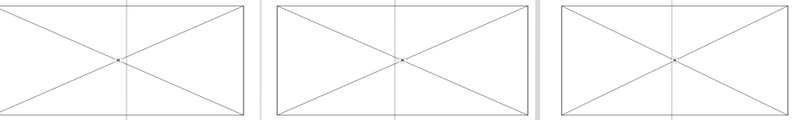
Rapid Prototyping of Data Visualizations

Romain Vuillemot
@romsson



UNIVERSITÉ DE LYON
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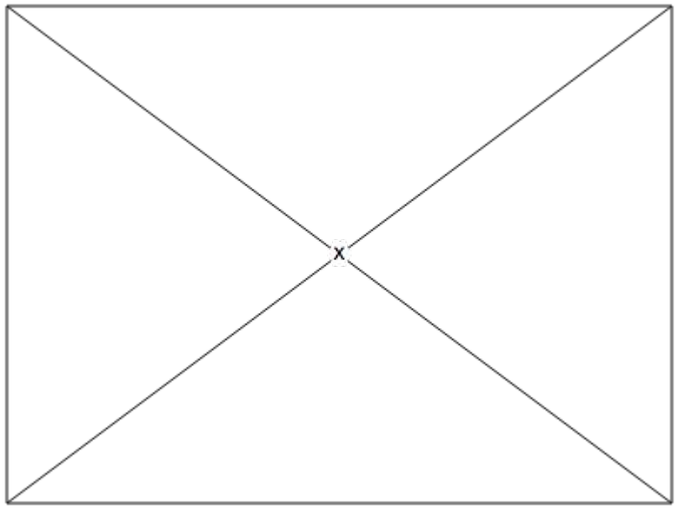
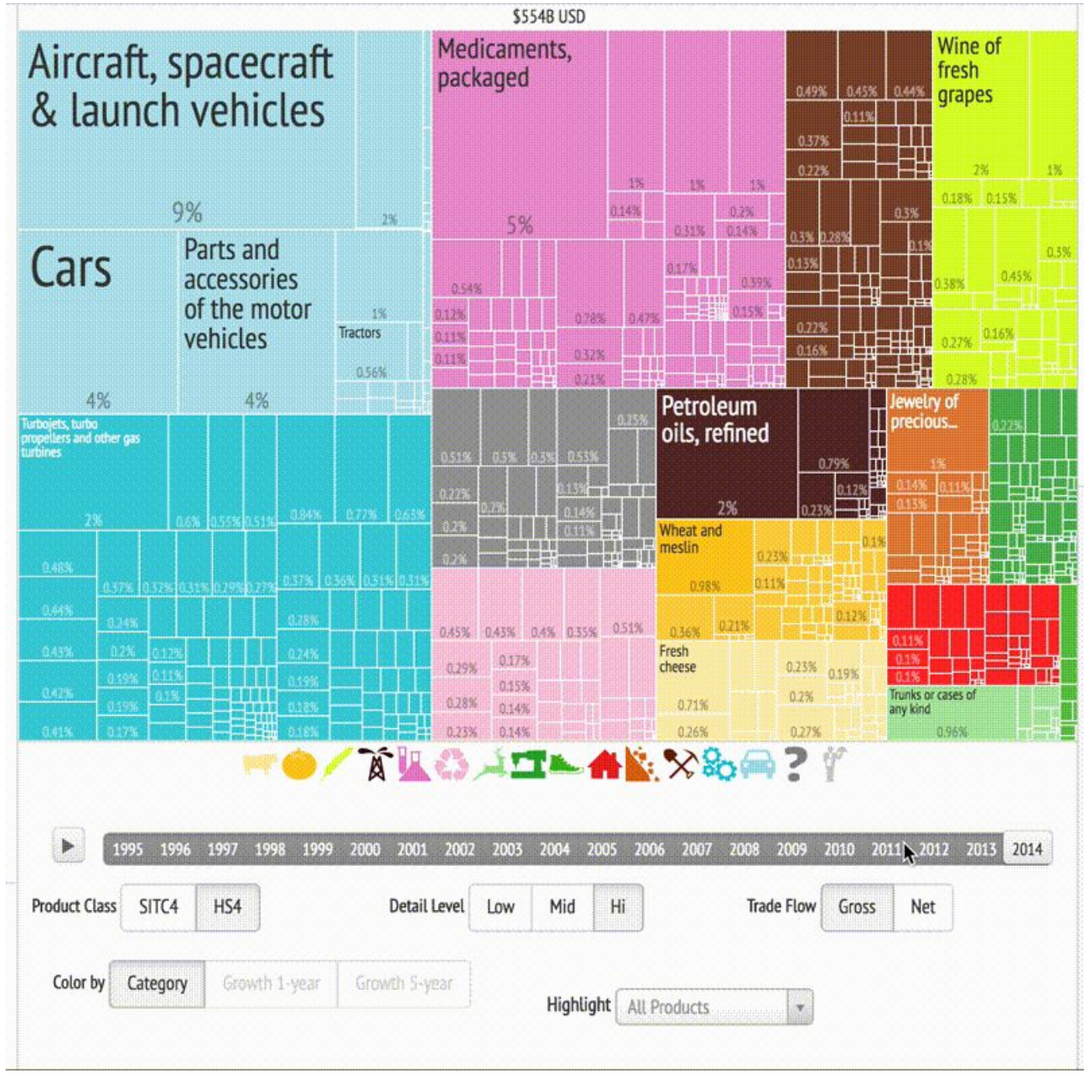


