph or pie chart move on to line/ bubble/ scatter or surface chart that shows a slightly complex set of informations and finally make a 3D map that has multitude of information and interaction. Detailed study needs to be done to come up with the exact deliverable which will come over time.

Examples

Calcflow lets you,

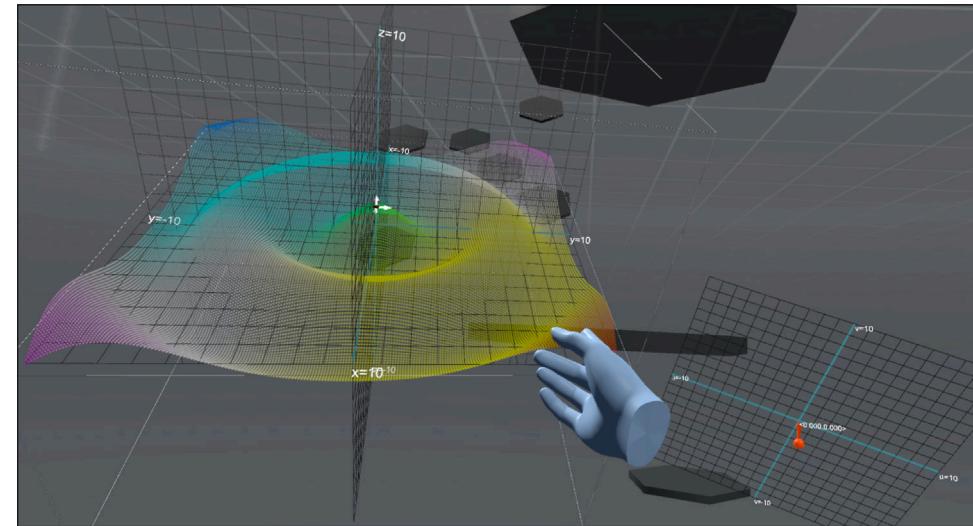
- Manipulate vectors with your hands, explore vector addition and cross product.
- See and feel a double integral of a sinusoidal graph in 3D, a mobius strip and it's normal, and spherical coordinates.
- Create your own parametrized function and vector field.

DeathTolls

"DeathTolls Experience visualizes the data behind the dead through virtual reality. Every day, countless tragic deaths number reach us through the news. Iranian computer artist Ali Eslami puts the tragedy of the victims in another perspective through his virtual reality experience. He wants to make us aware of the reality that is sometimes overshadowed by big data."

- From the DeathTolls website

Data here is news headlines as quantities expressed qualitatively. I think, along with representation of data as quantities, VR can be used for immersion and subjectivity to make these quantities into qualities. The deathroll is a good example because it picked up simple data, news headlines of mass killing, and represented it making use of immersion. It's simple and designed wisely, I like the smart move of using body bags, by skipping the modelling of human figures.



Snapshot of Calcflow



Snapshot of DeathTolls Experience

LoVR

"More than 100000 chemical reactions happen in your brain every second. So what about the moment you saw the girl of your dreams, and she saw you? If we could capture those few seconds what would the data look like? LoVR is a document of this moment."

- From the LoVR website

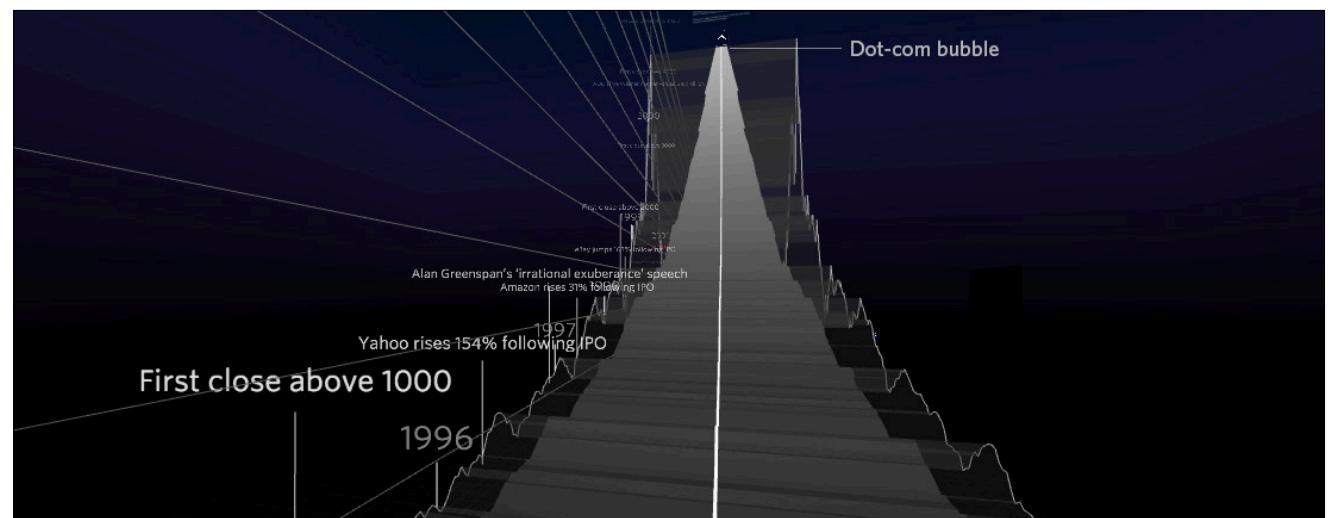
Though it is not interactive and the data is made up, still is a good example of data storytelling.

21 years of the Nasdaq as a rollercoaster

A good example of data storytelling using a line chart as the track of VR rollercoaster ride.



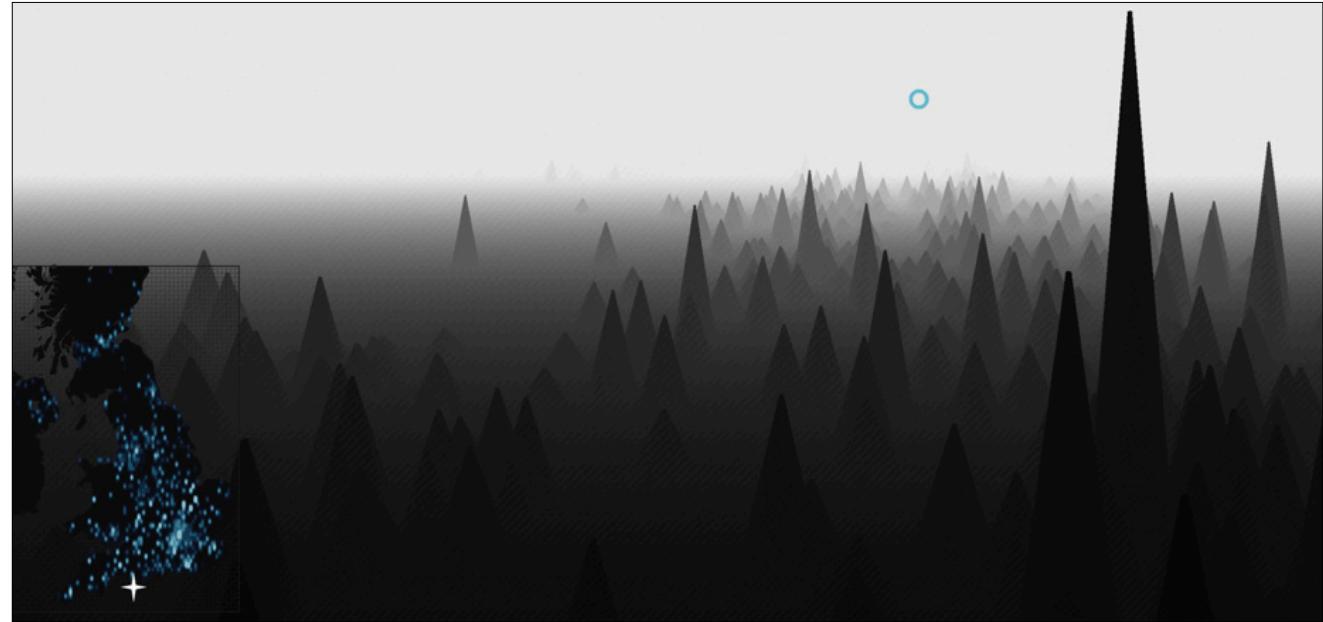
Snapshot of LoVR



Snapshot of 21 years of the nasdaq as a rollercoaster

Where is Piers Morgan disliked the most?

This example shows data visualisation of map in VR with protruding cones to represent the number of people in different US states. It has two. walk and fly, over modes of navigation through the data.



Snapshot of Where is Piers Morgan disliked the most?

Virtual Reality to Visualise Data on Salesforce

In this visualisation the data is represented in a form of different layers one above the other forming a cylindrical surface. Details can be seen by clicking on specific layers.



Snapshot of VR Salesforce data visualisation

Visualisation

“Graphic design in general, and information design in particular, depend upon cognitive processes and visual perception for both its creation (encoding) and its use (decoding). If the decoding process fails, the visualisation fails.”

- Isabel Meirelles, Design for Information

In her book Design for Information, isabel Meirelles gives a brief introduction of different types of visualisation techniques with classical examples of data visualisation to explain each type.

Basic 2D data representation techniques

Advantage of these techniques is that people know them so well that they won't be confused when they look at them.

Bar Chart: Comparison of many items with one variable per item or one item with two variables. Used widely because it is very effective. Humans have a built in capacity to easily parse the differences between the rectangular shapes, we are wired to see this type of chart. Bar chart shows each value at a single point.

Line Chart: Comparison over time of many categories in few periods or Non-cyclic data over many periods If looking at data over time, line chart comes by default.

Column Chart: Comparison of single or few categories over time (Few periods)

Circular Area Chart: Comparison over time of cyclic data with many periods

Scatter Chart: Relationship or distribution between two variables

Bubble Chart: Relationship between 3 variables

3D area chart: Distribution of 3 variables

Column / Line Histogram: Distribution of single variable data points (few / many respectively)

Pie Chart: Static composition of simple share of total. Bad at showing slight variance in data points. Good to show variance in two values.

Timeline: There are two ways in which we conceive of time moving:[3] The subject is moving (egomotion) and time is stationary. Time is moving and we are stationary

Maps: 5 standard ways to show data on the maps
Markers, Layers, Choropleth, Heatmap, Flows

Tree maps: Used to represent Hierarchy

Stream graphs, Matrices, Box plots, Heat maps, Node-link diagram, Fish eye distortion, Adjacency matrix, Chord Diagram and Venn Diagram are some other methods.

Technologies

Head Mounted Displays

There are two types of Head Mounted Displays (HMD), Mobile based and desktop based, each with its own qualities. Oculus rift, HTC vive, Playstation are desktop based, they are connected to a computer. Samsung Gear VR and Google VR (Cardboard and Daydream) are mobile based. Samsung Gear VR has its touchpad for input, while Google cardboard has a clicker.

In all platforms gaze based interaction is used. Desktop based HMDs are expensive and are not currently easily available in market. While a VR viewer like Google cardboard is cheap and easily available. Hence the project focuses on Google cardboard.

WebVR

D3 is generally used for data visualisation purposes. Along with the new WebVR framework AFrame, it can be used to create VR data visualisation. As the technology is in nascent stage it was discarded after creating the first prototype due to its limitations and inflexibility regarding the purposes of the project.

Software

Two competing open source game engines that are extensively used to create VR applications are the unity game engine and the unreal game engine. While both have its pros and cons, the project uses unity for the following reasons.

With version 5.1 Unity provided support for some specific VR devices. This includes, Stereo 3de for OpenGL or Direct3dx, like what we see at 3D movie theater using polarized glasses, the image is blurry when the glass is not worn, with right hardware this can be used in VR applications.

Split screen stereo 3d, where this is a camera on the left and right, one camera for each eye. This is the favorable approach of all VR vendors. Unity also has specific support for Oculus family of devices. They use split screen stereo 3D but there are other oculus specific hardware support provided within the unity game engine. Similarly for playstations VR device, unity has specific support for sony technology. Unity has cross platform support. In VR space, different competing technologies emerge, unity is supporting the main players and provide capabilities to take their technology and make it cross platform. For example, samsung's gear VR works only on android, and something like google's cardboard which works on iOS, Android and Desktop systems, take some of its technology and move it over to some other proprietary technologies. So you can go back and forth and easily deploy one source based on a variety of different VR platforms. It's important as the VR marketplace is shaking itself out.

Design Approach

Project focuses on the split screen and due to its position in the market oculus specific technology. With interaction in unity game engine on VR controller for a plugin based VR systems, specifically google cardboard and built in VR systems, specifically samsung's gear VR / Oculus.

Building cardboards gaze interface and see how it can be repurposed to work with built in systems. Finally deploy to cardboard and samsung's Gear VR on their respective supported platforms.

Search for Datasets

Following are some of the datasets that were looked at and considered for visualisation.

Medical data

Medical data is multidimensional and is generally represented in 3D, so it would make sense to its create visualisations in VR.

Data gathering requires expensive equipments and is user specific.

Ajanta

The idea was to create VR data visualisation of chronology created by Walter Spinks. In volume 4, 5, 6 he has described evolution of features over time in various caves. Data is multidimensional; Time, caves and evolution of features.

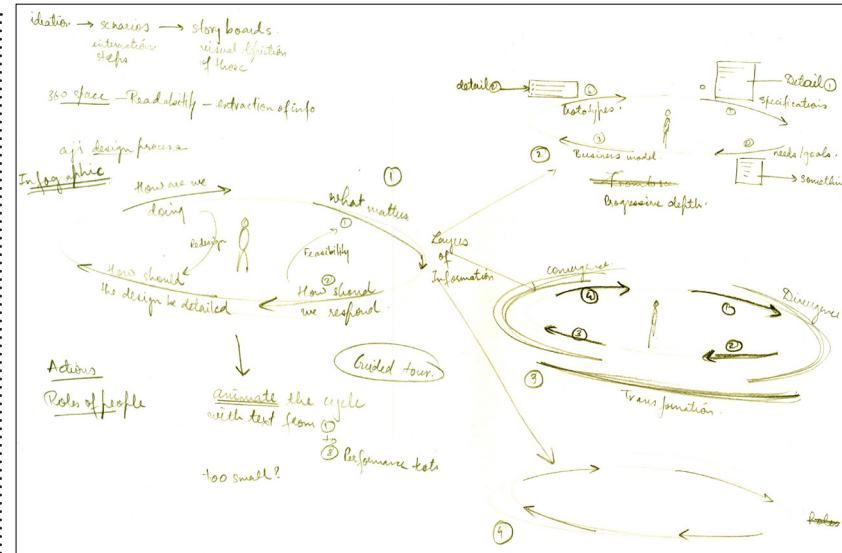
Data needs to be extracted from the books which requires a lot of time which can be utilised in creating visualisations.

Napoleon march from moscow

Recreating the classic in VR by having a hyperlapse experience through the visualisation was an idea. You are flying over the road with annotations and the road is shrinking with actual people being eliminated.

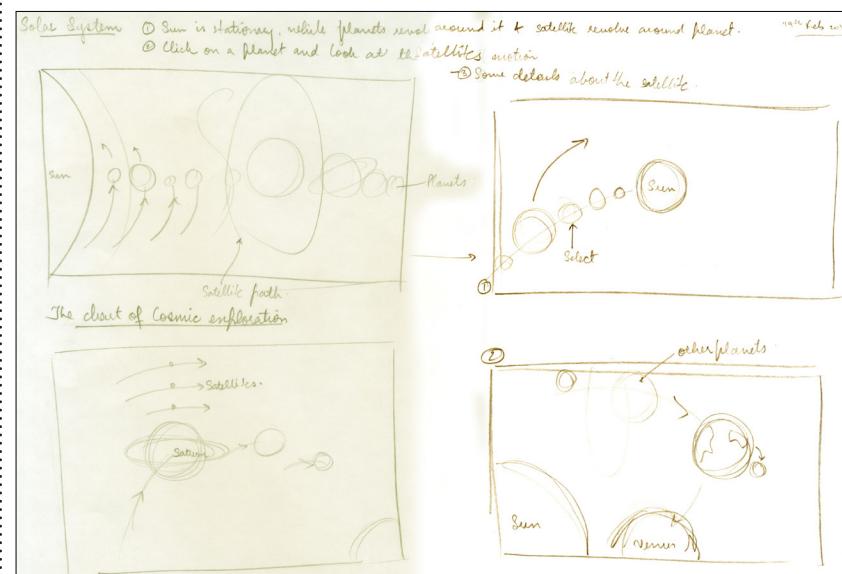
Visualisation on India from government data

Picking up a dataset of Indian government and create a 3D VR visualisation around it. For example, number of things as per states. Like, life cycle in datasets of Birthrate, Education, Employment, Marriage and Death.



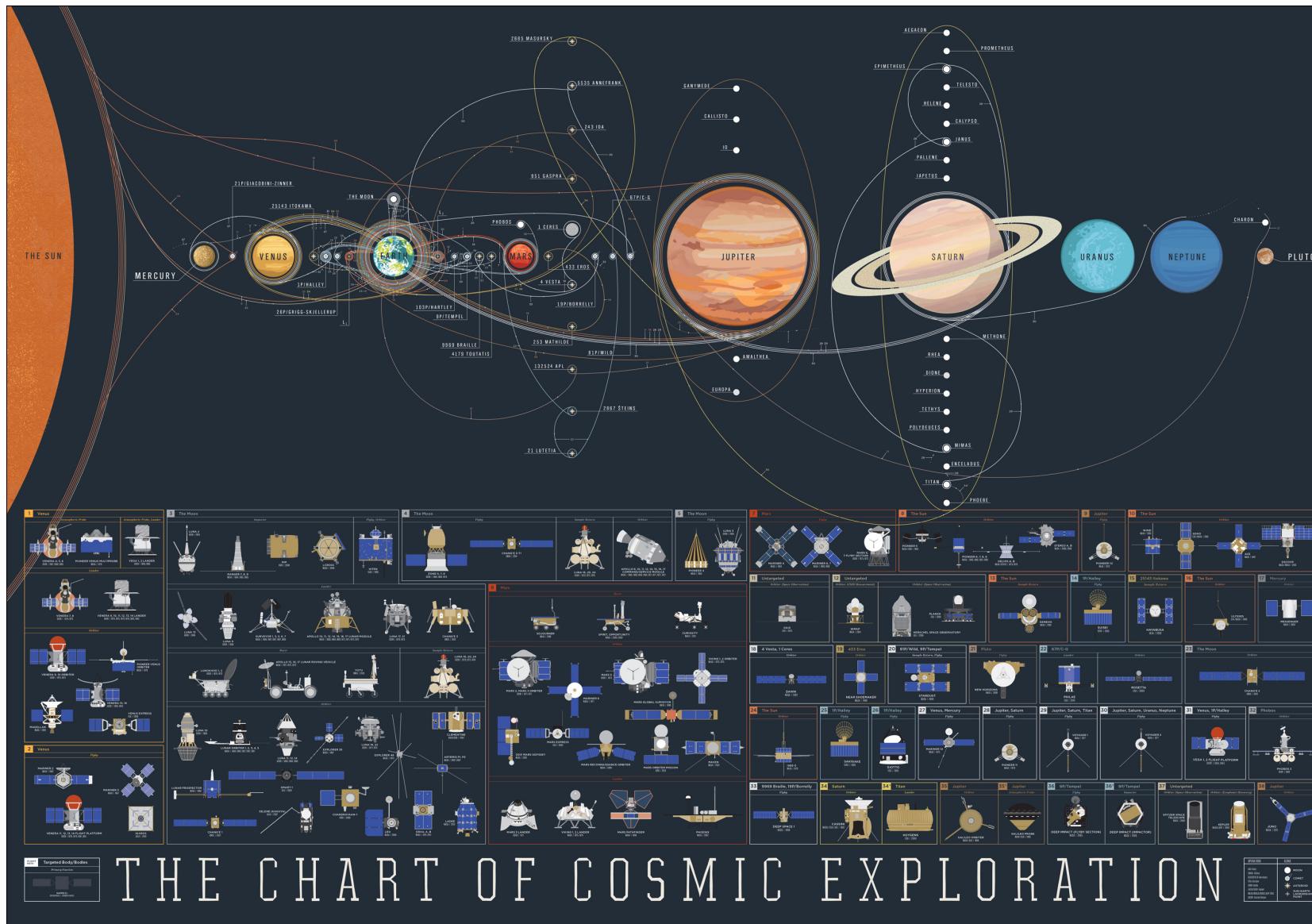
I looked at various existing infographics and visualizations to see how they can be translated into 3D VR data visualisations. Following are the sketches of some of these explorations.

Interaction Design Process as circular layers of information around the user.



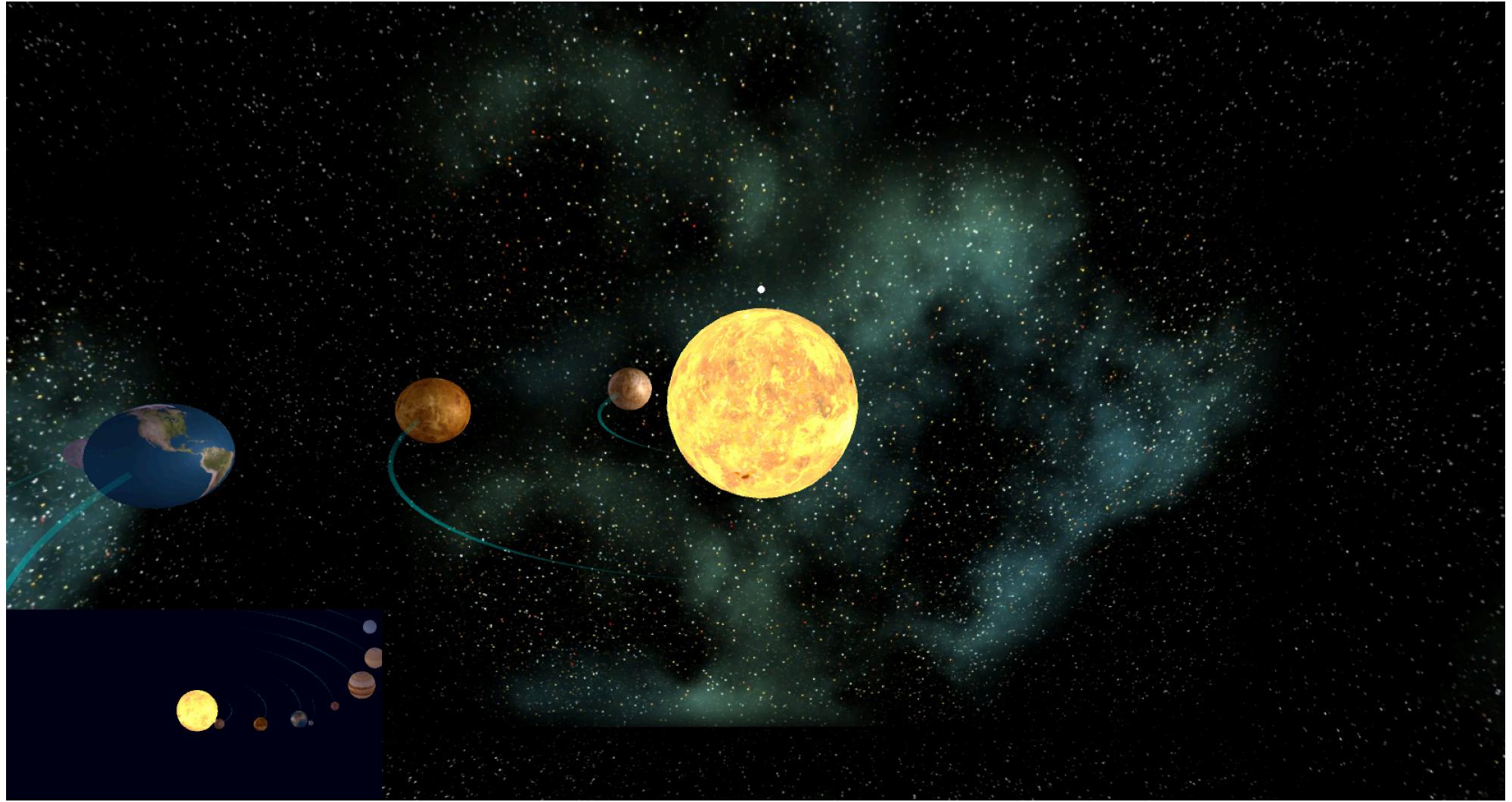
Concept for
The chart of Cosmic exploration

"This color-coded chart traces the trajectories of every orbiter, lander, rover, flyby, and impactor to ever slip the surly bonds of Earth's orbit and successfully complete its mission."

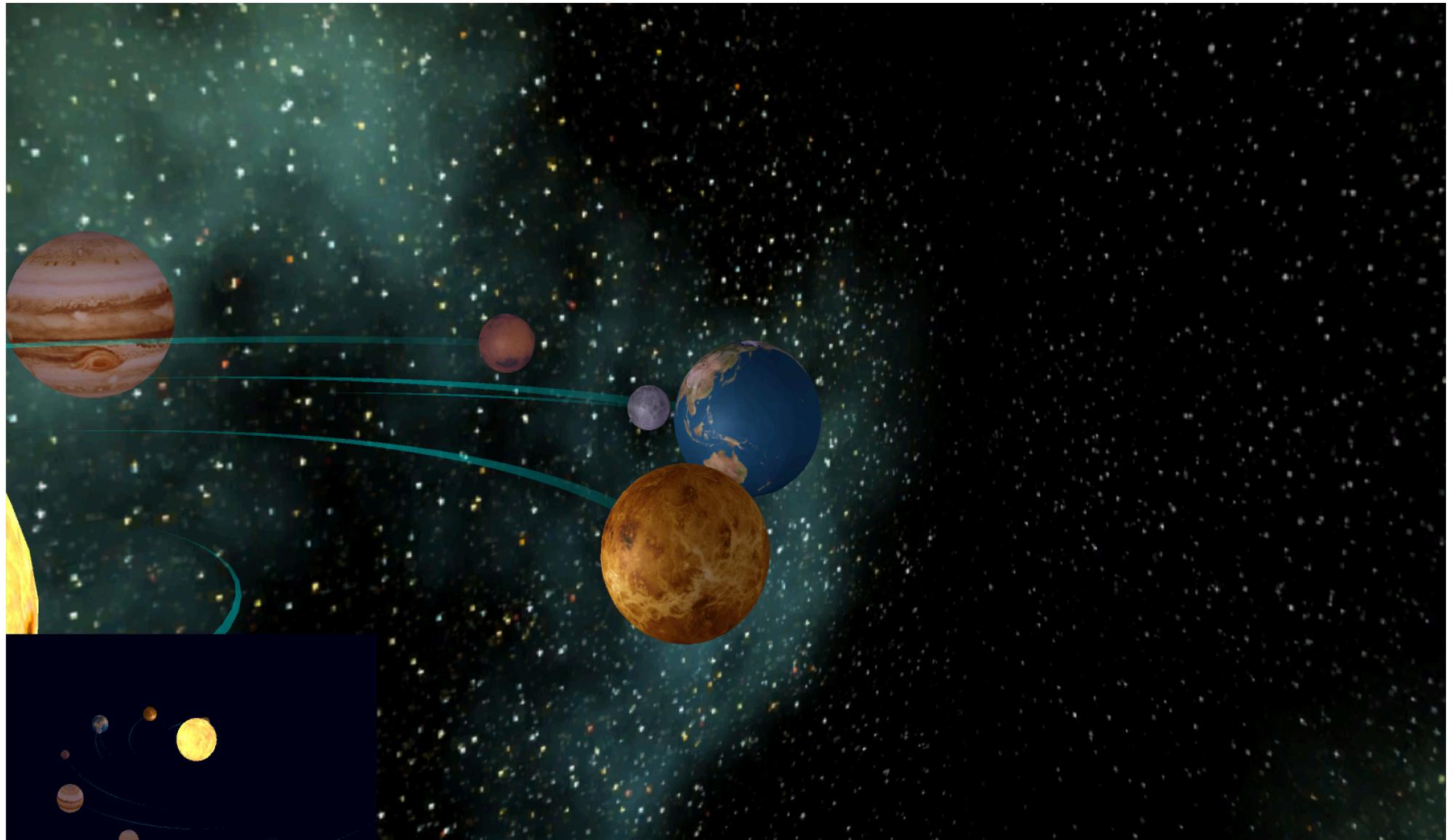


The chart of cosmic exploration showing all the satellites and their paths

Source: popchartlab.com/collections/best-sellers/products/the-chart-of-cosmic-exploration

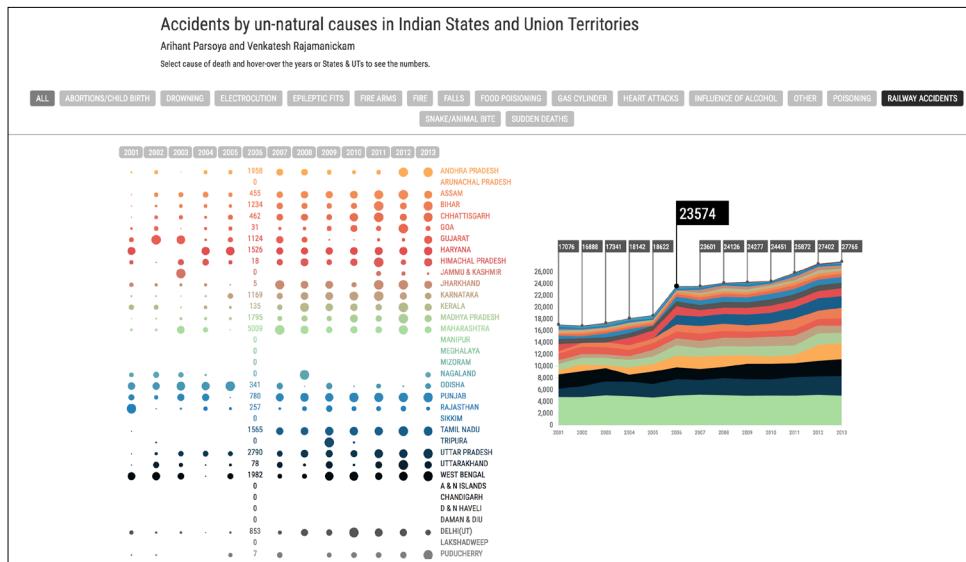


Prototype in Unity, Solar system with rotating planets revolving around the sun with trails to show their paths



A planet can be clicked and the whole scene can be viewed from its perspective

After these initial explorations, I got the data of unnatural deaths with following visualisations.



Bubble chart linked with area chart showing deaths over 13 years, causes can be selected from top

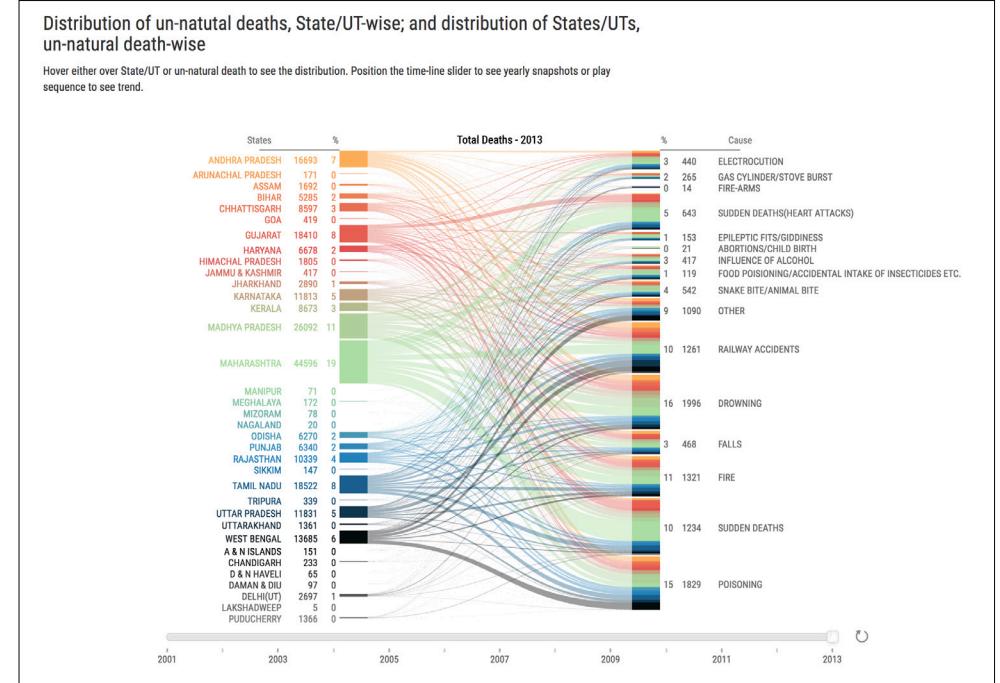
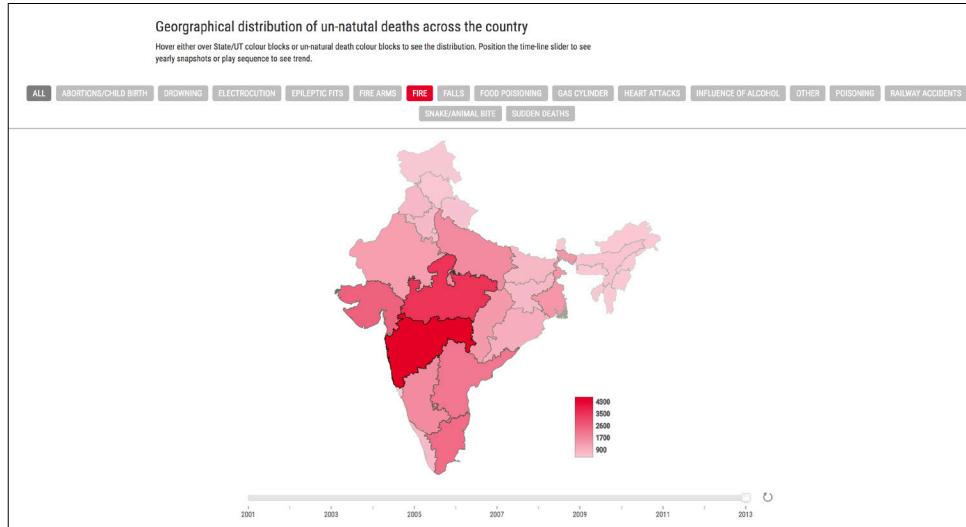


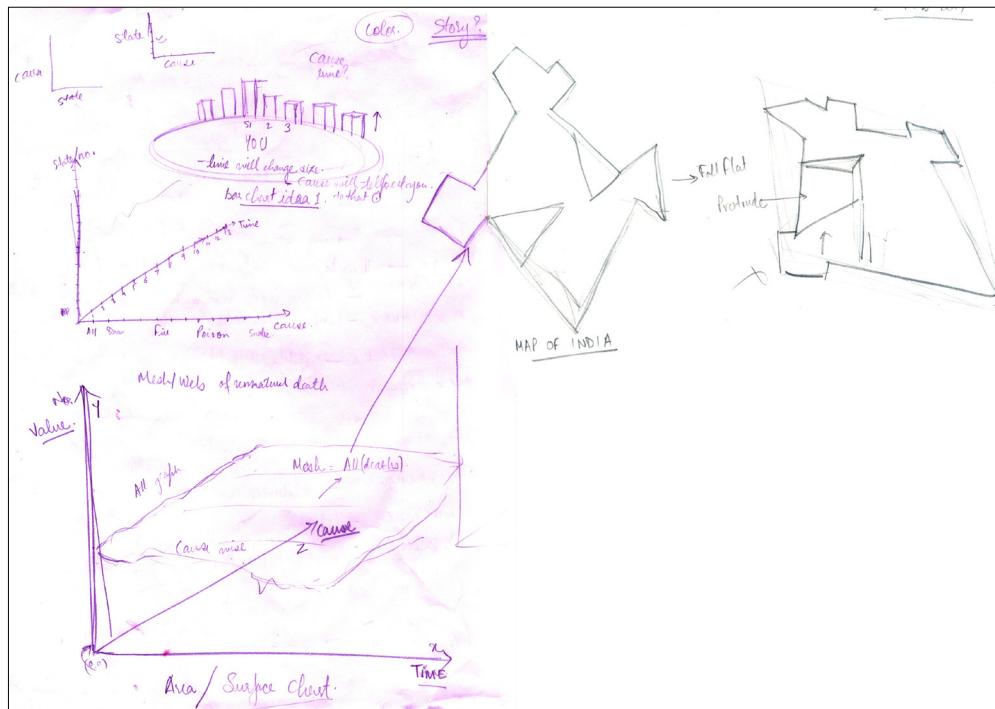
Chart listing states on left and causes on right with timeline



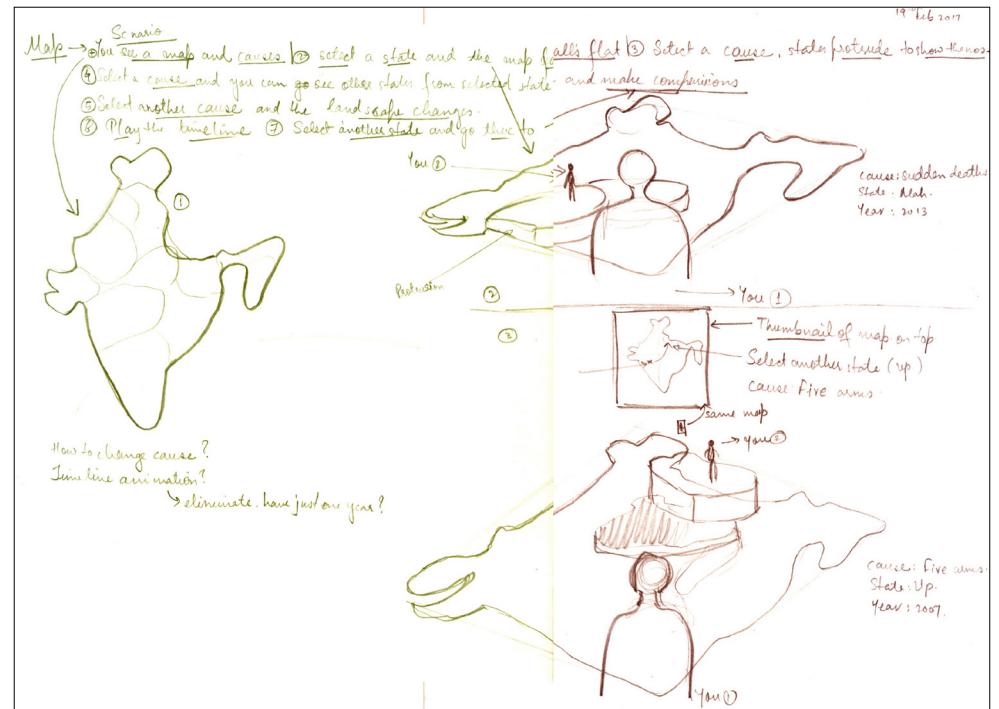
Map of India showing deaths in different states, causes can be selected at the top while the timeline at bottom shows number of deaths over 13 years