Economists
& Researchers

R&D Team

R&D Team

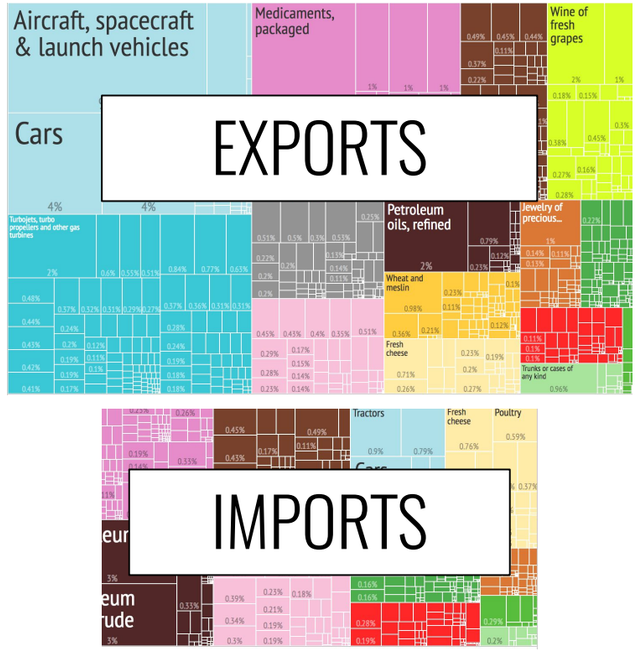
Economists
& Researchers



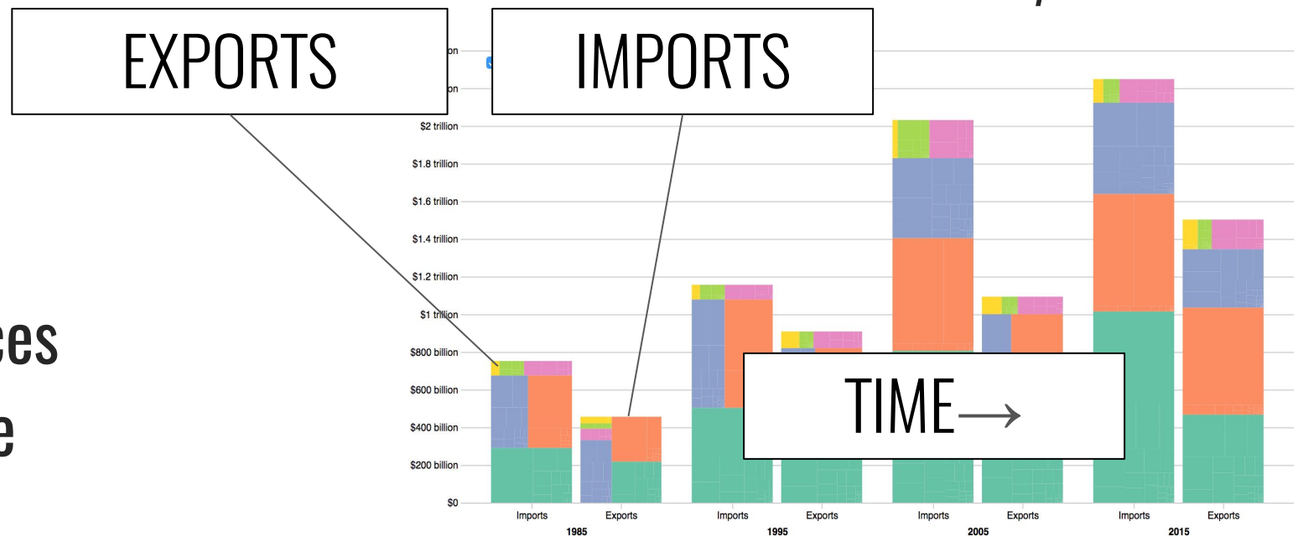
Economists
& Researchers

R&D Team

- But
  - Limited **time**
  - Limited **technical resources**
  - Data may **not be available**



"Double treemap"



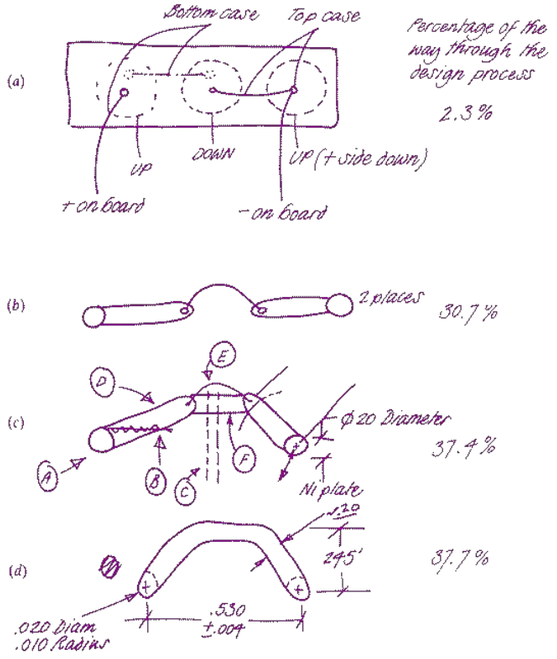
"Temporal treemap"

How to facilitate the creation of data visualizations?