Ideation

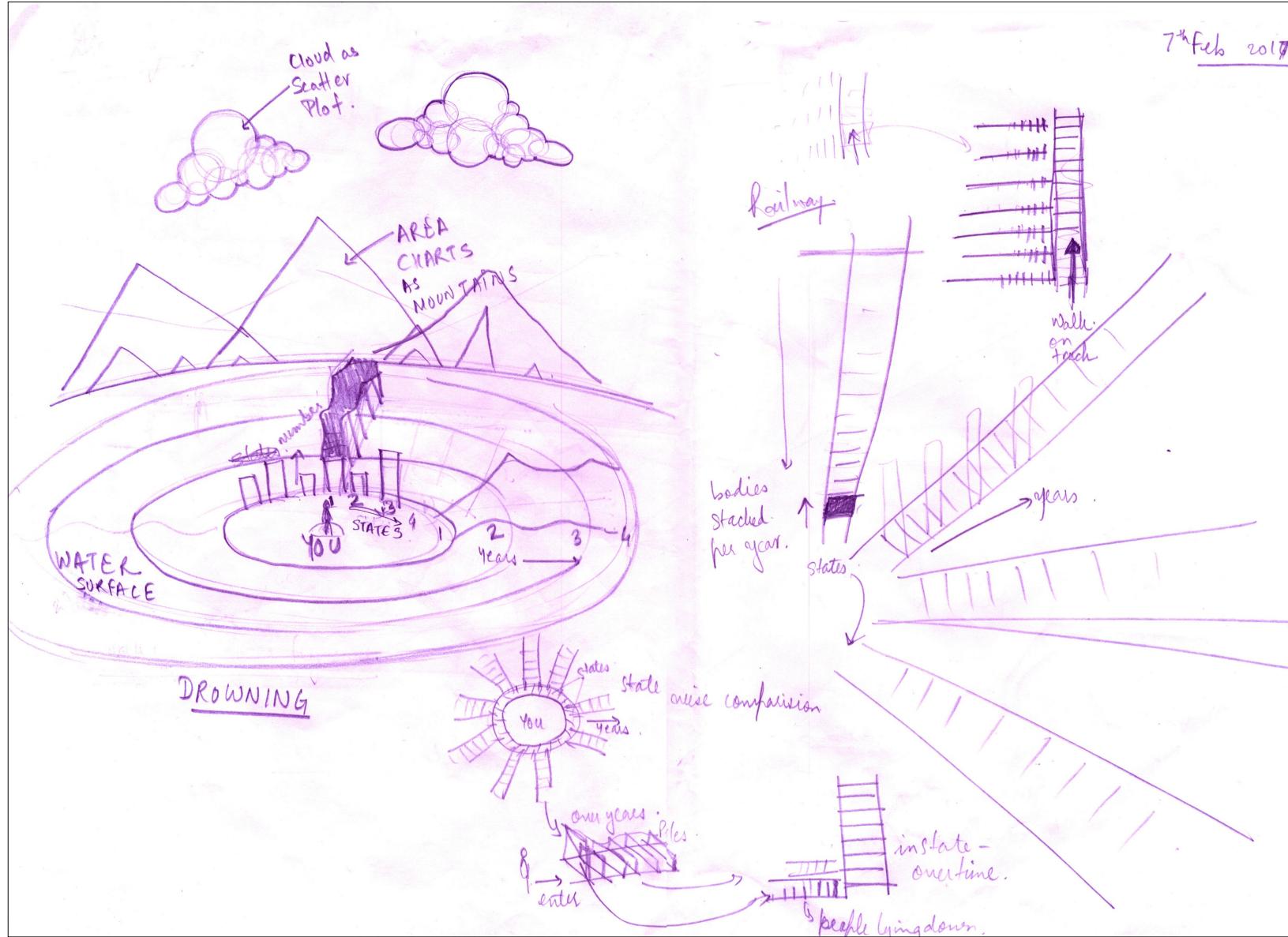
These are exploratory drawings to generate ideas for the visualisation.



Initial drawing showing surface chart, circular bar chart and map

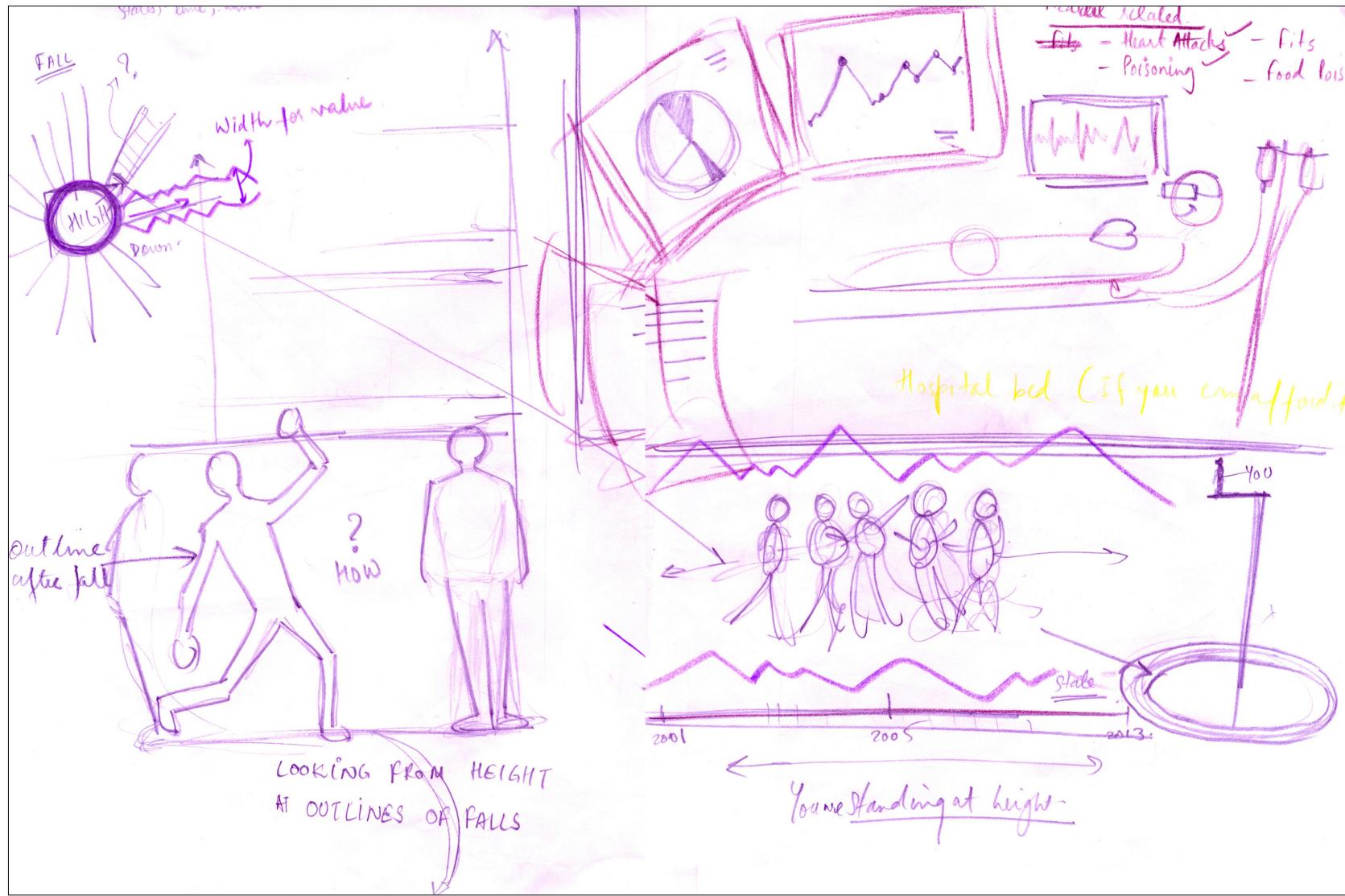


Details drawing from the idea of map with user placement and scenario

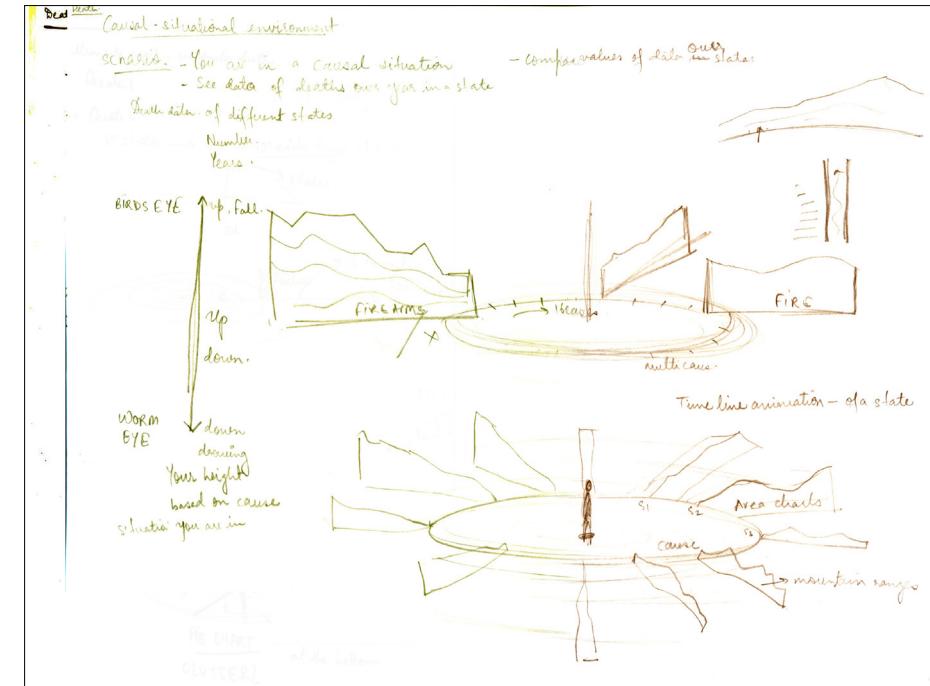
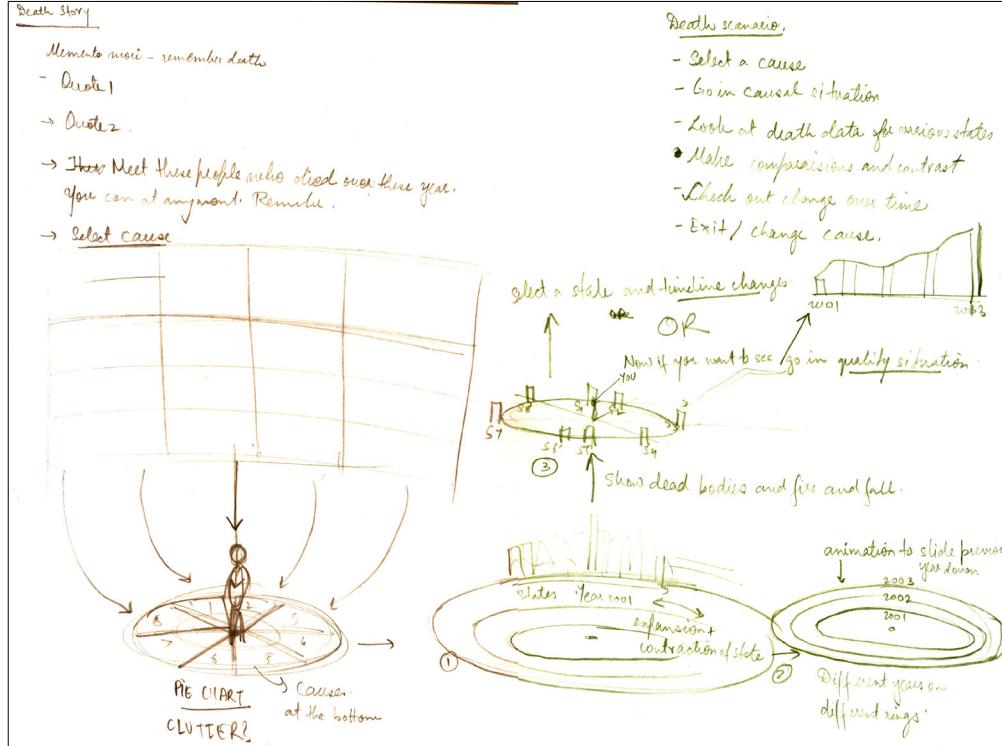


Exploratory drawings where data is represented in landscape with area chart as mountain ranges, bubble chart as clouds and the user standing in water looking at circular bar charts around him.

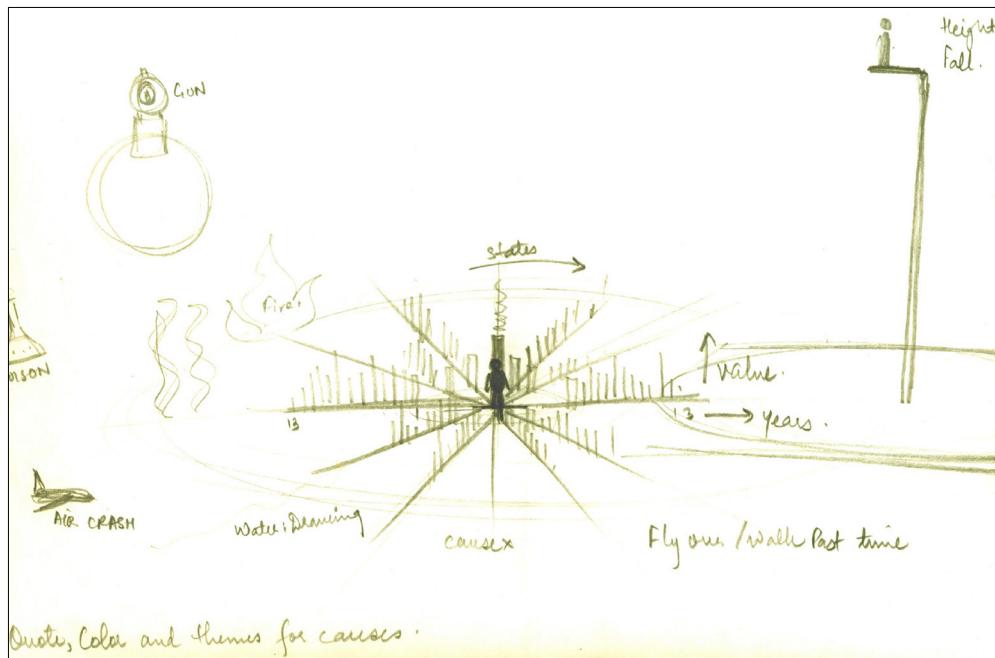
On right, the other idea is of representing data as bars in railway track.



Exploratory drawings where data is represented as outlines of fallen dead bodies being looked from a height for the cause of deaths due to falls and hospital chamber where data is shown as various charts on different windows

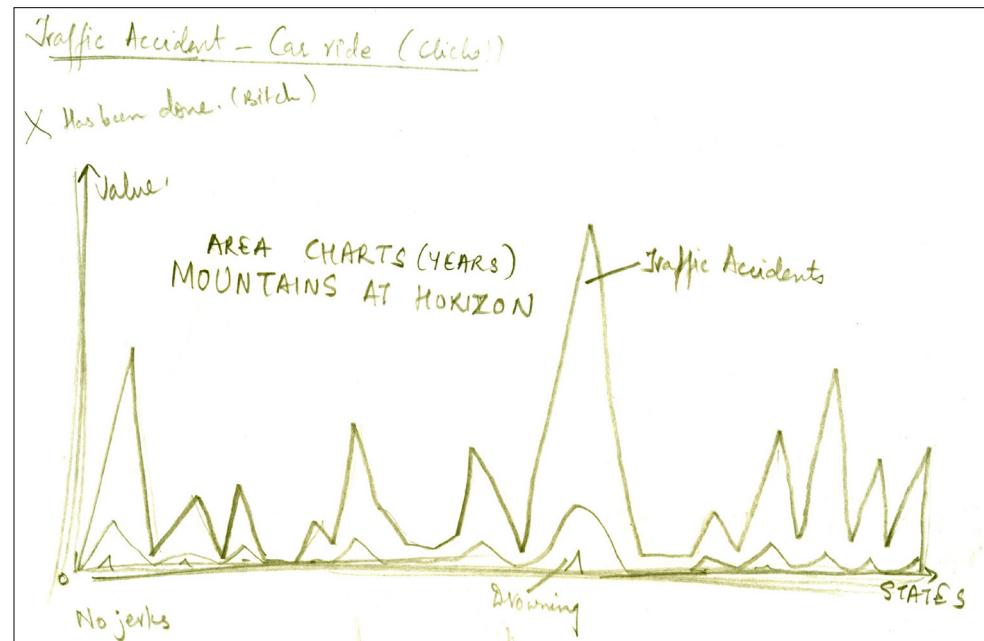


Data as pi chart at users feet and bar chart around the user with details of years as concentric rings and 35 states as each bar 10 degree apart.



Data as bar chart around the user with different causes and states and different representation of causes to view the data of specific cause

Data as area chart at the horizon as mountain ranges

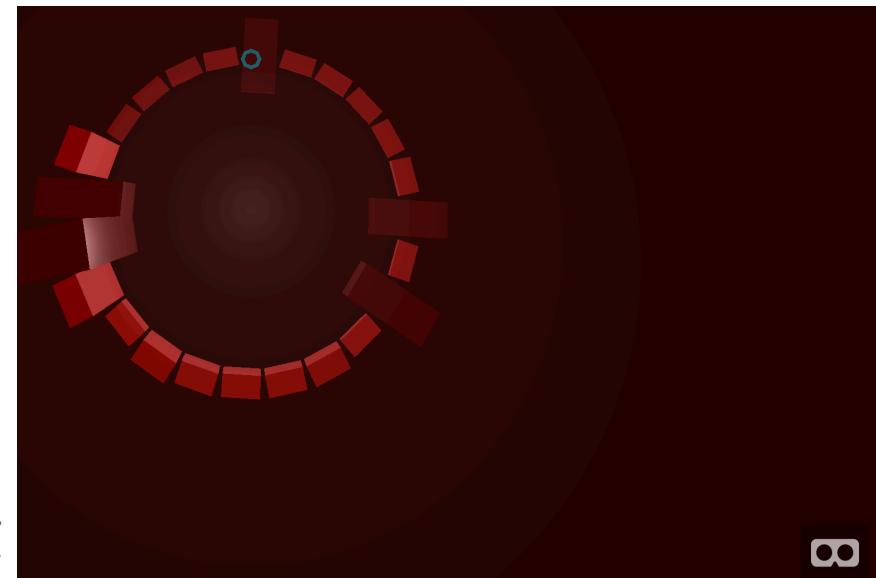
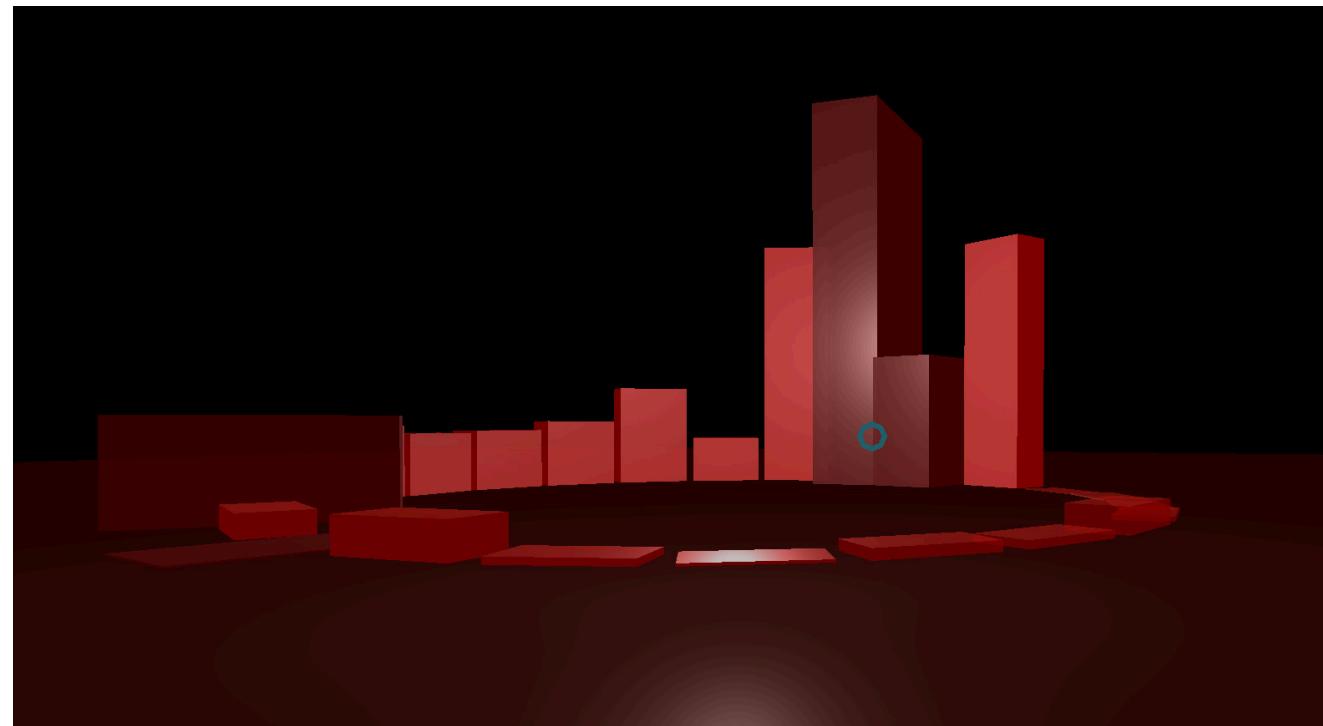


Prototype 1

WebVR - D3 and AFrame

Bar charts arranged in circular fashion showing total death data of Maharashtra. Bars grow when the pointer hovers over it and value is shown in console when clicked.

It's difficult to create advanced visualizations using these set technologies as its nascent and requires lot of redundant programming.



Prototype of circular bar charts arranged around the user made with D3 and AFrame



Data Exploration

Un-natural deaths from 2001 to 2013

Given Data file is a .csv file with 21,000 rows, with data of number of deaths from different states, with causes and year. Total number of deaths due to each cause is also given. Also, number of males and females injured and killed.

I started by making a pivot table with causes as rows with nested year as sub-rows and different states as columns. With values as the number of deaths / Total Killed, obviously.

Sparklines are inserted next to each cause to see the trend of deaths. Stacked bar charts of each causes for the same.

Two pivot tables to show trends of causes and states are made.

Table of causes, arranged in ascending order of total deaths, with respective charts show the trend of intensity each cause to number of deaths and the number of deaths with respect to the other in hierarchy. From the table of states a second table was made to see the ranks of different states due to different causes. It shows the trends of which state comes where in which causes.

Data spoke and many insights shows up as a result of this process.

A	B	C	D	E	F	G	H	I	J
STATE/UT	YEAR	CAUSE	CASES	MALE INJURED	FEMALE INJURED	TOTAL INJURED	MALE KILLED	FEMALE KILLED	TOTAL KILLED
1 ANDHRA PRADESH	2001	AIR-CRASH	0	0	0	0	0	0	0
2 ANDHRA PRADESH	2001	COLLAPSE OF STRUCTURE(HOUSE)	40	9	2	11	28	28	56
3 ANDHRA PRADESH	2001	COLLAPSE OF STRUCTURE(BUILDING)	18	1	2	3	29	7	36
4 ANDHRA PRADESH	2001	COLLAPSE OF STRUCTURE(DAM)	0	0	0	0	0	0	0
5 ANDHRA PRADESH	2001	COLLAPSE OF STRUCTURE(BRIDGE)	4	2	2	4	6	6	12
6 ANDHRA PRADESH	2001	COLLAPSE OF STRUCTURE(OTHERS)	84	17	8	25	80	33	113
7 ANDHRA PRADESH	2001	DROWNING(BOAT CAPSIZE)	33	6	0	6	34	7	41
8 ANDHRA PRADESH	2001	DROWNING(OTHER CASES)	1366	27	3	30	1044	362	1406
9 ANDHRA PRADESH	2001	ELECTROCUTION	611	8	10	18	573	92	665
10 ANDHRA PRADESH	2001	EXPLOSION (BOMB EXPLOSION)	8	16	4	20	13	16	29
11 ANDHRA PRADESH	2001	EXPLOSION(OTHER EXPLOSION LIKE BOILERS,	11	1	0	1	4	4	8
12 ANDHRA PRADESH	2001	FALLS (FALL FROM HEIGHT)	753	14	3	17	696	88	784
13 ANDHRA PRADESH	2001	FALL INTO PIT/MANHOLE	69	1	0	1	55	10	65
14 ANDHRA PRADESH	2001	FACTORY/MACHINE ACCIDENTS	48	9	0	9	40	17	57
15 ANDHRA PRADESH	2001	FIRE (FIREWORKS/CRACKERS)	28	16	3	19	31	8	39
16 ANDHRA PRADESH	2001	FIRE (SHORT-CIRCUIT)	292	8	2	10	264	43	307
17 ANDHRA PRADESH	2001	GAS CYLINDER/STOVE BURST	1003	21	52	73	204	732	936
18 ANDHRA PRADESH	2001	OTHER FIRE ACCIDENTS	582	6	13	19	169	390	559
19 ANDHRA PRADESH	2001	FIRE-ARMS	25	1	0	1	19	7	26
20 ANDHRA PRADESH	2001	SUDDEN DEATHS(HEART ATTACKS)	268	0	0	0	220	59	279
21 ANDHRA PRADESH	2001	EPILEPTIC FITS/GIDDINESS	50	1	0	1	34	15	49
22 ANDHRA PRADESH	2001	ABORTIONS/CHILD BIRTH	19	0	0	0	0	19	19
23 ANDHRA PRADESH	2001	INFLUENCE OF ALCOHOL	183	14	1	15	170	11	181
24 ANDHRA PRADESH	2001	KILLED BY ANIMALS	33	1	0	1	29	4	33
25 ANDHRA PRADESH	2001	MINES OR QUARRY DISASTER	19	5	4	9	12	3	15
26 ANDHRA PRADESH	2001	FOOD POISONING/ACCIDENTAL INTAKE OF INSECTICIDES ETC.	159	13	3	16	140	46	186
27 ANDHRA PRADESH	2001	SPURIOUS/POISONOUS LIQUOR	23	4	1	5	20	3	23
28 ANDHRA PRADESH	2001	LEAKAGE OF POISONOUS GASES ETC.	4	0	0	0	4	0	4
29 ANDHRA PRADESH	2001	SNAKE BITE/ANIMAL BITE	643	7	5	12	508	125	633
30 ANDHRA PRADESH	2001	OTHER	556	10	9	19	398	181	579
31 ANDHRA PRADESH	2001	STAMPEDE	2	0	0	0	2	0	2
32 ANDHRA PRADESH	2001	SUFFOCATION	9	0	0	0	9	0	9
33 ANDHRA PRADESH	2001	TRAFFIC ACCIDENTS (ROAD ACCIDENTS)	27188	27725	6110	33835	6947	1427	8374
34 ANDHRA PRADESH	2001	TRAFFIC ACCIDENTS (RAIL-ROAD ACCIDENTS)	623	6	1	7	558	68	626
35 ANDHRA PRADESH	2001	OTHER RAILWAY ACCIDENTS	674	0	0	0	586	90	676
36 ANDHRA PRADESH	2001	OTHER CAUSES (PLEASE SPECIFY)	1096	530	191	721	880	361	1241
37 ANDHRA PRADESH	2001	CAUSES NOT KNOWN	486	113	72	185	509	179	688
38 ANDHRA PRADESH	2001	TOTAL	37010	28592	6501	35093	14315	4441	18756
39 ANDHRA PRADESH	2001	TOTAL COLLAPSE	146	29	14	43	143	74	217
40 ANDHRA PRADESH	2001	TOTAL DROWNING	1399	33	3	36	1078	369	1447
41 ANDHRA PRADESH	2001	TOTAL EXPLOSION	19	17	4	21	17	20	37
42 ANDHRA PRADESH	2001	TOTAL FALLS	822	15	3	18	751	98	849
43 ANDHRA PRADESH	2001	TOTAL FIRE	1905	51	70	121	668	1173	1841
44 ANDHRA PRADESH	2001	TOTAL SUDDEN DEATHS	520	15	1	16	424	104	528
45 ANDHRA PRADESH	2001	TOTAL POISONING	1385	34	18	52	1070	355	1425
46 ANDHRA PRADESH	2001	TOTAL TRAFFIC ACCIDENTS	28485	27731	6111	33842	8091	1585	9676
47 ANDHRA PRADESH	2001								

*Snapshot of the State/UT-wise profile of accidents by un-natural causes during 2001-2013
Source: data.gov.in/catalog/stateut-wise-profile-accidents-un-natural-causes*

Pivot Tables and Sparklines

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
		Column Labels																					
3	Sum of TOTAL KILLED	A & N ISLANDS	ANDHRA PRADESH	ARUNACHAL PRADESH	ASSAM	BIHAR	CHANDIGARH	CHHATTISGARH	D & N HAVELI	DAMAN & DIU	DELHI(UT)	GOA	GUJARAT	HARYANA	HIMACHAL PRADESH	JAMMU & KASHMIR	JHARKHAND	KARNATAKA	KERALA	LAKSHADWEEP	MADHYA PRADESH	MAHARASHTRA	
4	Row Labels																						
5	► ABORTIONS/CHILD BIRTH	4	162	1	82	104	19	367	8	3	246	11	422	162	22	40	96	136	133	0	1911	4347	
6	► AIR-RASH	0	28	13	0	0	0	9	0	0	0	30	21	12	6	14	4	7	1	1	7	38	
7	► CAUSES NOT KNOWN	171	10254	354	5806	1779	435	20192	122	23	9269	472	7211	2032	681	1088	1680	18999	3449	2	28546	12384	
8	► COLLAPSE OF STRUCTURE(BRIDGE)	0	7	1	2	3	0	0	0	0	0	13	1	6	0	2	0	0	6	23	0	4	12
9	► COLLAPSE OF STRUCTURE(BUILDING)	0	29	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	
10	► COLLAPSE OF STRUCTURE(DAM)	0	1	0	0	7	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	94	
11	► COLLAPSE OF STRUCTURE(HOUSE)	0	59	0	0	41	0	26	0	0	9	1	45	0	2	1	5	17	12	0	35	105	
12	► COLLAPSE OF STRUCTURE(OTHERS)	0	114	0	11	55	0	45	0	0	31	3	68	2	5	7	113	37	23	0	35	139	
13	► COLLAPSE OF STRUCTURE(BRIDGE)	1	53	20	75	79	0	18	3	1	9	0	45	9	39	1	22	4	12	0	59	28	
14	► COLLAPSE OF STRUCTURE(BUILDING)	4	499	6	56	93	3	40	6	0	224	2	196	75	30	9	89	157	212	0	86	566	
15	► COLLAPSE OF STRUCTURE(DAM)	0	23	0	5	35	0	133	0	0	1	0	44	0	0	20	43	6	5	0	25	4	
16	► COLLAPSE OF STRUCTURE(HOUSE)	0	712	8	24	555	11	363	2	0	205	30	1916	166	41	67	174	545	161	0	1334	1342	
17	► COLLAPSE OF STRUCTURE(OTHERS)	17	1579	58	146	609	8	376	2	3	348	81	1312	315	110	53	598	993	402	4	1302	1672	
18	► DROWNING (BOAT CAPSIZE)	16	477	3	461	1172	0	851	0	23	52	23	534	250	52	29	198	418	313	7	1614	298	
19	► DROWNING (OTHER CASES)	28	1395	20	214	216	5	1131	10	14	145	186	1112	50	79	25	0	1392	1196	2	3461	5040	
20	► DROWNING(OTHER CASES)	394	25937	256	3763	3604	62	16231	183	209	1739	2045	19745	5557	1522	586	2972	21598	18362	17	47489	59564	
21	► ELECTROCUTION	48	13750	42	738	1657	95	5354	80	50	2058	265	6594	3485	166	214	981	4499	2537	1	15828	14834	
22	► EPILEPTIC FITS/GIDDINESS	12	1906	5	8	317	21	1035	26	30	290	52	6331	686	99	47	213	1284	1197	1	2085	18045	
23	► EXPLOSION (BOMB EXPLOSION)	0	168	0	196	77	0	387	0	0	109	2	45	28	2	716	56	8	1	0	100	454	
24	► EXPLOSION(OTHER EXPLOSION LIKE BOIL	0	519	6	14	140	3	90	0	0	131	5	132	70	9	68	101	85	63	0	216	228	
25	► EXPLOSION(OTHER EXPLOSION LIKE BOILERS,	0	222	1	6	54	1	20	2	0	36	6	65	36	2	10	11	37	23	0	93	160	
26	► EXPLOSION(OTHER EXPLOSION LIKE BOILERS, GAS CYLINDER ETC.)	0	19	0	1	11	0	1	0	0	24	0	19	0	1	0	0	21	9	0	31	39	
27	► FACTORY/MACHINE ACCIDENTS	2	595	5	73	179	4	665	63	14	599	57	1531	497	107	69	248	338	198	0	1050	1227	
28	► FALL INTO PIT/MANHOLE	38	1697	9	42	201	20	813	12	7	351	236	3119	588	43	38	454	315	817	0	2109	5281	
29	► FALLS (FALL FROM HEIGHT)	118	13188	222	277	1006	245	4016	163	86	4244	1061	10886	2145	3205	633	988	5777	7148	1	8667	21204	
30	► FIRE (FIREWORKS/CRACKERS)	1	328	0	8	275	2	136	5	5	44	5	212	99	7	11	195	72	122	0	617	117	
31	► FIRE (SHORT-CIRCUIT)	7	3386	32	88	239	6	61	6	3	583	7	2824	303	159	113	304	869	186	0	486	1837	
32	► FIRE-ARMS	0	129	51	226	276	7	1050	0	0	440	2	52	212	18	1668	155	340	9	0	1508	300	
33	► FOOD POISONING/ACCIDENTAL INTAKE OF INSECTICIDES ETC.	13	3122	17	318	3780	27	6702	3	4	957	31	5252	3659	1154	163	1788	1872	259	0	27123	17267	
34	► GAS CYLINDER/STOVE BURST	82	7951	7	160	1352	131	263	96	28	1409	138	8914	1617	125	110	566	3897	376	1	2415	4093	
35	► INFLUENCE OF ALCOHOL	37	3347	46	36	962	198	2887	58	30	1376	126	504	2539	767	112	768	3744	1133	0	4992	16097	
36	► KILLED BY ANIMALS	20	576	67	969	135	6	843	4	2	54	11	740	135	101	32	504	645	401	0	1113	1554	
37	► LEAKAGE OF POISONOUS GASES ETC.	0	130	0	30	143	1	42	0	1	19	0	423	59	13	29	39	207	10	0	323	94	
38	► MINES OR QUARRY DISASTER	4	297	3	1	31	0	477	0	1	2	18	179	89	2	15	202	79	151	0	1667	297	
39	► OTHER	28	11917	217	2104	2439	124	3654	1	5	1741	70	4576	4194	1036	314	844	13691	1214	0	5519	2346	
40	► OTHER CAUSES (PLEASE SPECIFY)	2002	14743	137	1243	4089	821	23417	286	296	10798	1095	21087	9584	2089	1062	3577	13471	7194	3	46337	170274	
41	► OTHER FIRE ACCIDENTS	151	11389	78	1451	3934	140	8957	30	79	2986	434	19405	2456	505	167	2160	13891	2946	4	29727	61791	
42	► OTHER RAILWAY ACCIDENTS	0	20250	0	5156	14514	0	5959	0	0	11716	472	14665	13762	211	86	4207	14775	4536	0	15479	64403	
43	► SNAKE BITE/ANIMAL BITE	8	10191	4	78	611	5	10042	58	0	148	41	6372	656	174	38	369	7793	583	0	25114	14301	
44	► SORISSAUS/POISONOUS LIQUOR																						
45	► SPURIOUS/POISONOUS LIQUOR	0	1091	7	80	737	12	237	0	5	145	0	947	299	76	58	262	1469	15	0	404	391	
46	► STAMPEDE	0	355	0	1	22	0	151	0	0	11	1	66	126	110	0	13	118	106	0	203	351	
47	► SUDDEN DEATHS(HEART ATTACKS)	340	5463	128	574	1048	532	2842	170	95	2764	225	21396	5029	1725	775	733	6779	15352	9	9430	65805	
48	► SUFOCATION	7	196	5	5	242	18	5316	2	1	118	13	796	277	127	30	348	125	178	0	4828	986	
49	► TOTAL	3850	335694	3438	46421	91930	4722	161097	2058	1305	81441	11138	250602	113029	26934	22034	46276	243623	118341	58	383712	727452	
50	► TOTAL COLLAPSE	22	3076	93	327	1479	22	1004	13	4	840	118	3632	567	229	158	1044	1765	850	4	2952	3870	
51	► TOTAL DROWNING	438	27809	279	4438	4992	67	18213	193	246	1936	2254	21391	5857	1653	640	3170	23408	19871	26	52564	64902	
52	► TOTAL EXPLOSION	0	928	7	217	282	4	498	2	0	300	13	261	134	14	794	168	151	96	0	440	881	
53	► TOTAL FALLS	156	14885	231	319	1207	265	4829	175	93	4595	1297	14005	2733	3248	671	1442	6092	7965	1	10776	26485	
54	► TOTAL FIRE	241	23054	117	1703	5800	279	9417	134	115	5022	584	31355	4474	796	400	3225	18729	3630	5	33245	67838	
55	► TOTAL POISONING	49	26451	245	2610	770	169	20677	62	15	3010	142	17570	8867	2453	602	3302	25032	2081	0	56483	34399	
56	► TOTAL SUDDEN DEATHS	393	10878	180	700	2431	770	7131	262	158	4676	414	28653	8416	2613	974	1810	11943	17815	10	18418	104294	
57	► TOTAL TRAFFIC ACCIDENTS	297	187690	1609	27041	59619	1760	41854	660	287	37713	4352	95458	65532	12521	13603	24403	117862	51809	5	105747	222538	
58	► TRAFFIC ACCIDENTS (RAIL-ROAD ACCIDE	0	1386	0	347	598	0	977	0	0	16	7	505	93	0	220	437	88	454	0			