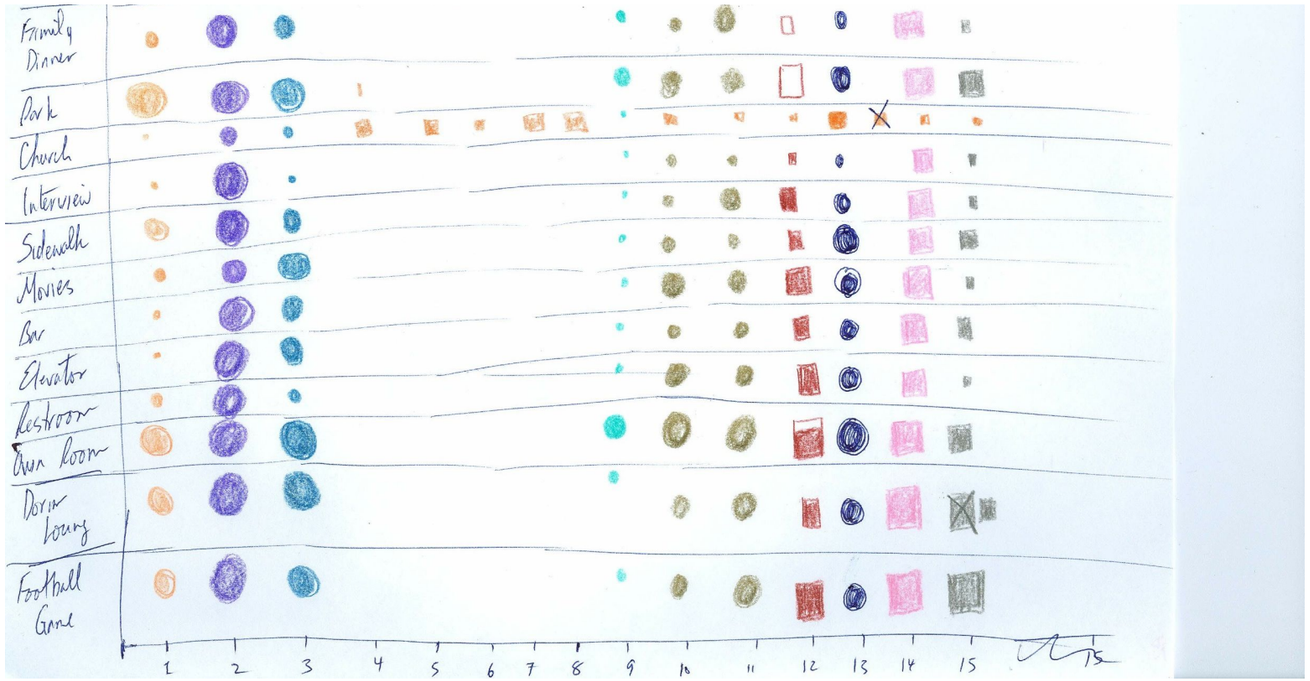
Sketching

Design Process

Visual Tools



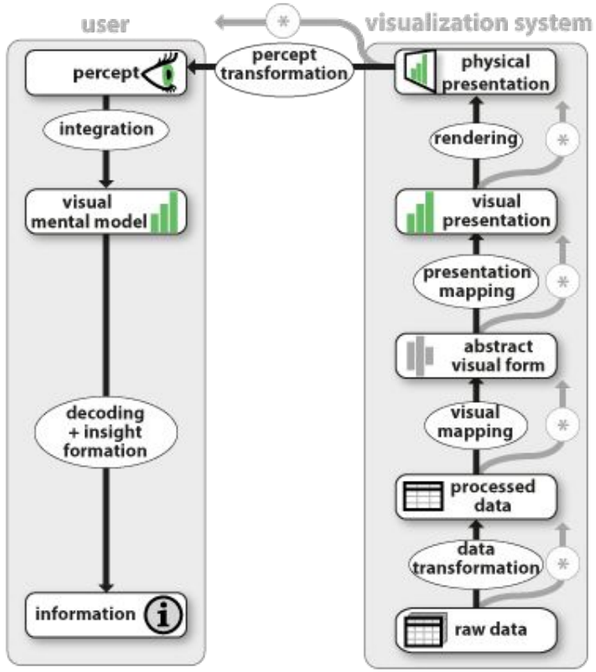
[Ullman, 1990]



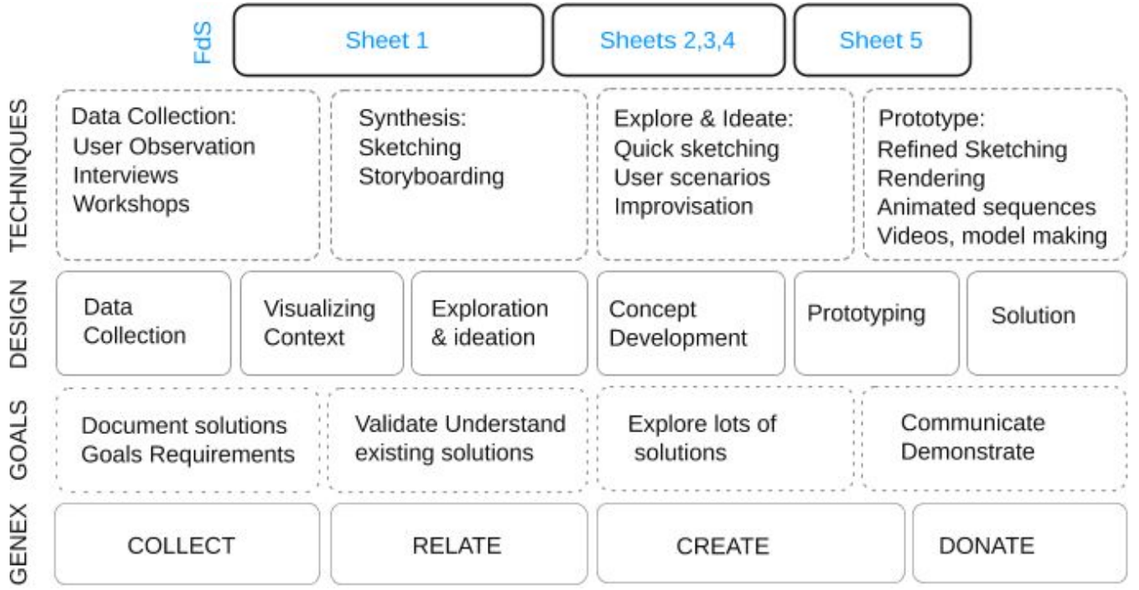
[Walny, 2015]

Romain Vuillemot, Jeremy Boy. Structuring Visualization Mock-ups at the Graphical Level by Dividing the Display Space. *IEEE Transactions on Visualization and Computer Graphics (InfoVis '17).*

Sketching **Design Process** Visual Tools



[Card, 2009] & [Jansen, 2013]



[Roberts, 2009]

Romain Vuillemot, Jeremy Boy. Structuring Visualization Mock-ups at the Graphical Level by Dividing the Display Space. *IEEE Transactions on Visualization and Computer Graphics (InfoVis '17).*