Pivot Tables and Sparklines

2	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35					
3																				
4	MAHARASHTRA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	ODISHA	PUDUCHERRY	PUNJAB	RAJASTHAN	SIKKIM	TAMIL NADU	TRIPURA	UTTAR PRADESH	UTTARAKHAND	WEST BENGAL	TOTAL (STATES)	TOTAL (UTS)	TOTAL (ALL INDIA)	Grand Total	Sparklines
5	4347	11	11	2	0	94	8	158	291	0	220	16	733	67	286	9885	288	10173	30519	
6	38	0	10	0	3	0	0	10	16	0	14	0	20	25	2	290	1	291	873	
7	12384	512	466	189	28	19548	120	2218	18512	144	14030	738	15201	996	21468	208977	10142	219119	657357	
8	0	0	0	0	0	0	0	1	3	0	7	1	5	0	0	1167	14	1181	2404	
9	12	0	2	0	0	1	0	2	10	1	62	0	38	0	1	3615	250	3865	7953	
10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	438	1	439	892	
11	105	0	0	2	0	8	1	13	42	0	60	0	143	3	8	12717	256	12973	26643	
12	139	2	6	0	0	30	3	23	53	7	159	1	237	17	14	15771	428	16199	33638	
13	28	0	5	3	0	12	0	10	10	1	319	11	61	8	221				1139	
14	566	7	5	18	0	24	0	119	70	5	497	7	453	19	65				3642	
15	4	0	0	0	0	0	0	8	6	6	19	0	10	10	22				425	
16	1342	0	4	4	0	86	28	257	679	4	729	2	2623	83	121				12276	
17	1672	65	32	10	2	200	12	462	958	43	1357	18	1412	91	309				14959	
18	298	11	24	74	4	361	6	79	79	0	579	6	1647	41	271	9869	104	9973	29919	
19	5040	11	27	23	3	361	78	298	1141	13	721	37	390	55	424	313457	3943	317400	654103	
20	59564	130	363	187	63	6573	1057	5424	17965	235	16041	722	9334	1726	6442				298097	
21	14834	116	120	62	21	2183	330	3154	7301	59	5033	301	5931	467	1468	97160	2662	99822	299466	
22	18045	5	62	4	0	537	1930	980	1724	14	2937	62	873	92	238	40838	2310	43148	129444	
23	454	136	5	8	4	16	0	10	123	0	53	1	268	8	378	3250	109	3359	10077	
24	228	3	13	1	0	10	0	73	214	0	108	34	321	58	170				2885	
25	160	1	0	0	0	17	0	11	82	7	123	0	271	3	93				1393	
26	39	0	0	0	0	2	0	3	21	1	77	0	42	0	48	4451	197	4648	9666	
27	1227	5	14	5	0	273	28	565	947	1	618	3	846	98	192	10406	710	11116	33348	
28	5281	6	20	14	4	315	14	473	1566	2	785	37	1218	116	144	20462	442	20904	67212	
29	21204	63	171	165	31	4511	613	1660	6755	429	5683	109	2597	901	1917	105415	5470	110885	332655	
30	117	0	1	0	0	91	7	259	74	0	483	2	896	10	409	4429	61	4490	13470	
31	1837	3	12	2	5	871	6	454	357	2	855	76	644	73	451	14697	611	15308	45924	
32	300	42	43	22	57	58	0	521	77	6	224	18	16332	201	479	24076	447	24523	73569	
33	17267	9	4	7	1	3092	48	3296	11009	23	3841	132	7726	1584	2584	105815	1052	106867	320601	
34	4093	2	37	6	1	542	7	1920	1763	13	8408	13	1577	384	825	47475	1754	49229	147687	
35	16097	5	71	15	3	460	2552	2306	2676	78	2001	91	2146	309	739	48960	4251	53211	159633	
36	1554	1	52	4	3	1011	4	132	449	3	920	13	441	206	643	11704	90	11794	35382	
37	94	0	13	0	2	49	4	352	55	1	188	1	179	16	27	2425	25	2450	7350	
38	297	4	100	16	9	323	0	71	1108	0	124	0	320	60	60	5703	7	5710	17130	
39	2346	62	62	39	3	6218	44	3170	4067	90	18708	80	3272	445	15308	105659	1943	107602	322806	
40	170274	209	244	341	22	9591	848	6624	26262	92	24549	679	20427	1595	10937	420971	15054	436025	1308075	
41	61791	29	116	44	23	3626	471	1757	7993	65	16417	201	10509	717	6757	207545	3861	211406	634218	
42	64403	0	0	31	3421	54	9422	4086	0	14381	16	33789	546	29200	277367	11770	289137	867411		
43	14301	0	1	7	0	5883	184	568	3552	1	6478	8	1374	73	3691	98003	403	98406	295218	
44						14												14		
45	391	0	0	8	0	202	0	1713	87	1	1675	35	839	6	1093	11746	162	11908	35710	
46	351	0	0	0	19	0	31	216	4	231	0	87	9	12	2232	11	2243	6729		
47	65805	102	110	56	17	1513	833	5386	6278	41	11526	474	3513	1027	6941	174288	4743	179031	537093	
48	986	20	9	7	1	556	9	928	1757	6	253	6	2207	105	239	19566	155	19721	59163	
49	727452	3322	4269	2234	1110	114584	12090	88429	231056	2261	326996	6688	316945	23659	182505	3885482	105524	3991006	11973018	
50	3870	74	54	37	2	361	44	895	1831	67	3209	40	4982	231	761	33708	949	34657	103971	
51	64902	152	414	284	70	7295	1141	5801	19185	248	17341	765	11371	1822	7137	323326	4047	327373	982119	
52	881	140	18	9	4	45	0	97	440	8	361	35	902	69	689	7701	306	8007	24021	
53	26485	69	191	179	35	4826	627	2133	8321	431	6468	146	3815	1017	2061	125877	5912	131789	395367	
54	67838	34	166	52	29	5130	491	4390	10187	80	26163	292	13626	1184	8442	274146	6287	280433	841299	
55	34399	71	80	61	6	15458	280	9099	18770	116	30890	256	13390	2124	22703	323648	3585	327233	981699	
56	104294	123	254	77	20	2604	5323	8830	10969	133	16684	643	7265	1495	8204	273971	11592	285563	856689	
57	222538	1750	2034	889	800	45303	2845	42930	104708	863	179587	2753	199782	11955	97008	1722020	43567	1765587	5296761	
58	225	0	0	5	1988	0	203	164	0	149	6	5818	81	2739				17299		
59	299	0	0	0	20	0	91	62	0	660	0	1744	23	1817	25292	41	25333	58700		
60	157611	1750	2034	889	764	39874	2791	33214	100396	863	164397	2731	158431	11305	63252	1419361	31756	1451117	4353351	
61	198011	9057	11749	6056	3186	310190	34931	251033	636523	6468	934101	18306	889023	67215	512015	10855361	287293	11142654	33427952	

Pivot table with causes as rows with nested year as sub-rows and different states as columns and Sparklines showing change data per row over columns

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1					3	4	5	6	7	8	9	10	11	12	13							21
2																						
3	Sum of TOTAL KILLED	Column Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4	Row Labels	A & N ISLANDS	ANDHRA PRADESH	ARUNACHAL PRADESH	ASSAM	BIHAR	CHANDIGARH	CHHATTISGARH	D & N HAVELI	DAMAN & DIU	DELHI(U)	GOA	GUJARAT	HARYANA	HIMACHAL PRADESH	JAMMU & KASHMIR	JHARKHAND	KARNATAKA	KERALA	LAKSHADWEEP	MADHYA PRADESH	MAHARASHTRA
5	AIR-CRASH	0	28	13	0	0	0	9	0	0	0	21	12	6	14	4	7	1	1	1	7	38
6	STAMPEDE	0	355	0	1	22	0	151	0	0	11	1	56	126	110	0	13	118	106	0	203	351
7	MINES OR QUARRY DISASTER	4	297	3	1	31	0	477	0	1	2	18	179	89	2	15	202	79	151	0	1667	297
8	TOTAL EXPLOSION	0	928	7	217	282	4	498	2	0	300	13	261	134	14	794	168	151	96	0	440	881
9	ABORTIONS/CHILD BIRTH	4	162	1	82	104	19	367	8	3	246	11	422	162	22	40	96	136	133	0	1911	4347
10	FACTORY/MACHINE ACCIDENTS	2	595	5	73	179	4	665	63	14	599	57	1531	497	107	69	248	338	198	0	1050	1227
11	KILLED BY ANIMALS	20	576	67	969	135	6	843	4	2	54	11	740	135	101	32	504	645	401	0	1113	1554
12	SPURIOUS/POISONOUS LIQUOR	0	1091	7	80	737	12	237	0	5	145	0	947	299	76	58	262	1469	15	0	404	391
13	SUFFOCATION	7	196	5	5	242	18	5316	2	1	118	13	796	277	127	30	348	125	178	0	4828	986
14	FALL INTO PIT/MANHOLE	38	1697	9	42	201	20	813	12	7	351	236	3119	588	43	38	454	315	817	0	2109	5281
15	FIRE-ARMS	0	129	51	226	276	7	1050	0	0	440	2	52	212	18	1668	155	340	9	0	1508	300
16	TOTAL COLLAPSE	22	3076	93	327	1479	22	1004	13	4	840	118	3632	567	229	158	1044	1765	850	4	2952	3870
17	EPILEPTIC FITS/GIDDINESS	12	1906	5	8	317	21	1035	26	30	290	52	6331	686	99	47	213	1284	1197	1	2085	18045
18	GAS CYLINDER/STOVE BURST	82	7951	7	160	1352	131	263	96	28	1409	138	8914	1617	125	110	566	3897	376	1	2415	4093
19	INFLUENCE OF ALCOHOL	37	3347	46	36	962	198	2887	58	30	1376	126	504	2539	767	112	768	3744	1133	0	4992	16097
20	SNAKE BITE/ANIMAL BITE	8	10191	4	78	611	5	10042	58	0	148	41	6372	656	174	38	369	7793	583	0	25114	14301
21	ELECTROCUTION	48	13750	42	738	1657	95	5354	80	50	2058	265	6594	3485	166	214	981	4499	2537	1	15828	14834
22	FOOD POISONING/ACCIDENTAL INTAKE OF INSECTICIDES ETC	13	3122	17	318	3780	27	6702	3	4	957	31	5252	3659	1154	163	1788	1872	259	0	27123	17267
23	TOTAL FALLS	156	14885	231	319	1207	265	4829	175	93	4595	1297	14005	2733	3248	671	1442	6092	7965	1	10776	26485
24	CAUSES NOT KNOWN	171	10254	354	5806	1779	435	20192	122	23	9269	472	7211	2032	681	1088	1680	18999	3449	2	28546	12384
25	TOTAL FIRE	241	23054	117	1707	5800	279	9417	134	115	5022	584	31355	4474	796	400	3225	18729	3630	5	3245	67838
26	TOTAL SUDDEN DEATHS	393	10878	180	700	2431	770	7131	262	158	4676	414	28653	8416	2613	974	1810	11943	17815	10	18418	104294
27	TOTAL POISONING	49	26451	245	2610	7710	169	20677	62	15	3010	142	17570	8867	2453	602	3302	25032	2081	0	56483	34399
28	TOTAL DROWNING	438	27809	279	4438	4952	67	18213	193	246	1936	2254	21391	5857	1653	640	3170	23408	19871	26	52564	64902
29	TOTAL TRAFFIC ACCIDENTS	297	187690	1609	27041	59619	1760	41854	660	287	37713	4352	95458	65532	12521	13603	24403	117882	51809	5	105747	222538
30	TOTAL	3850	335694	3438	46421	91930	4722	161097	2058	1305	81441	11138	250602	113029	26934	22034	46276	243623	118341	58	383712	727452
31	Grand Total	5892	686112	6835	92403	2E-05	9056	321123	4091	2421	157006	21816	511978	226680	54239	43612	93491	494285	234001	115	787240	1364452

Table of causes in rows arranged in ascending order of total deaths

V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35				
2																			
3	MAHARASHTRA	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	ODISHA	PUDUCHERRY	PUNJAB	RAJASTHAN	SIKKIM	TAMIL NADU	TRIPURA	UTTAR PRADESH	UTTARAKHAND	WEST BENGAL	TOTAL (STATES)	TOTAL (UTS)	TOTAL (ALL INDIA)	Grand Total
4	38	0	10	0	3	0	0	10	16	0	14	0	20	25	2	290	1	291	873
5	351	0	0	0	0	19	0	31	216	4	231	0	87	9	12	2232	11	2243	6729
6	297	4	100	16	9	323	0	71	1108	0	124	0	320	60	60	5703	7	5710	17130
7	881	140	18	9	4	45	0	97	440	8	361	35	902	69	689	7701	306	8007	24021
8	4347	11	11	2	0	94	8	158	291	0	220	16	733	67	286	9885	288	10173	30519
9	1227	5	14	5	0	273	28	565	947	1	618	3	846	98	192	10406	710	11116	33348
10	1554	1	52	4	3	1011	4	132	449	3	920	13	441	206	643	11704	90	11794	35382
11	391	0	0	8	0	202	0	1713	87	1	1675	35	839	6	1093	11746	162	11908	35710
12	986	20	9	7	1	556	9	928	1757	6	253	6	2207	105	239	19566	155	19721	59163
13	5281	6	20	14	4	315	14	473	1566	2	785	37	1218	116	144	20462	442	20904	62712
14	300	42	43	22	57	58	0	521	77	6	224	18	16332	201	479	24076	447	24523	73569
15	3870	74	54	37	2	361	44	895	1831	67	3209	40	4982	231	761	33708	949	34657	103971
16	18045	5	62	4	0	537	1930	980	1724	14	2937	62	873	92	238	40838	2310	43148	129444
17	4093	2	37	6	1	542	7	1920	1763	13	8408	13	1577	384	825	47475	1754	4929	147687
18	16097	5	71	15	3	460	2552	2306	2676	78	2001	91	2146	309	739	48960	4251	53211	159633
19	14301	0	1	7	0	5883	184	568	3552	1	6478	8	1374	73	3691	98003	403	98406	295218
20	14834	116	120	62	21	2183	330	3154	7301	59	5033	301	5931	467	1468	97160	2662	99822	299466
21	17267	9	4	7	1	3092	48	3296	11009	23	3841	132	7726	1584	2584	105815	1052	106867	320601
22	26485	69	191	179	35	4826	627	2133	8321	431	6468	146	3815	1017	2061	125877	5912	131789	395367
23	12384	512	466	189	28	19548	120	2218	18512	144	14030	738	15201	996	21468	208977	10142	219119	657357

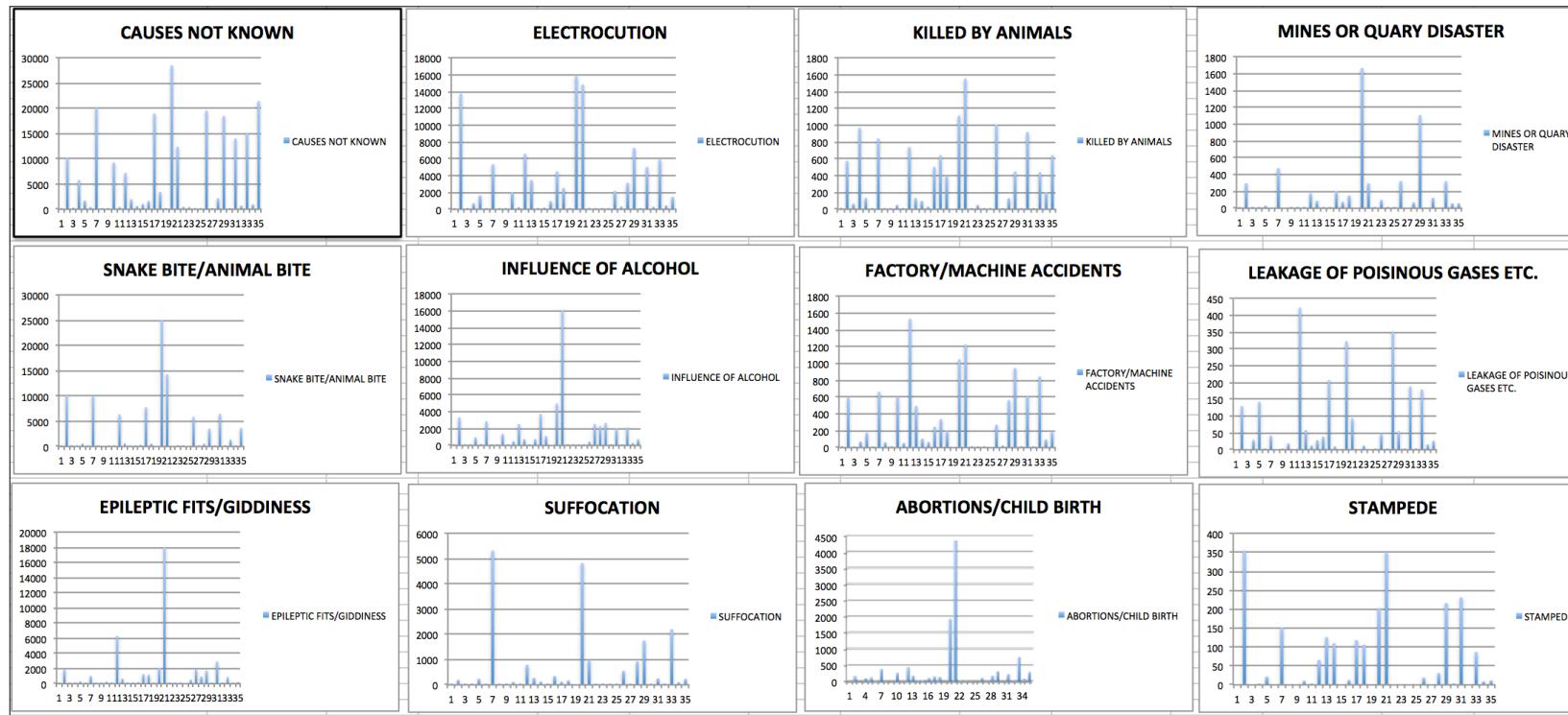
Table of causes in rows arranged in ascending order of total deaths with Sparklines showing deaths in different states due to each cause.