Sketching Design Process **Visual Tools**

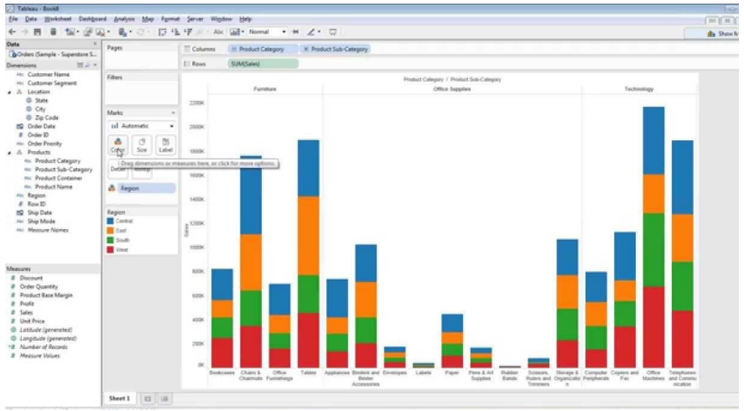
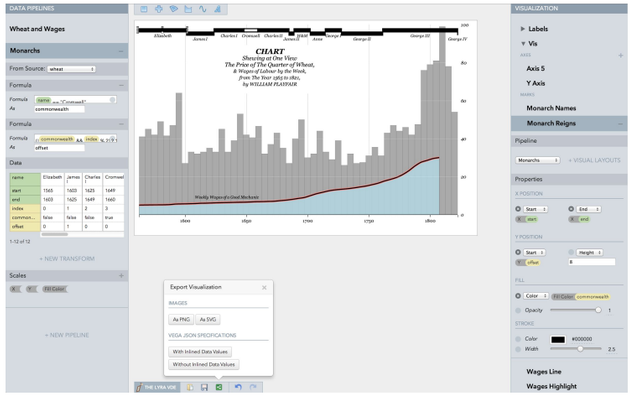
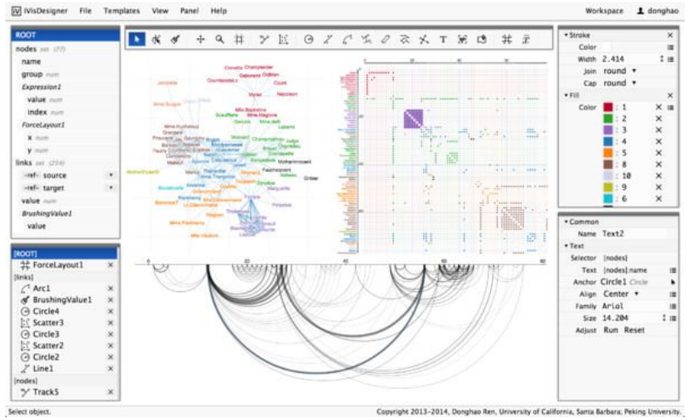


Tableau [Stolte, 2002]

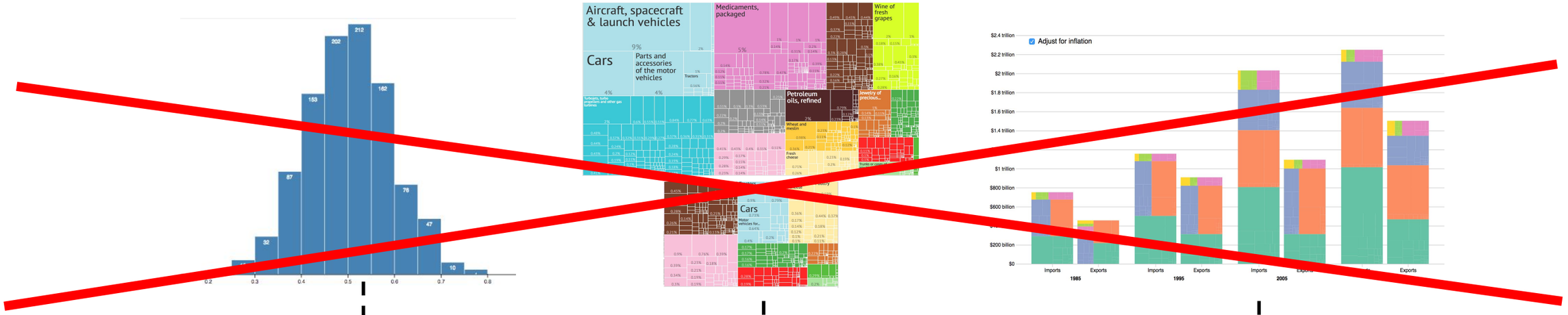


Lyra [Satyanarayan, 2014]

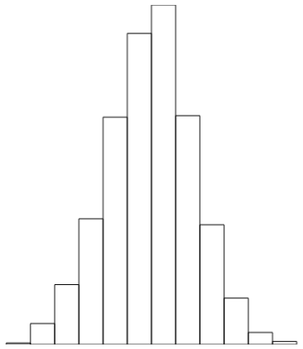


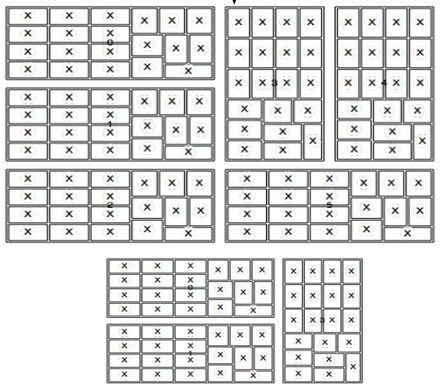
iVisDesigner [Ren, 2014]

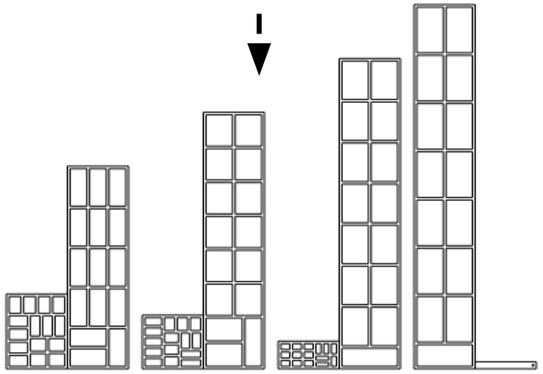
Romain Vuillemot, Jeremy Boy. Structuring Visualization Mock-ups at the Graphical Level by Dividing the Display Space. *IEEE Transactions on Visualization and Computer Graphics (InfoVis '17).*



Mock-ups





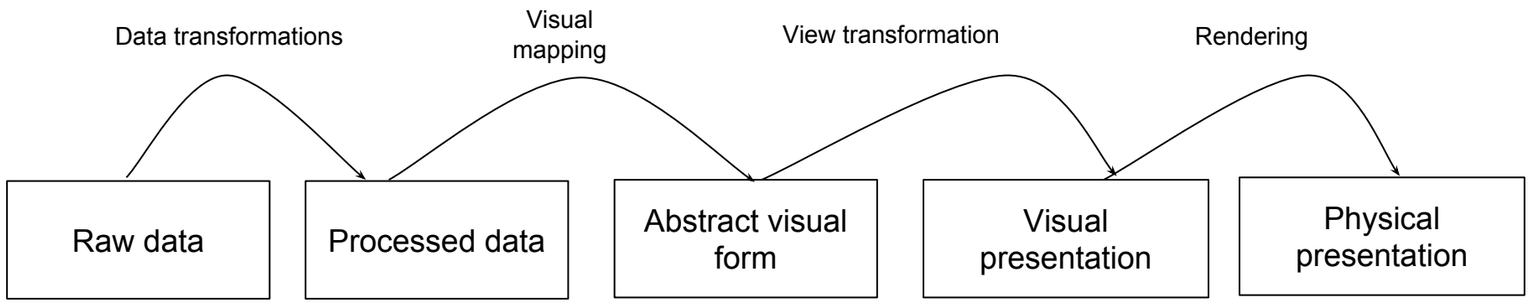


- **Conversation medium** with stakeholder
- **Focus** on main design decisions

Mock-ups in Graphic Design

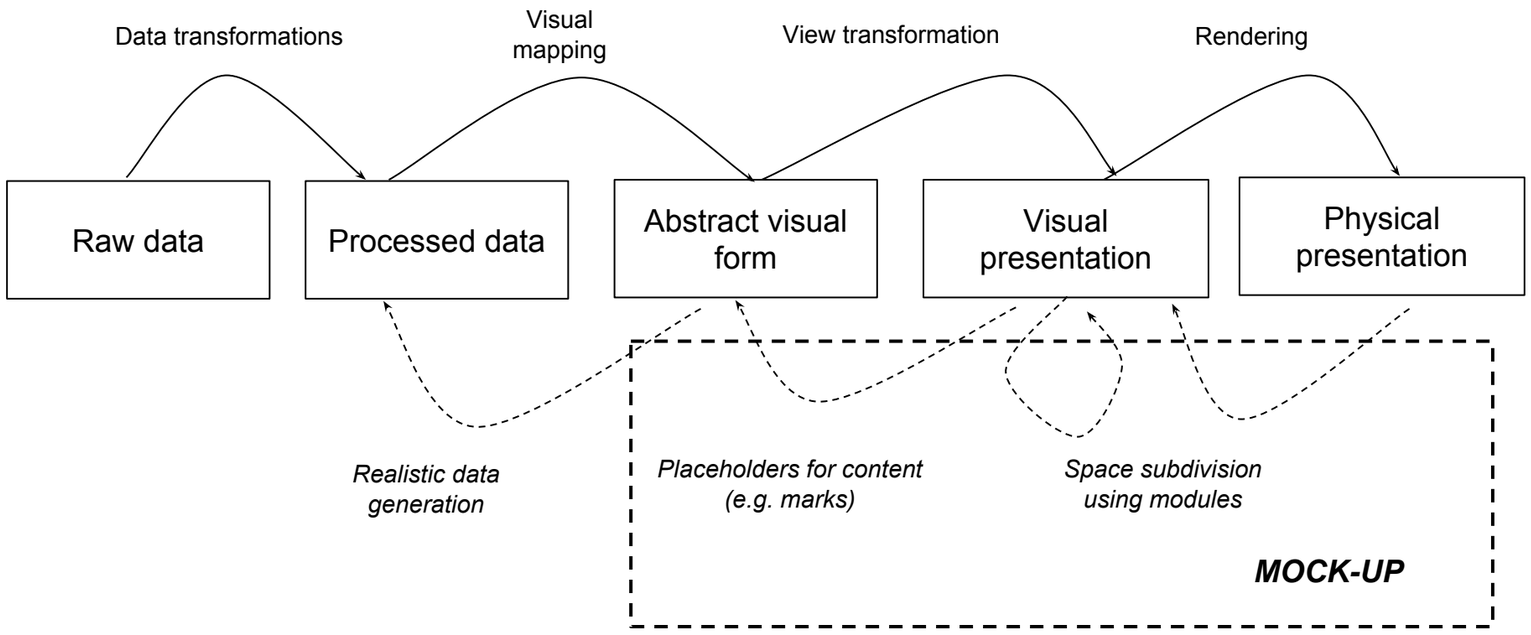
Data and Display

Data-to-display



Data and Display

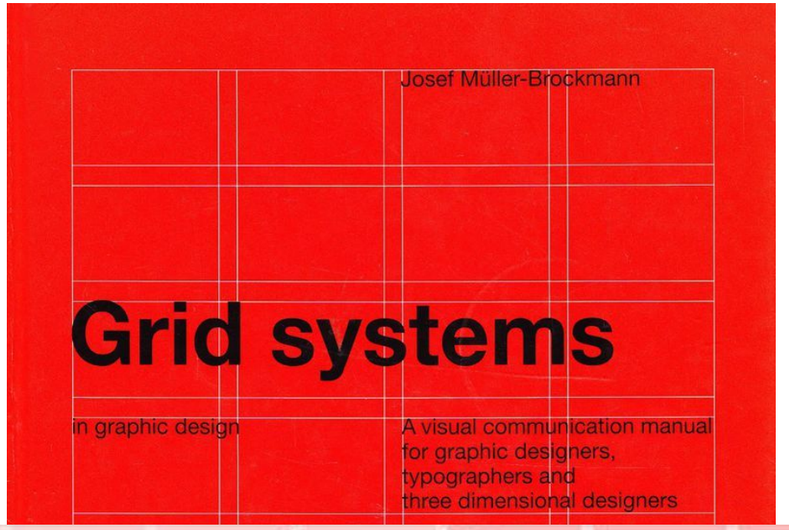
Data-to-display

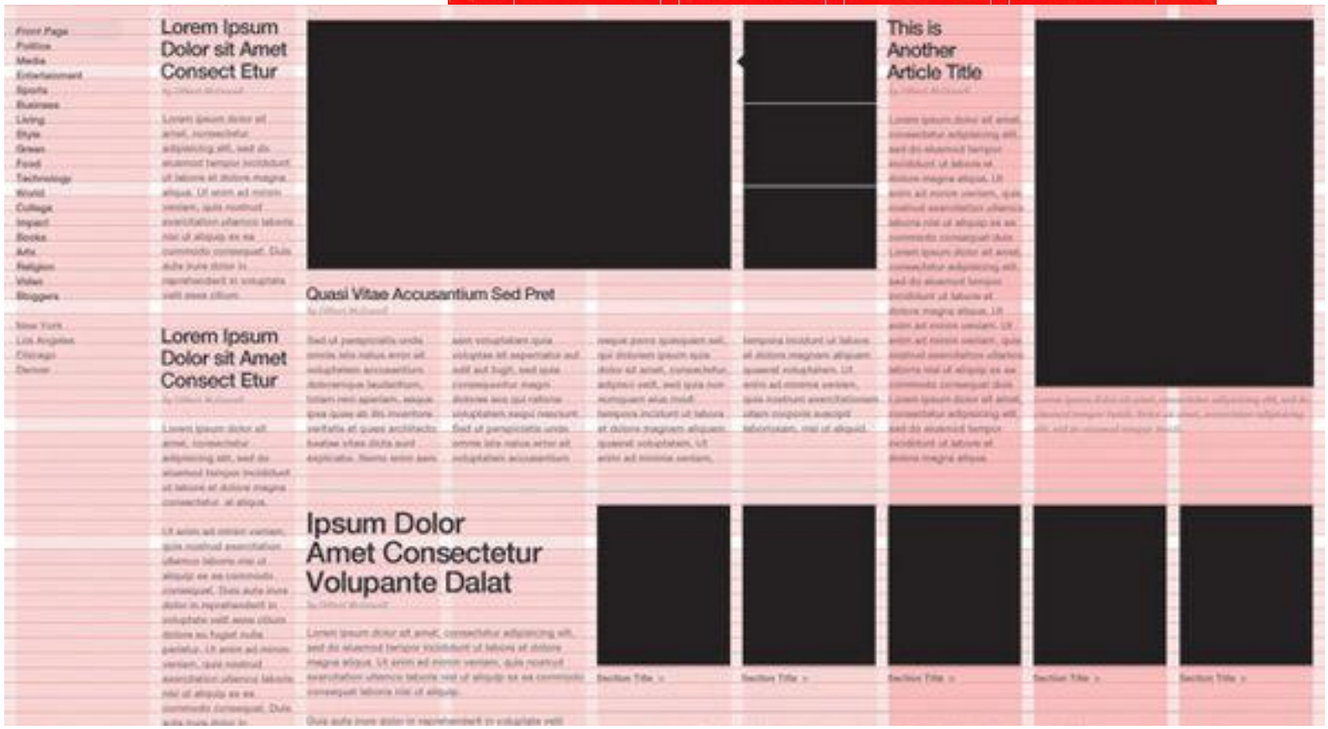


Display-to-data