ABORTIONS/CHILD BIRTH	AIR-CRASH	CAUSES NOT KNOWN	ELECTROCUTION	EPILEPTIC FITS/GIDDINESS	FACTORY/MACHINE ACCIDENTS	FIRE-ARMS	FOOD POISONING/ACCIDENTAL INTAKE OF INSECTICIDES ETC.	GAS CYLINDER/STOVE BURST	INFLUENCE OF ALCOHOL	KILLED BY ANIMALS	LEAKAGE OF POISINOUS GASES ETC.	MINES OR QUARRY DISASTER	OTHER	SNAKE BITE/ANIMAL BITE		
LAKSHADWEEP	SIKKIM	LAKSHADWEEP	LAKSHADWEEP	NAGALAND	NAGALAND	LAKSHADWEEP	LAKSHADWEEP LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP		
NAGALAND	MIZORAM	DAMAN & DIU	NAGALAND	LAKSHADWEEP	LAKSHADWEEP	A & N ISLANDS	NAGALAND	NAGALAND	MANIPUR	MANIPUR	MANIPUR	D & N HAVELI	D & N HAVELI	D & N HAVELI		
SIKKIM	DAMAN & DIU	NAGALAND	ARUNACHAL PRADESH	MIZORAM	SIKKIM	DAMAN & DIU	D & N HAVELI	MEGHALAYA	MANIPUR	DAMAN & DIU	SIKKIM	NAGALAND	NAGALAND DAMAN & DIU	NAGALAND DAMAN & DIU		
ARUNACHAL PRADESH	A & N ISLANDS	PUDUCHERRY	A & N ISLANDS	ARUNACHAL PRADESH	A & N ISLANDS	PUDUCHERRY	DAMAN & DIU	MEGHALAYA	MIZORAM	MIZORAM	D & N HAVELI	CHANDIGARH	CHANDIGARH	CHANDIGARH	CHANDIGARH	
MIZORAM	D & N HAVELI	D & N HAVELI	DAMAN & DIU	MANIPUR	TRIPURA	D & N HAVELI	MEGHALAYA	GOA	MIZORAM	ARUNACHAL PRADESH	DAMAN & DIU	GOA	TRIPURA	A & N ISLA MEGHALAYA	A & N ISLA MEGHALAYA	
DAMAN & DIU	PUDUCHERRY	SIKKIM	ASSAM	CHANDIGARH	GOA	ASSAM	CHANDIGARH	GOA	PUDUCHERRY	SIKKIM	MIZORAM	A & N ISLANDS	PUDUCHERRY	MIZORAM SIKKIM	MIZORAM SIKKIM	
A & N ISLANDS	MANIPUR	A & N ISLANDS	MIZORAM	SIKKIM	GOA	MIZORAM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	D & N HAVELI	ARUNACHAL PRADESH	DAMAN & DIU	PUDUCHERY	PUDUCHERY	
D & N HAVELI	TRIPURA	MIZORAM	D & N HAVELI	SIKKIM	ARUNACHAL PRADESH	CHANDIGARH	A & N ISLANDS	TRIPURA	ARUNACHAL PRADESH	CHANDIGARH	DAMAN & DIU	ASSAM	ASSAM	MANIPUR CHANDIGARH	MANIPUR CHANDIGARH	
PUDUCHERRY	CHANDIGARH	ARUNACHAL PRADESH	CHANDIGARH	MANIPUR	KERALA	ARUNACHAL PRADESH	SIKKIM	TRIPURA	MEGHALAYA	CHANDIGARH	D & N HAVELI	HIMACHAL PRADESH	MEGHALAYA MIZORAM	DELHI(U)	DELHI(U) MEGHALAYA	
MANIPUR	ASSAM	CHANDIGARH	MANIPUR	D & N HAVELI	TRIPURA	SIKKIM	TRIPURA	TRIPURA	GOA	CHANDIGARH	SIKKIM	GOA	GOA A & N ISLANDS	GOA A & N ISLANDS	GOA A & N ISLANDS	
MEGHALAYA	ODISHA	MEGHALAYA	MEGHALAYA	DAMAN & DIU	HIMACHAL PRADESH	MEGHALAYA	HIMACHAL PRADESH	D & N HAVELI	TRIPURA	ARUNACHAL PRADESH	TRIPURA	TRIPURA	TRIPURA TRIPURA	TRIPURA TRIPURA	TRIPURA TRIPURA	
GOA	BHAR	GOA	HIMACHAL PRADESH JAMMU & KASHMIR	GOA	PUDUCHERRY	MIZORAM	GOA	TRIPURA	JAMMU & KASHMIR	JAMMU & KASHMIR	JAMMU & KASHMIR	SIKKIM JAMMU & KASHMIR	SIKKIM JAMMU & KASHMIR	JAMMU & KASHMIR	JAMMU & KASHMIR	
TRIPURA	DELHI(U)	MANIPUR	JAMMU & KASHMIR	GOA	GOA	MANIPUR PUDUCHERRY	GOA	TRIPURA	GOA	MANIPUR	GOA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	
CHANDIGARH	LAKSHADWEEP	HIMACHAL PRADESH	CHANDIGARH	D & N HAVELI	TRIPURA	SIKKIM	TRIPURA	TRIPURA	SIKKIM	SIKKIM	SIKKIM	TOTAL (UTS)	TOTAL (UTS)	ASANAGI D & N HAVELI	ASANAGI D & N HAVELI	
HIMACHAL PRADESH	KERALA	TRIPURA	TRIPURA	TRIPURA	JAMMU & KASHMIR	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	
JAMMU & KASHMIR	TOTAL (UTS)	UTTARAKHAND	PUDUCHERRY	UTTARAKHAND	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	
UTTARAKHAND	WEST BENGAL	JAMMU & KASHMIR	UTTARAKHAND	HIMACHAL PRADESH	UTTARAKHAND	NAGALAND	NAGALAND	NAGALAND	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA
ASSAM	NAGALAND	JHARKHAND	ASSAM	JHARKHAND	HIMACHAL PRADESH	UTTARAKHAND	UTTARAKHAND	UTTARAKHAND	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH
ODISHA	JHARKHAND	BIHAR	JHARKHAND	WEST BENGAL	BIHAR	RAJASTHAN	RAJASTHAN	RAJASTHAN	WEST BENGAL	PUNJAB	PUNJAB	PUNJAB	PUNJAB	PUNJAB	PUNJAB	PUNJAB
JHARKHAND	HIMACHAL PRADESH	WEST BENGAL	WEST BENGAL	WEST BENGAL	WEST BENGAL	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	UTTARAKHAND	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH
BIHAR	KARNATAKA	PUNJAB	BIHAR	KERALA	KERALA	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR
KERALA	MADHYA PRAK KERALA	DELHI(U)	ODISHA	JHARKHAND	UTTARAKHAND	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA
KARNATAKA	CHHATTISGARH	ASSAM	ASSAM	CHANDIGARH	TRIPURA	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM
PUNJAB	MEGHALAYA	GUJARAT	A & N ISLANDS	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA
HARYANA	PUNJAB	DELHI(U)	TOTAL (UTS)	PUNJAB	HARYANA	ASSAM	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA	ODISHA
ANDHRA PRADESH	HARYANA	TOTAL (UTS)	PUNJAB	CHHATTISGARH	PUNJAB	BIHAR	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	ANDHRA PRADESH
TAMIL NADU	ARUNACHAL PRADESH	ANDHRA PRADESH	HARYANA	KERALA	ANDHRA PRADESH	ANDHRA PRADESH	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA
DELHI(U)	JAMMU & KASHMIR	KARNATAKA	PUNJAB	BIHAR	KERALA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA
WEST BENGAL	WEST BENGAL	WEST BENGAL	WEST BENGAL	WEST BENGAL	WEST BENGAL	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)
TOTAL (UTS)	JHARKHAND	TOTAL (UTS)	PUNJAB	WEST BENGAL	ASSAM	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA	KARNATAKA
PUNJAB	ODISHA	KERALA	BIHAR	DELHI(U)	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR	BIHAR
KERALA	BIHAR	ANDHRA PRADESH	TOTAL (UTS)	KERALA	PUNJAB	ASSAM	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH	HIMACHAL PRADESH
BIHAR	PUNJAB	WEST BENGAL	HARYANA	PUNJAB	HARYANA	HARYANA	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT
HARYANA	GUJARAT	BIHAR	ODISHA	TOTAL (UTS)	WEST BENGAL	BIHAR	DELHI(U)	BIHAR	DELHI(U)	BIHAR	DELHI(U)	BIHAR	DELHI(U)	BIHAR	DELHI(U)	BIHAR
UTTAR PRADESH	UTTAR PRADESH	TOTAL (UTS)	PUNJAB	KERALA	CHHATTISGARH	ODISHA	DELHI(U)	ODISHA	DELHI(U)	ODISHA	DELHI(U)	ODISHA	DELHI(U)	ODISHA	DELHI(U)	ODISHA
RAJASTHAN	KERALA	HARYANA	CHHATTISGARH	CHHATTISGARH	UTTAR PRADESH	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)
WEST BENGAL	HIMACHAL PRADESH	JHARKHAND	WEST BENGAL	BIHAR	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)	TOTAL (UTS)
ODISHA	KARNATAKA	ODISHA	RAJASTHAN	KARNATAKA	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH
GUJARAT	HARYANA	GUJARAT	KARNATAKA	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN	RAJASTHAN
TAMIL NADU	CHHATTISGARH	PUNJAB	GUJARAT	MADHYA PRADESH	KERALA	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH	CHHATTISGARH
KARNATAKA	MADHYA PRAK KARNATAKA	UTTAR PRADESH	MADHYA PRAK KARNATAKA	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT	GUJARAT
CHHATTISGARH	RAJASTHAN	RAJASTHAN	TAMIL NADU	TAMIL NADU	KARNATAKA	JAMMU & KASHMIR	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH	MADHYA PRADESH
ANDHRA PRADESH	TAMIL NADU	UTTAR PRADESH	ANDHRA PRADESH	ANDHRA PRADESH	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA
MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MADHYA PRADESH	MADHYA PRAK MAHARASHTRA	MADHYA PRADESH	MADHYA PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH	UTTAR PRADESH
MADHYA PRADESH	ANDHRA PRADESH	CHHATTISGARH	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA	MAHARASHTRA

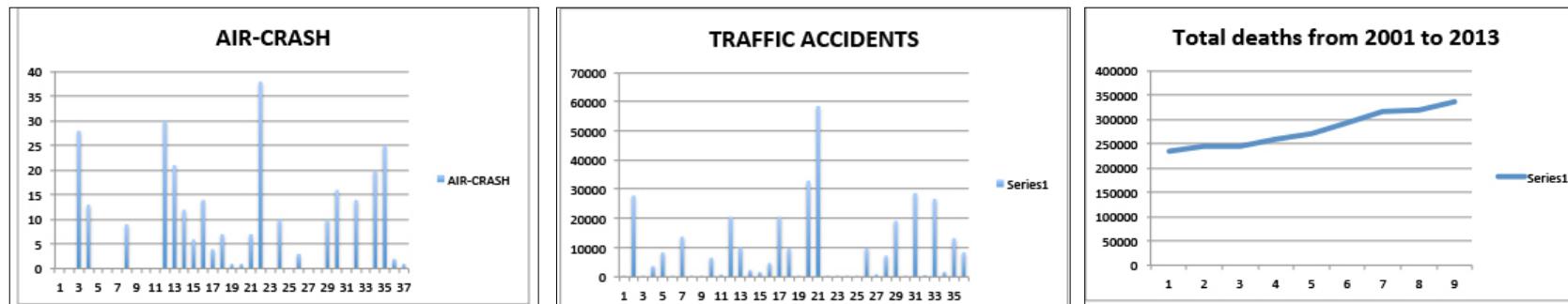
Different states arranged in ascending order of number of deaths due to different causes.

SNAKE BITE/ANIMAL BITE	STAMPEDE	SUFFOCATION	TOTAL	TOTAL COLLAPSE	TOTAL DROWNING	TOTAL EXPLOSION	TOTAL FALLS	TOTAL FIRE	TOTAL POISONING	TOTAL SUDDEN DEATHS	TOTAL TRAFFIC ACCIDENTS						
LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	LAKSHADWEEP	NAGALAND	NAGALAND	LAKSHADWEEP	LAKSHADWEEP	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	
NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	NAGALAND	
DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	
MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR	MANIPUR
MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA
SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM
ARUNACHAL PRADESH	CHANDIGARH	TRIPURA	MANIPUR	MIZORAM	SIKKIM	CHANDIGARH	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	DAMAN & DIU	
CHANDIGARH	MIZORAM	SIKKIM	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH	ARUNACHAL PRADESH								
MIZORAM	A & N ISLANDS	MIZORAM	A & N ISLANDS	PUDUCHERRY	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM	MIZORAM
A & N ISLANDS	TRIPURA	A & N ISLANDS	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA							
TRIPURA	JAMMU & KAS	MEGHALAYA	CHANDIGARH	SIKKIM	A & N ISLANDS	GOA	TRIPURA	GOA	MEGHALAYA	CHANDIGARH	CHANDIGARH	GOA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA
JAMMU & KASHMIR	D & N HAVELI	PUDUCHERRY	TRIPURA	TRIPURA	JAMMU & KASHMIR	HIMACHAL PRADESH	ASSAM	TRIPURA	CHANDIGARH	CHANDIGARH	CHANDIGARH	GOA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA
GOA	PUDUCHERRY	GOA	GOA	ARUNACHAL PRADESH	TRIPURA	MEGHALAYA	SIKKIM	TRIPURA	CHANDIGARH	CHANDIGARH	CHANDIGARH	GOA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA	MEGHALAYA
D & N HAVELI	GOA	GOA	CHANDIGARH	PUDUCHERRY	GOA	PUDUCHERRY	TRIPURA	PUDUCHERRY	TRIPURA	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY	PUDUCHERRY
UTTARAKHAND	ASSAM	MANIPUR	JAMMU & KASHMIR	HIMACHAL PRADESH	UTTARAKHAND	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM	SIKKIM
ASSAM	SIKKIM	JAMMU & KASHMIR	UTTARAKHAND	HIMACHAL PRADESH	UTTARAKHAND</td												

Comparing Causes

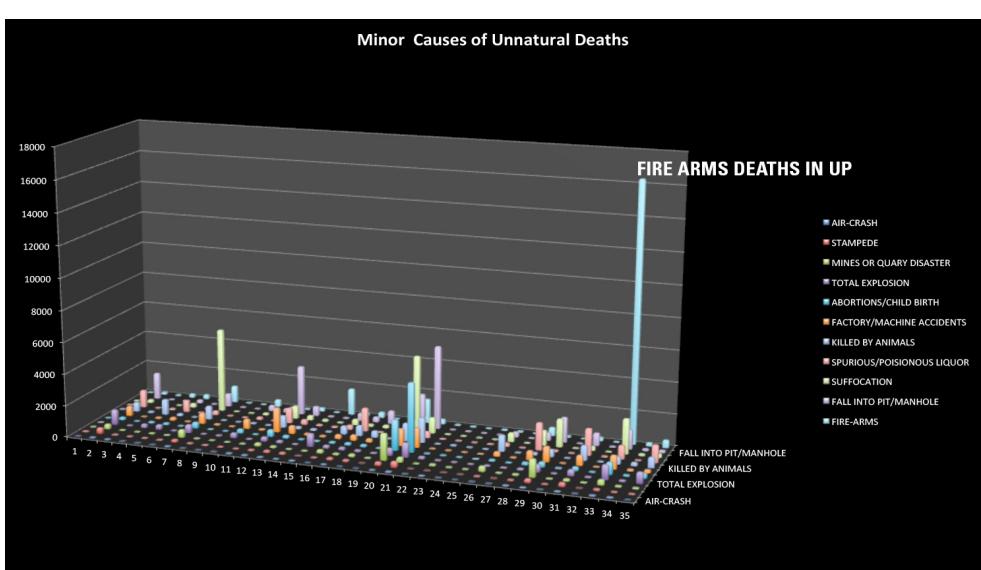
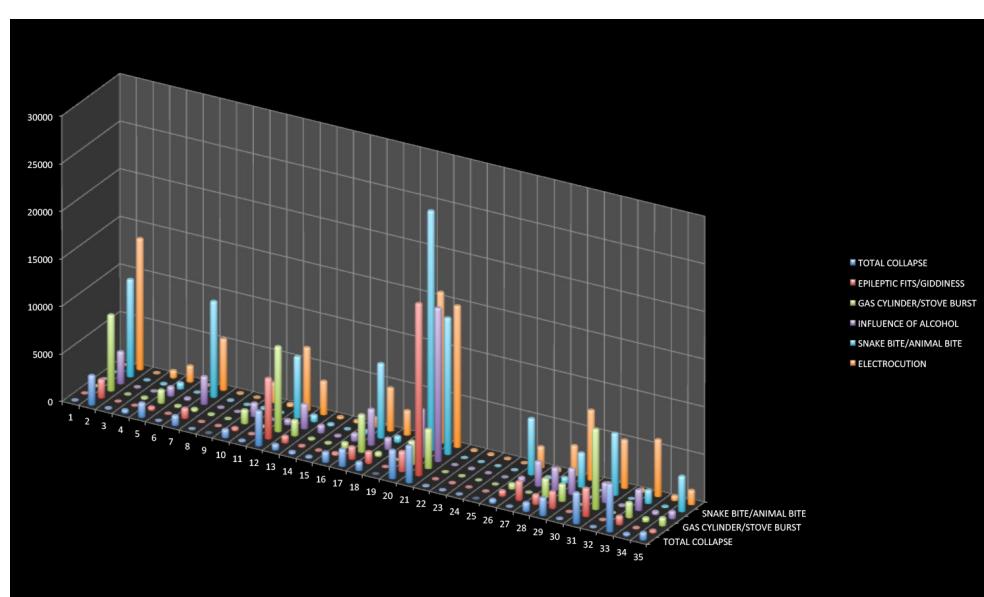
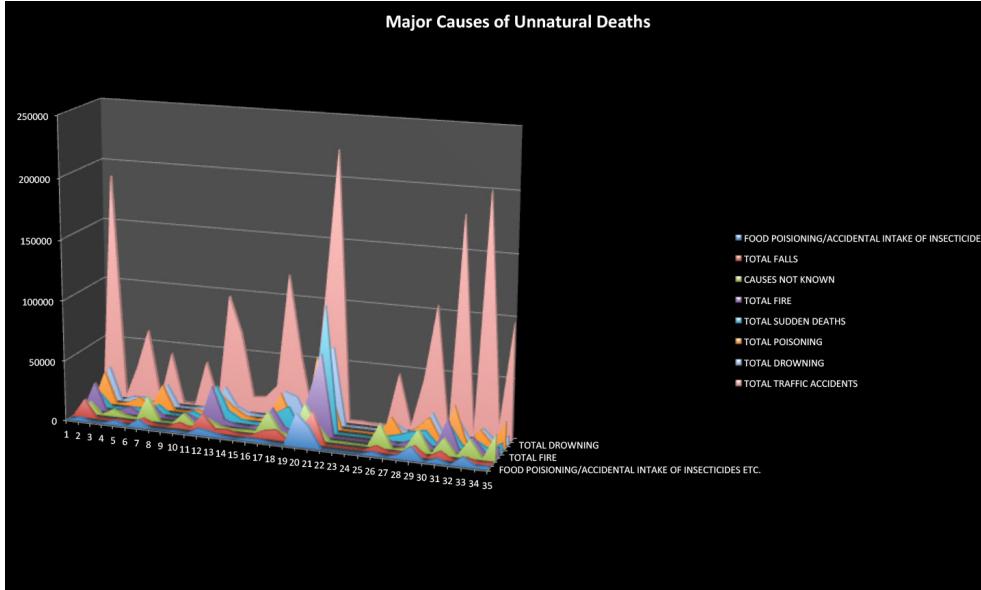
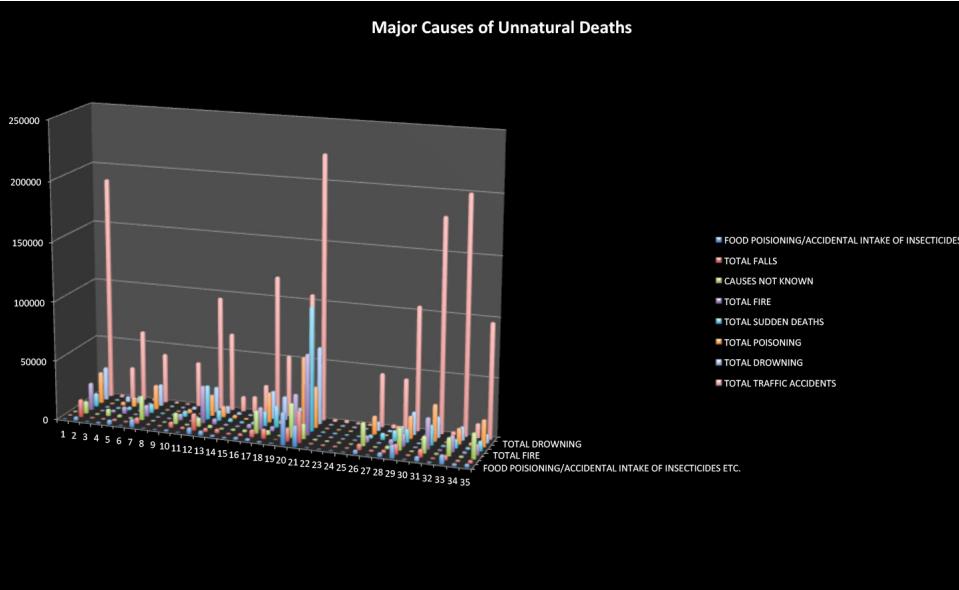


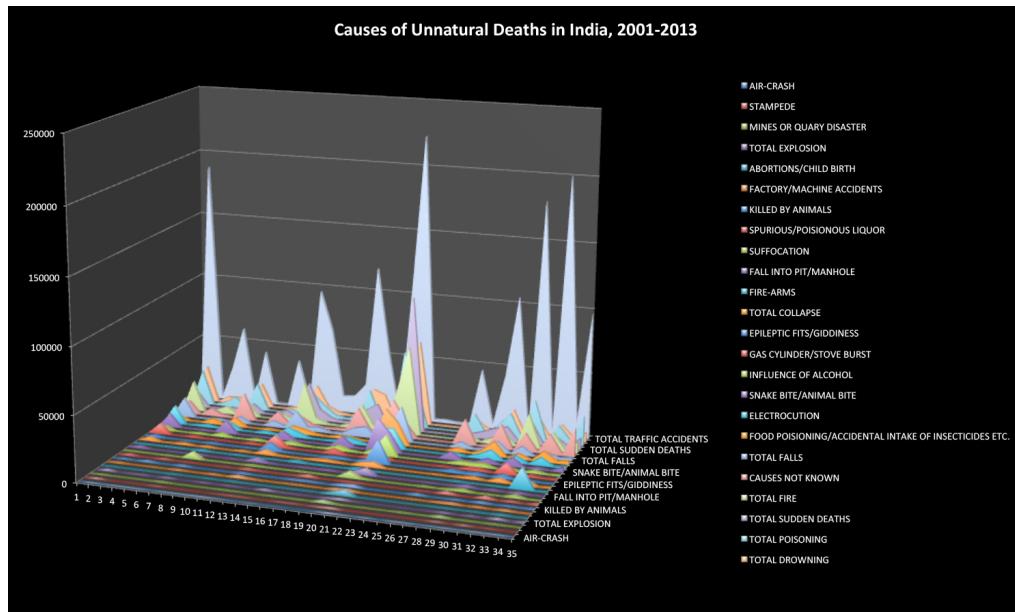
Initial Bar charts showing trends of deaths due to different causes.