Graphics design

- **Designer** cannot always wait for final content (like data)
- Favor **parti pris** instead of data insights
- Use **mature tools** (e.g. Adobe Illustrator)





Graphics design

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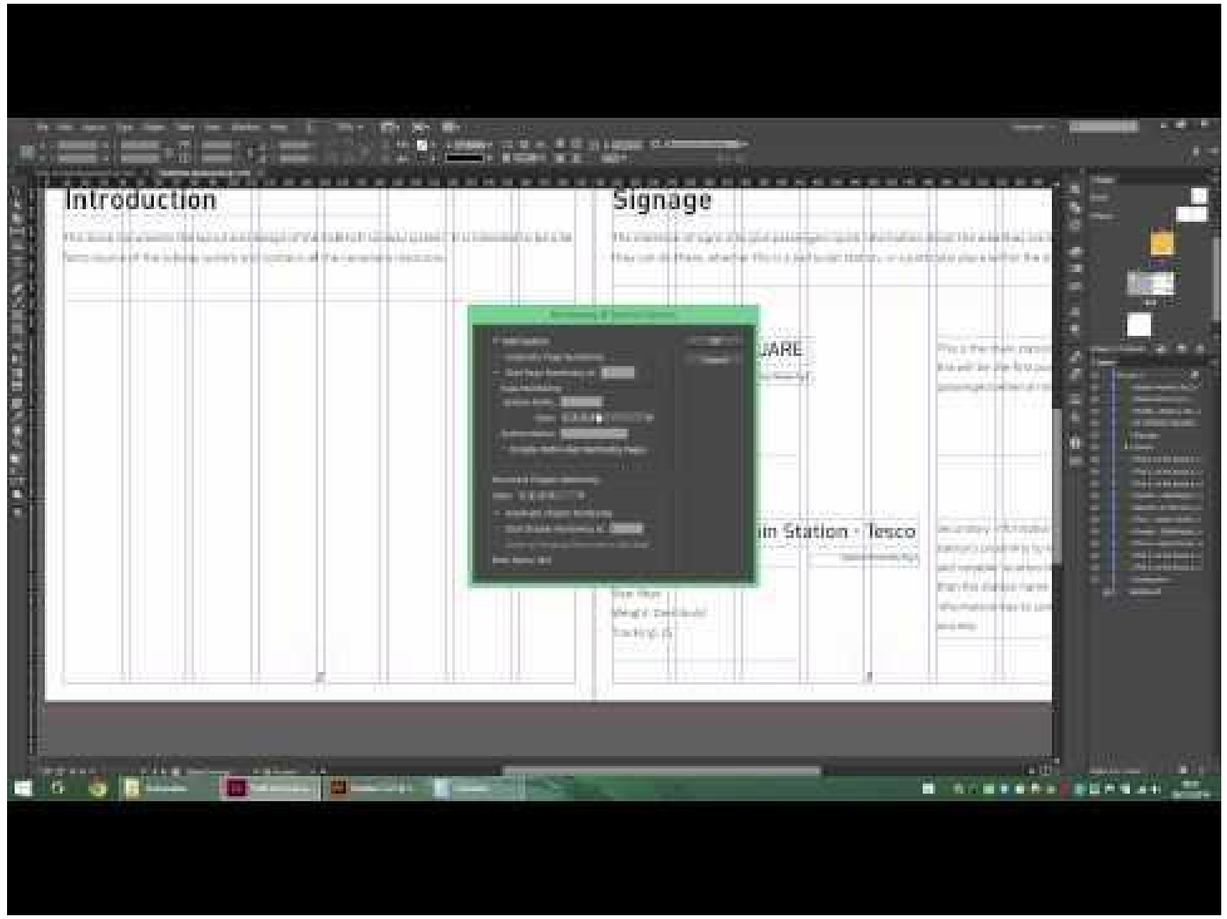
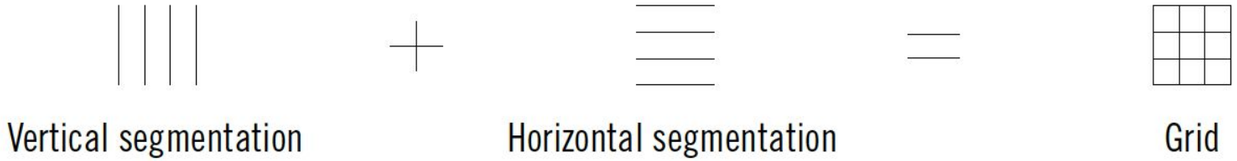
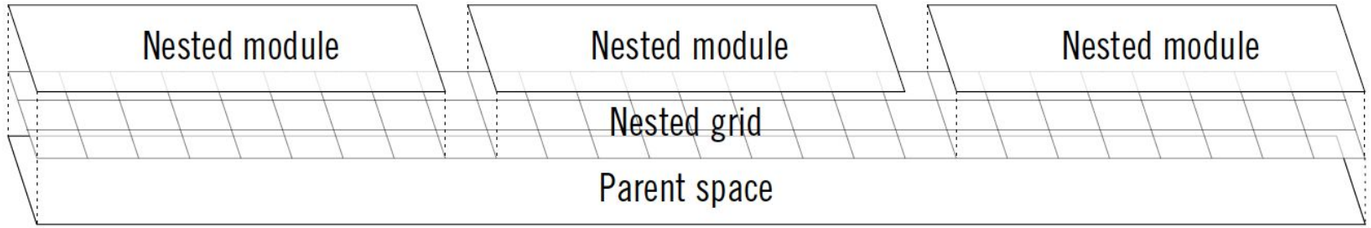


Grids and modularity

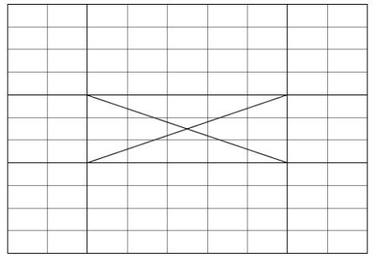
- Grids result from **vertical** and **horizontal** segmentations

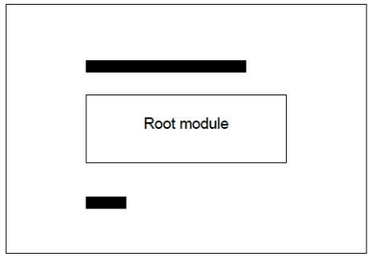


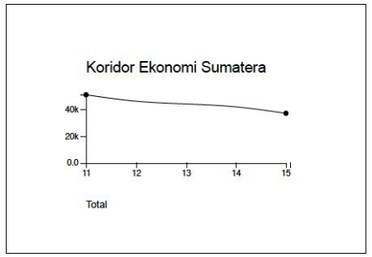
- Grids allow to place placeholders for content



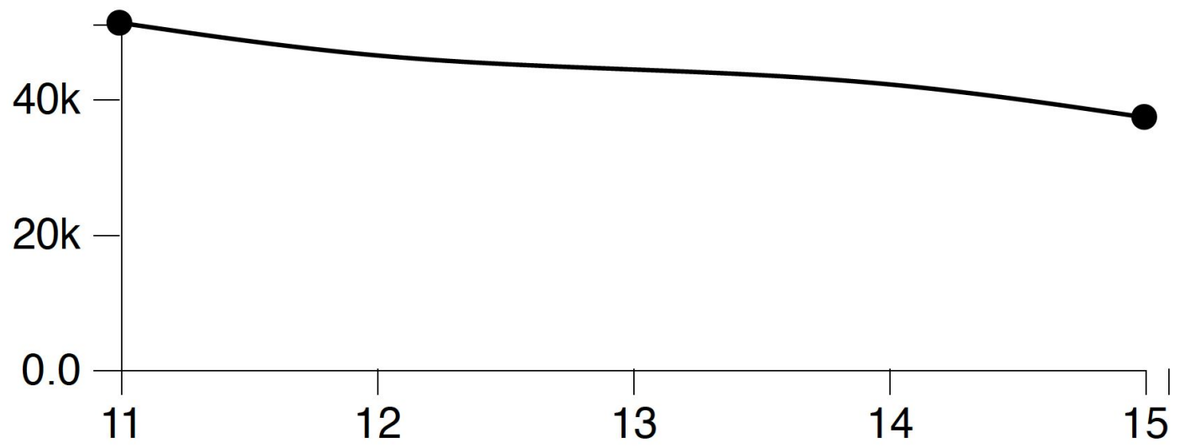
- Grids also allow to place modules that can nest other modules or placeholders