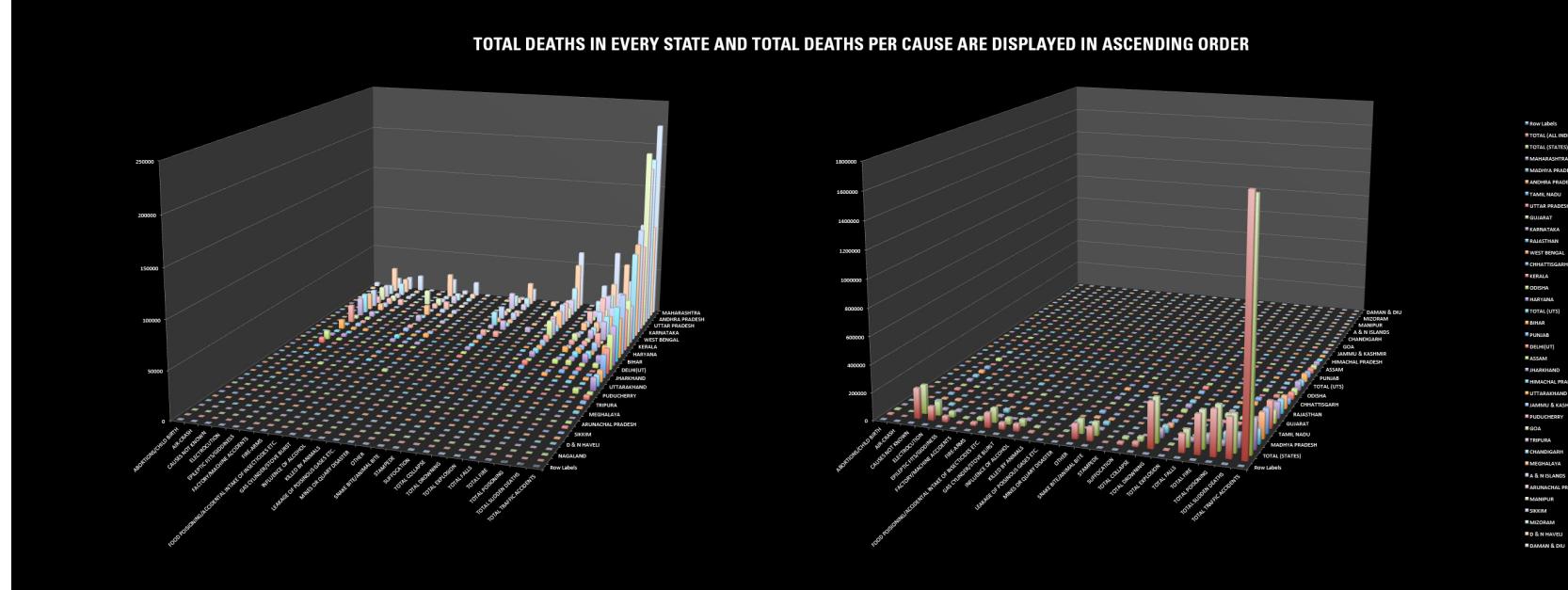
Bar charts showing trends of deaths due to air-crash and traffic accidents,
The lowest and highest cause of unnatural deaths.

Bar charts showing total number of
unnatural deaths from 2001 to 2013

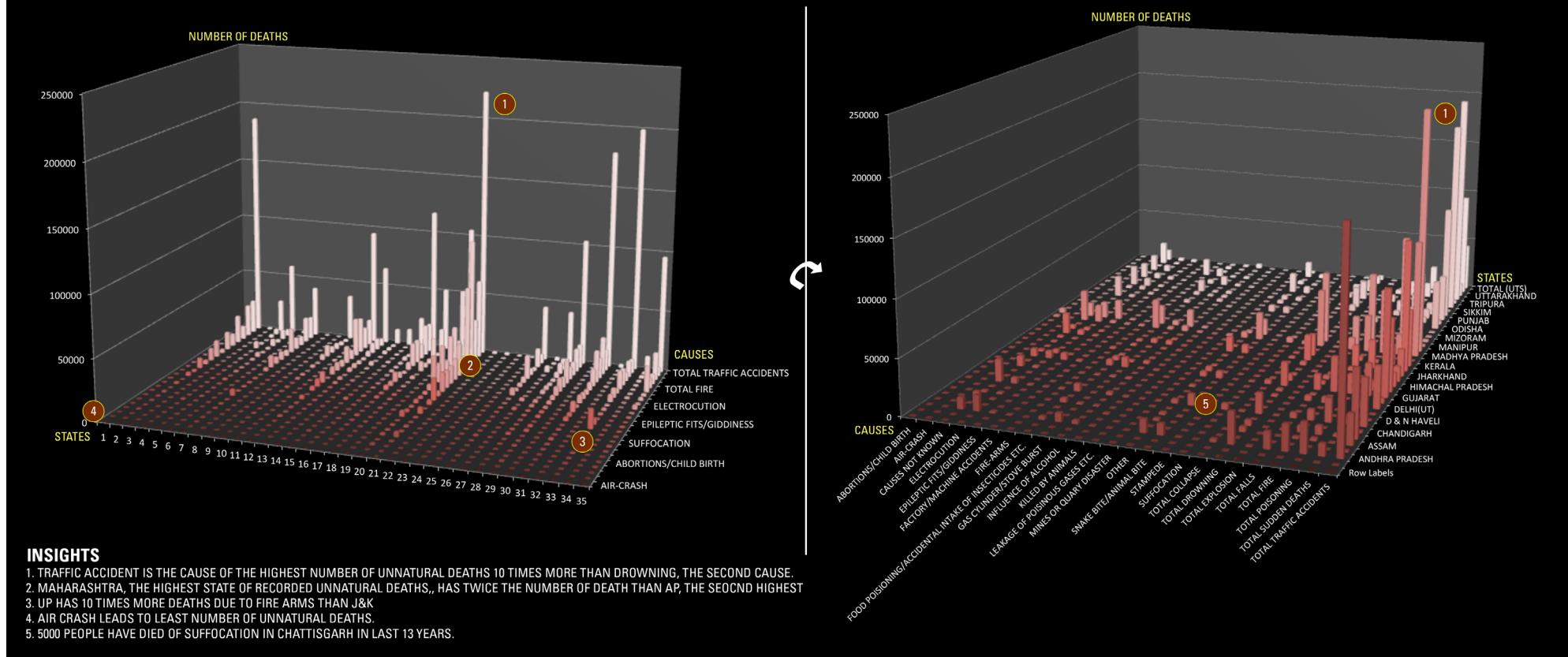




3D Area chart of deaths due to unnatural causes in different states of India



CAUSES OF UNNATURAL DEATHS IN DIFFERENT STATES OF INDIA FROM 2001 TO 2013



3D Bar chart of deaths due to unnatural causes in different states of India from two angles, second rotated 90 degrees clockwise, with insights marked at the bottom

Insights

39,91,006 people have died in India due to unnatural deaths from 2001 to 2013.

Traffic accidents cause much more deaths than any other cause, killing 17,65,587 people.

3,27,373 died due to drowning which is the second leading cause of death, which shows that traffic accidents kill 5 times more people than drowning does.

Only 291 people have died due to air crash.

Highest deaths to be recorded are in Maharashtra - 7,27,452.

Second, Madhya pradesh - 3,83,712

Third, Andhra Pradesh - 3,35,694

Fourth, Tamil Nadu - 3,26,699

Deaths in Maharashtra seem to be almost twice as compared to other 3 states which have more or less similar count.

North Eastern states and Union territories have least amounts of deaths in almost all cases.

Zones of Causes

Causes can be divided in following zones according to the total number of deaths they have caused over the years (Top three states are given in brackets):

Major Cause of Deaths

Traffic accidents : 17,65,587 (Maharashtra, UP, AP)

4,00,000 to 1,00,000 Deaths

Drowning : 3,27,373 (Maharashtra, MP, AP)

Poisoning : 3,27,233 (MP, Maharashtra, TN)

Sudden deaths : 2,85,563 (Maharashtra, Gujarat, MP)

Fire : 2,80,433 (Maharashtra, MP, Gujarat)

Cause unknown : 2,19,119 (MP - 28,546, WB, Chhattisgarh)

Falls : 1,31,789 (Maharashtra, AP, Gujarat)

Food poisoning : 1,06,867 (MP, Maharashtra, Rajasthan)

1,00,000 to 30,000 Deaths

Electrocution : 99,822 (MP, Maharashtra, AP)

Snake/Animal Bite : 98,406 (MP, Maharashtra, AP)

Gas cylinder burst : 49,229 (Gujarat, TN, AP)

Epileptic Fits/Giddiness : 43,148 (Maharashtra, Gujarat, TN)

Collapse : 34,657 (UP, Maharashtra, Gujarat)

30,000 to 0 Deaths

Fire-arms : 24,523 (UP - 16332, J&K - 1668, MP)

Suffocation : 19,721 (Chattisgarh - 5316, MP, UP)

Killed by Animals : 11,794 (Maharashtra, MP, Orissa)

Factory accidents : 11,116 (Gujarat, Maharashtra, MP)

Abortion : 10,173 (Maharashtra, MP, UP)

Explosion : 8,007 (AP, UP, Maharashtra)

Stampede : 2,243 (AP, Maharashtra, TN) and

Least amounts of deaths

Air crash : 291 (Maharashtra, Goa, AP)

Some facts from above,

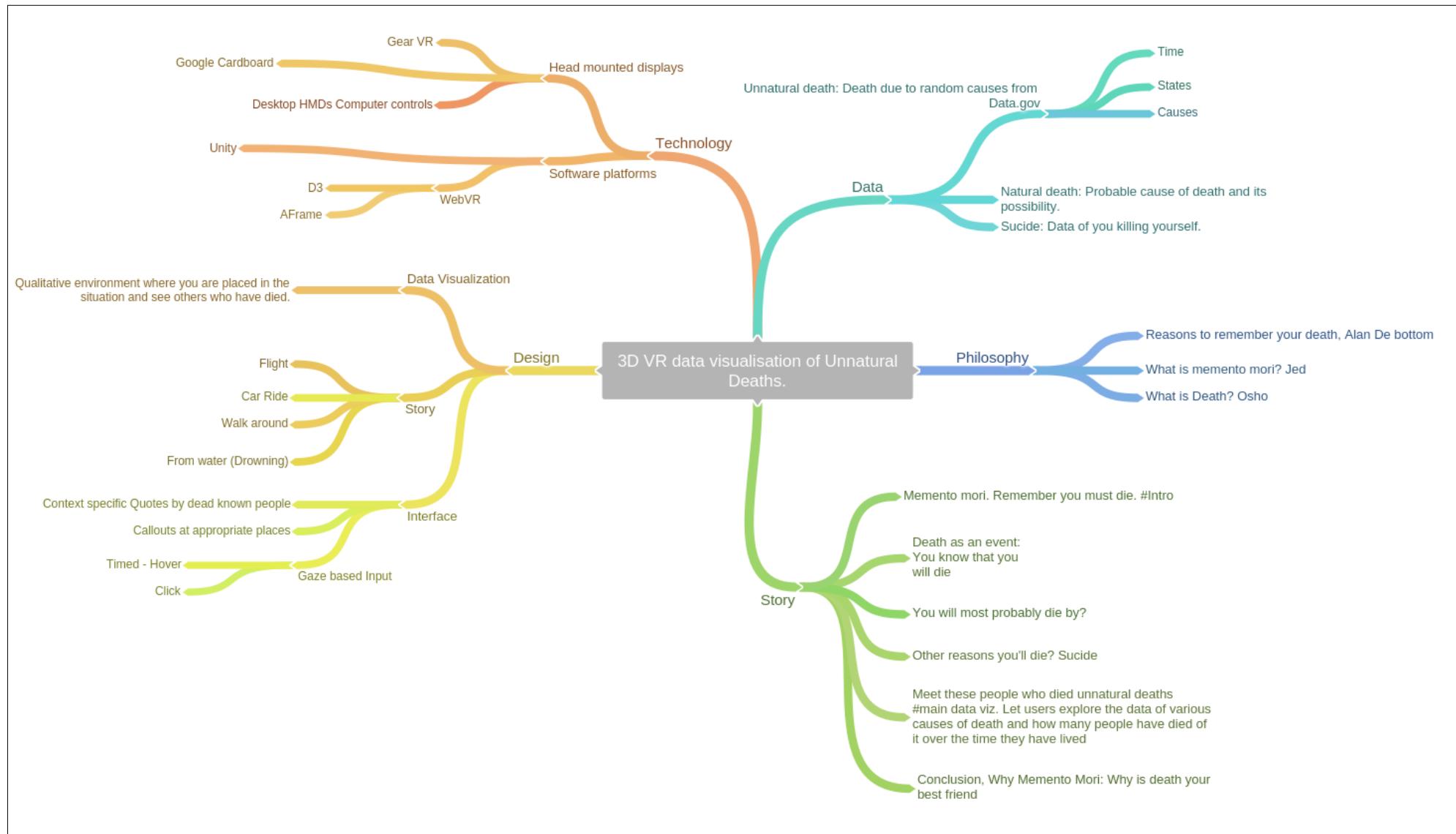
UP has a epic proportion of deaths due to firearms, almost ten times more than J&K, the second state in the line.

Maharashtra comes in top three in almost all the cases.

More than 5,000 people have died due to suffocation in Chattisgarh.

The cause of 7% of sudden deaths in MP is unknown.

Mind Map



Mind Map of the general direction of the project

Design Idea

Qualities of Virtual Reality (VR) are immersion and subjectivity.

A popular method of data storytelling is personalisation which can make good use of this quality of the medium. Personalisation is to try to create story consciously to connect directly to the audience and their need to understand certain things. To do this, often the best way is to allow them to make the story about themselves. Power of medium like Virtual Reality to create immersion and subjectivity can be used to create this effect.

As far as abstract theme like death is concerned it is tainted by negativity and taboo. But according to many traditions and philosophies, reminder of death is a very positive thing for a mature human adult. The idea is to recall one's own death as against death as an event that takes place in everyone's lives. In art, 'Mementos Mori' are artistic or symbolic reminders of mortality. In practice people used to keep skull on dead men as a reminder of their own death.

I think, this data of unnatural deaths can be used in this context of 'Mementos Mori'. In the sense that looking at these people who have died of these unnatural causes and you being just a human remember you will die as well.

As stated by these syllogisms,

From

Major premise: All mortals die.
Minor premise: All men are mortals.
Conclusion: All men die.

,

All men are mortals.
Socrates is a man.
Socrates is a mortal.

To

If All humans are mortals.
And You are a human.
Then You are a mortal.

Remember you must die.

Done.

The visualisation spaces can be designed to keep the user in the situation in which these deaths have occurred and here he can do the data exploration of deaths of these people. So the idea is to keep the user in the situation / environment where he can find himself about to die and explore the data of people who have died of those causes and perhaps remind himself that death as his most certain subjective reality. A Virtual Reality data visualisation experience around this idea with perspectives of death from different philosophies, as against the mainstream understanding of it, seems to be a good way to go about it, does it?

City of the dead

The City of the dead is the idea in which data is arranged in 3D bar charts with x-axis as the states in alphabetical order, z-axis are the causes in ascending order of deaths and y-axis is the number of death. It's a terrain of bar charts which the user can explore in multiple ways from worm eye to birds eye view. He can walk around, drive a car and fly a plane to explore different things in data. He can read callouts and be pointed out to different insights in the data.

Traffic accidents cause highest deaths, drowning cause the second highest, while ari-crash cause the least deaths. Borrowing form the data the city is build on a water body with a road around the 3D bar chart.

The experience starts with the user sitting in the car and is being introduced to the data and experience. Reaching trafficaccidentszone, there is a carcrash and the user becomes a ghost and enters the city of the dead. Here he can walk around and navigate the city. There are other places around the city where he can come, die and then enter the city of dead. These are places like tall places where he can fall from, collapsable buidings, fire arms etc. The bar charts are like a monument at the center of the city which forms the major part of it.

Interaction

Toucer over data points

Select range/chunk of

- State(s)

- Cause(s)

- Relative size of
you to maze.

Maze based Infraface

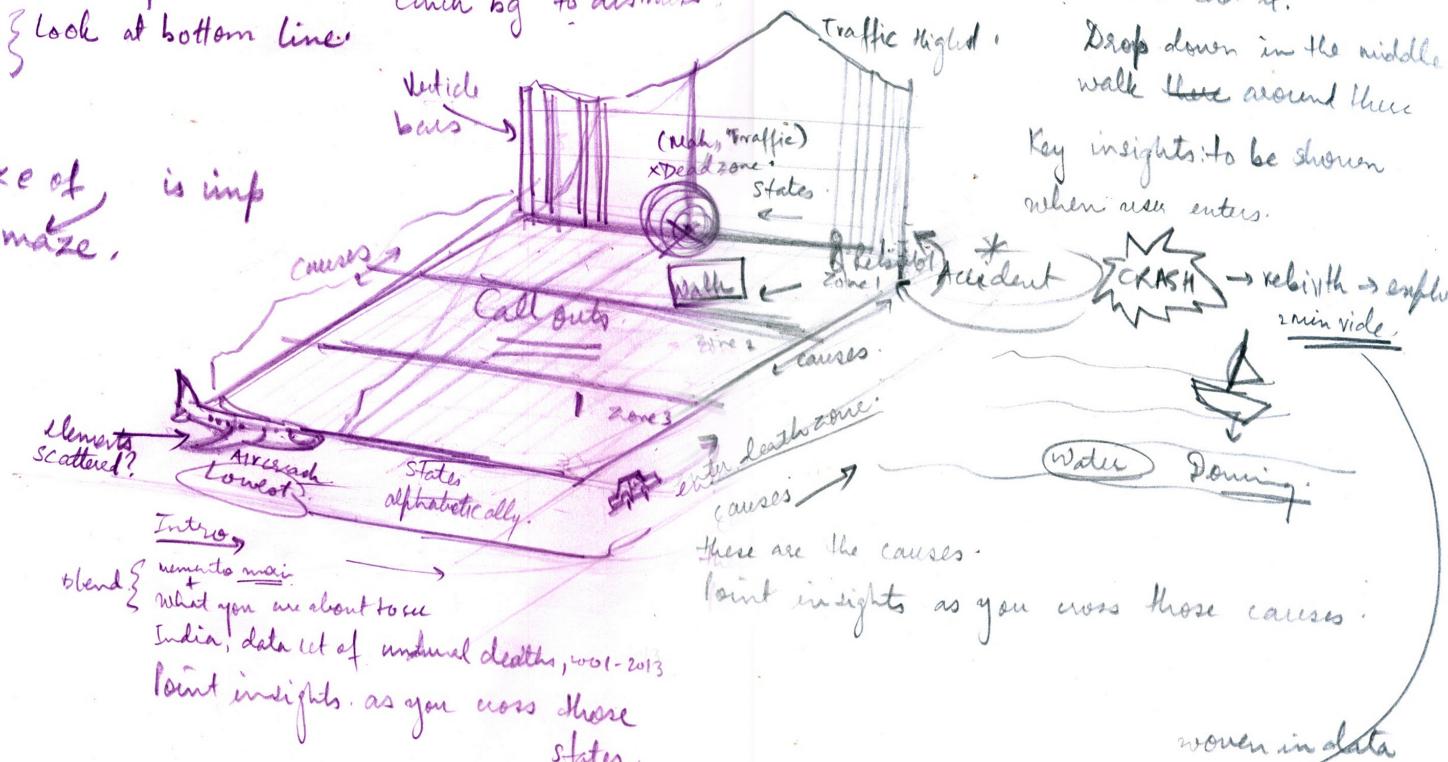
Basic buttons

and click to select Maze of the dead.

& toucer

Indian city of the dead.

click bg to dismiss.



Car ride

24th feb 2017

Intro text

Legends

what this viz is doing,
how to read it.

Drop down in the middle
walk there around there

Key insights to be shown
when user enters.

→ rebirth → explu
2 min ride



Water Drowning

these are the causes.

Point insights as you cross those causes.

woven in data

To tell the story

Explain dataset

Legends and layout

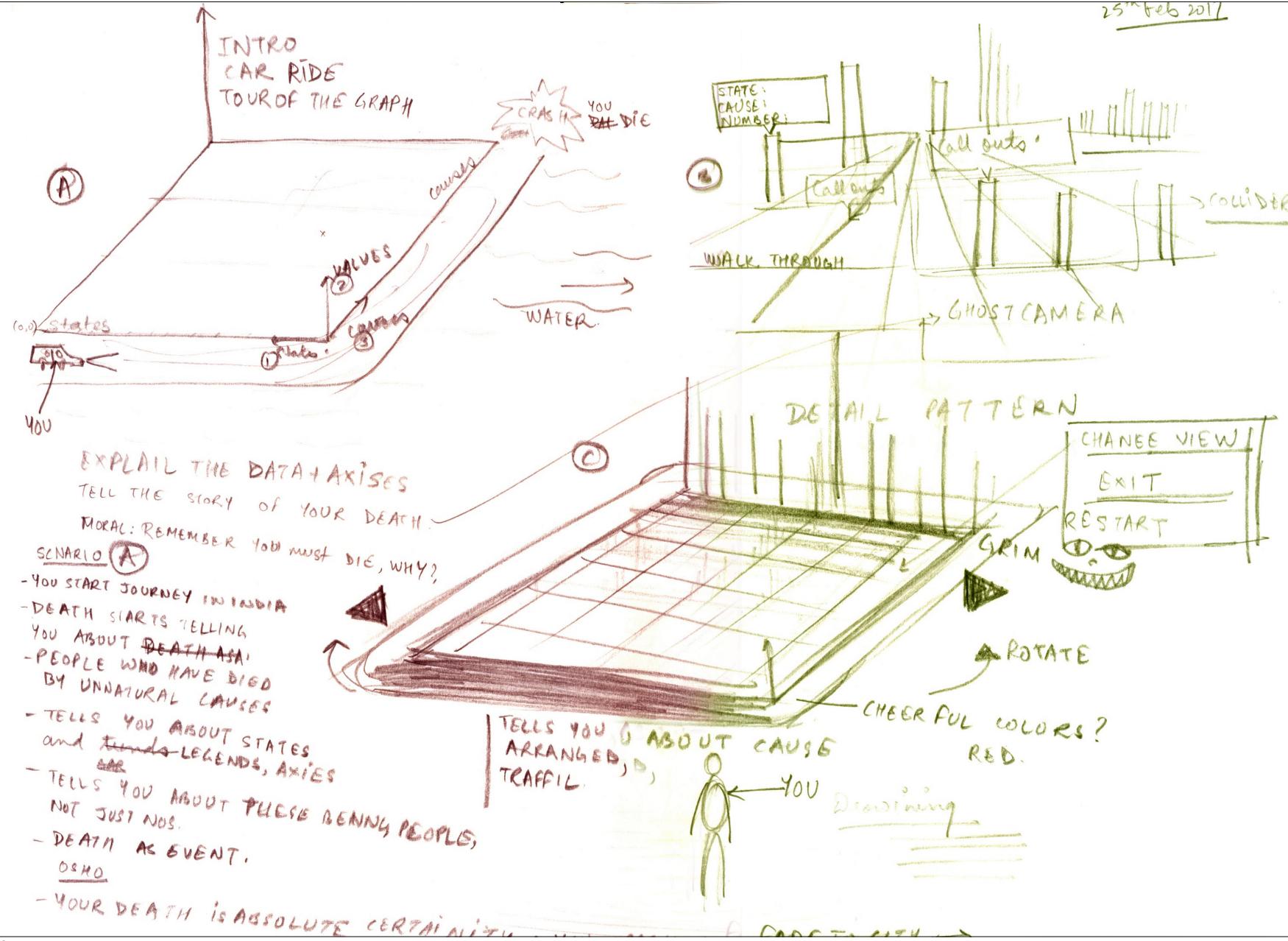
Insights

Die → Remember you must die

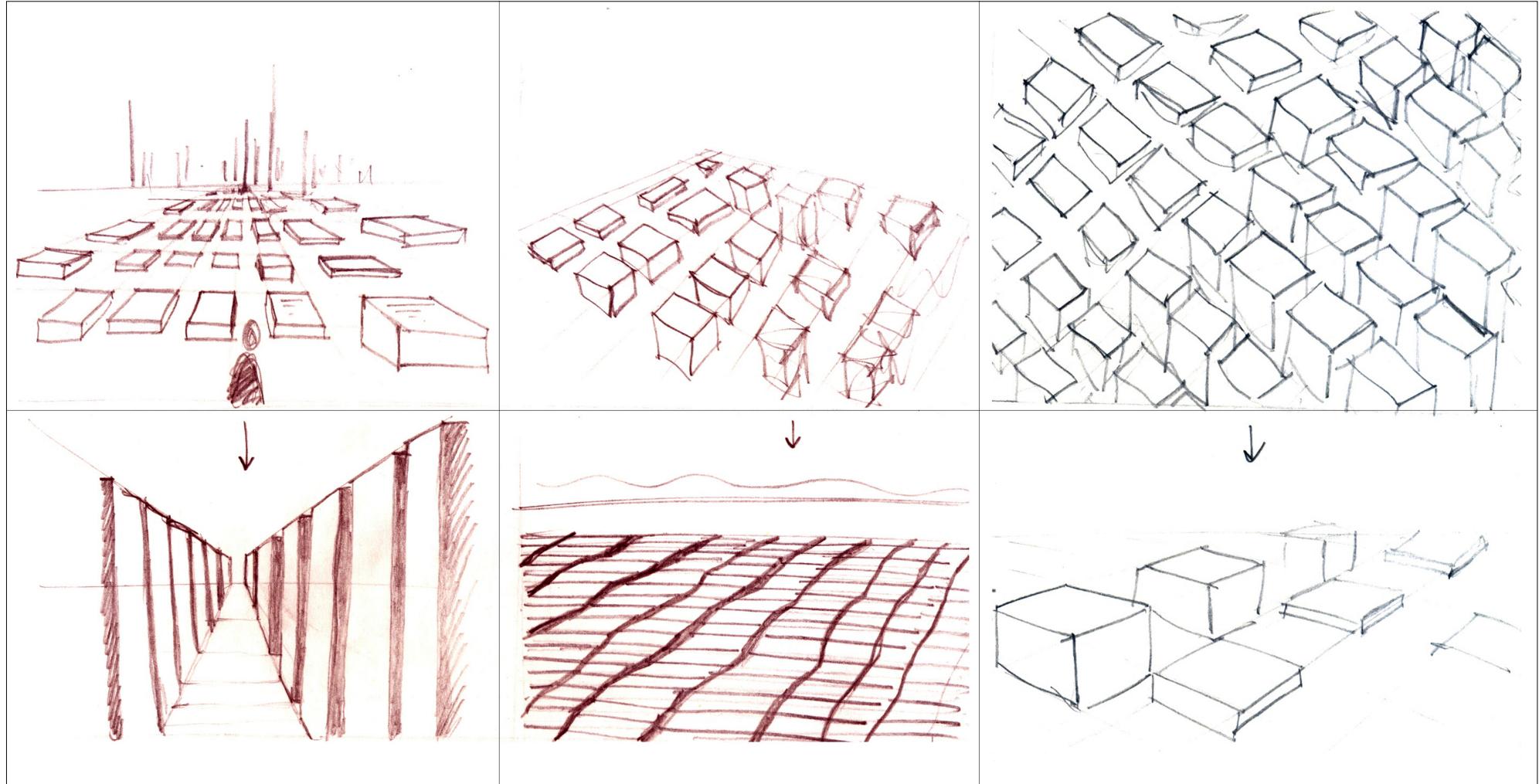
Data story of Unnatural deaths in India from 2001 to 2013

First drawing of the city of the dead with all major points highlighted

25th Feb 2011

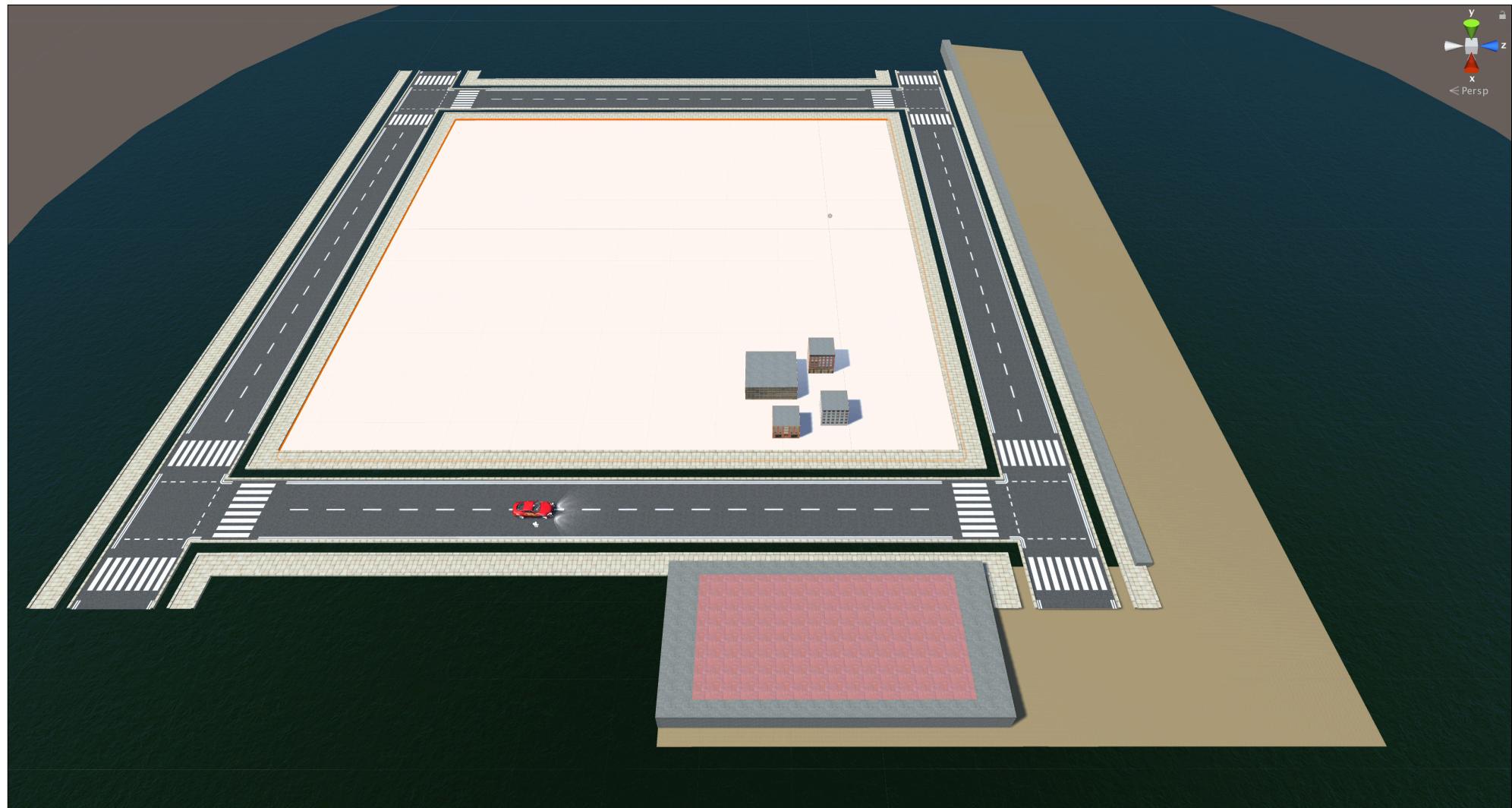


Different views of the city; car drive, walk and from water

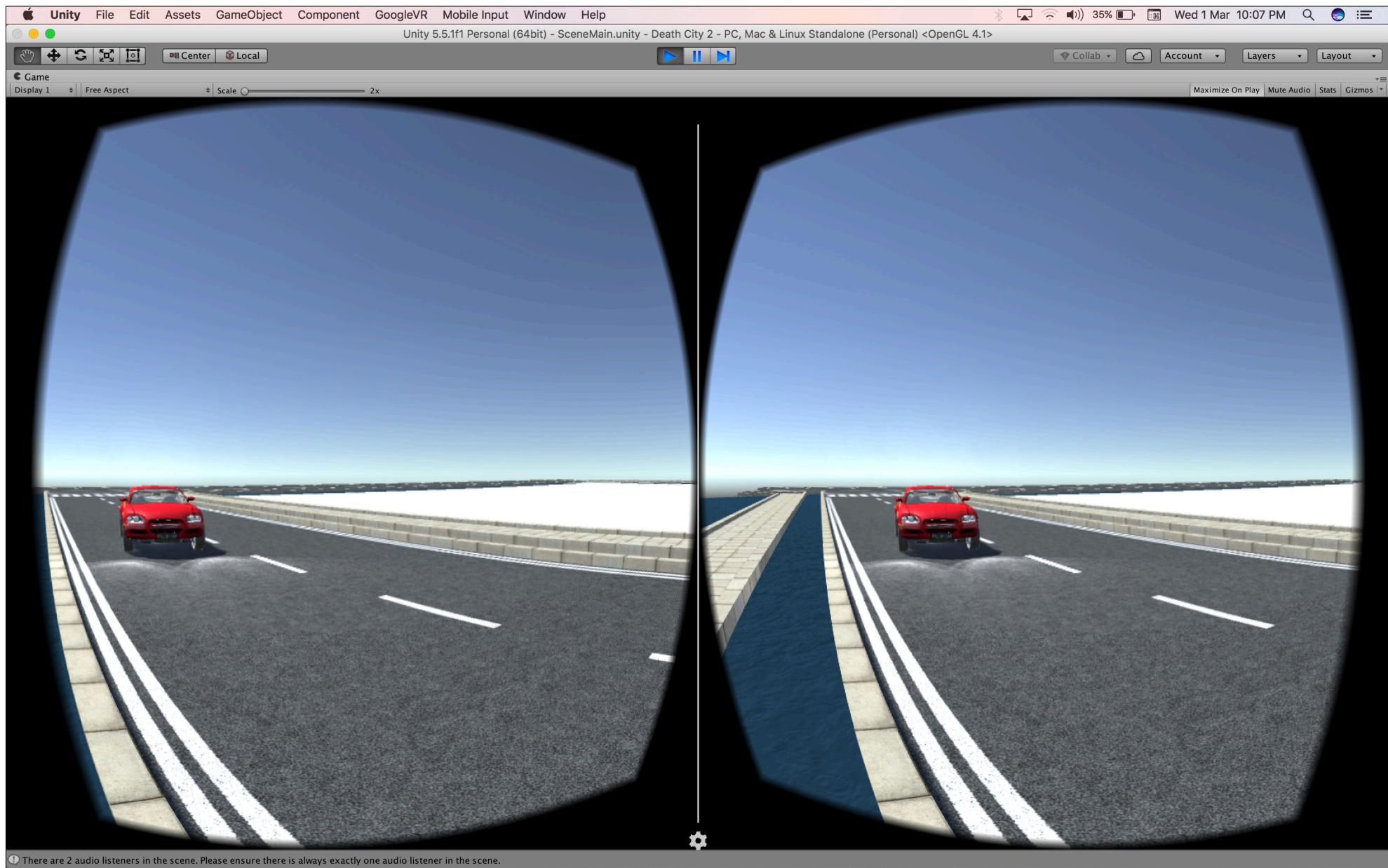


Drawings of different views / perspectives from which the visualisation can be viewed

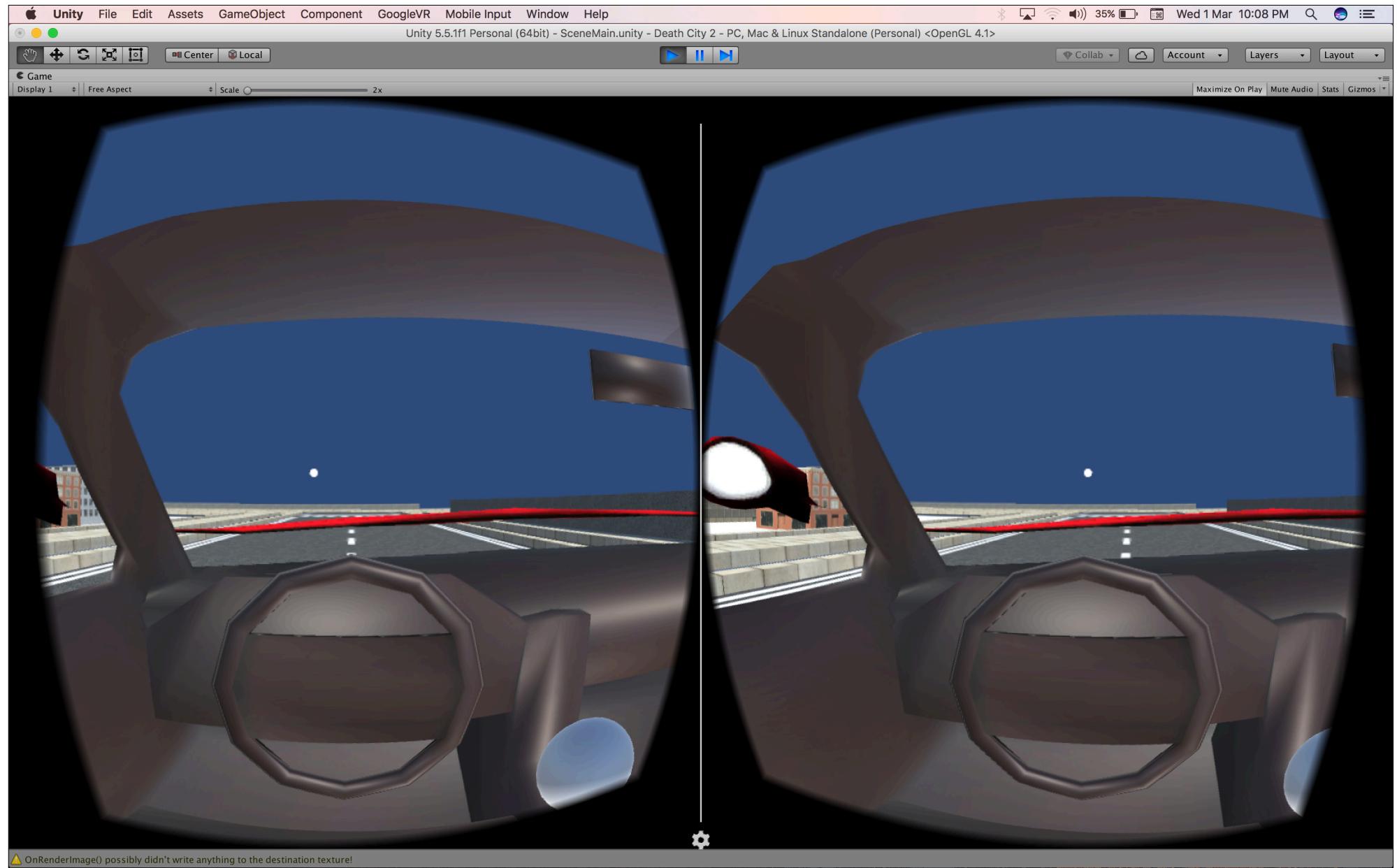
Prototype 2



Layout in Unity



VR view, Walking through the scene



⚠ OnRenderImage() possibly didn't write anything to the destination texture!

VR view, Driving the car

Interaction and Scenarios

To be Written.

Storyboard

To be Written.

Final Design

To be Written.

Evaluation

To be Written.

Conclusion

To be Written.

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LoVR

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