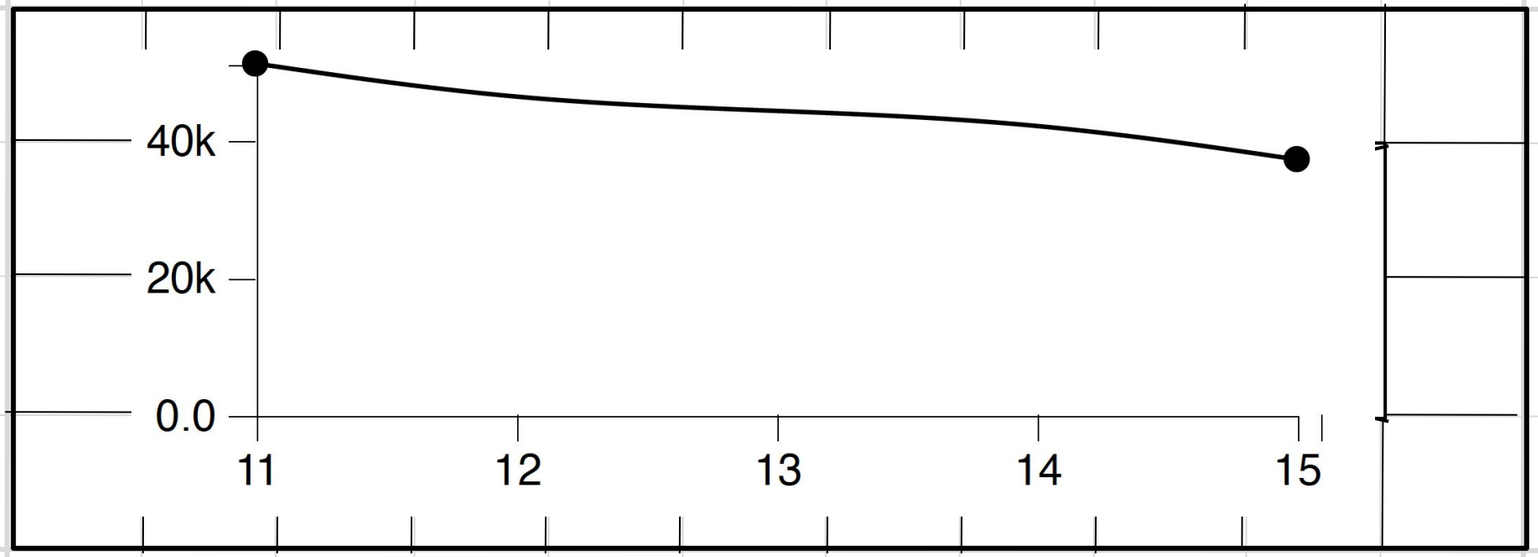
Koridor Ekonomi Sumatera



Total

Module

Koridor Ekonomi Sumatera

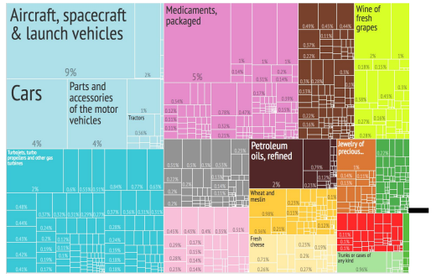


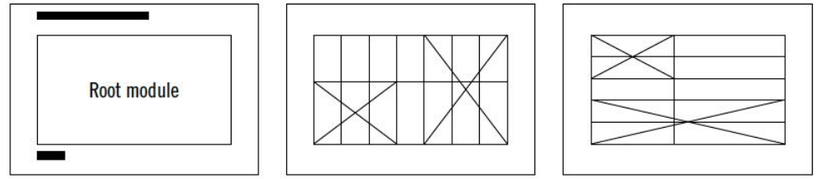
Total

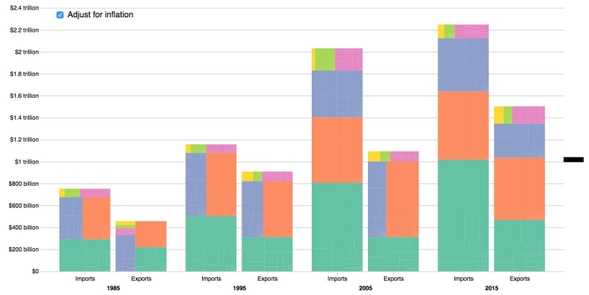
- Elements are proportional to the page
- Based on realistic values

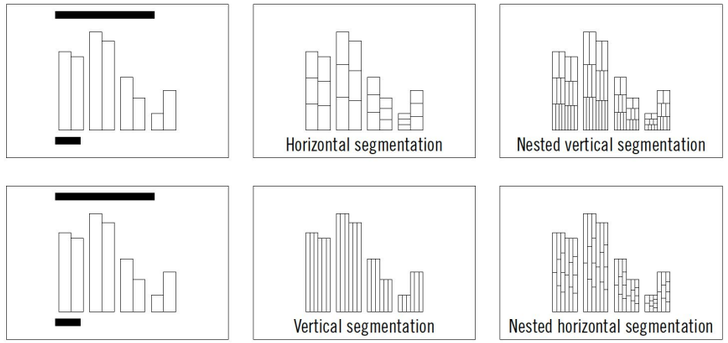
Grids and modularity

- But remains handcrafted
  - difficult to test variations
  - difficult to include data (when available)







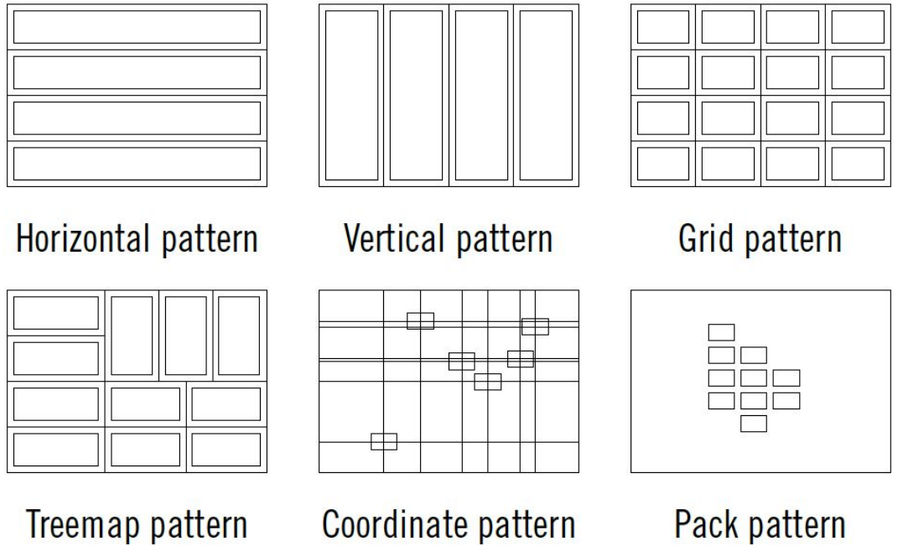


Novel Tools for Rapid Prototyping

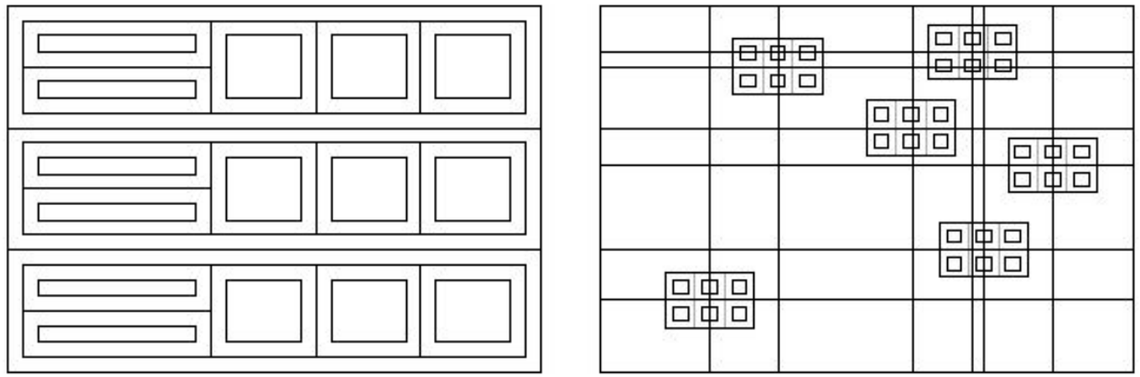
https://github.com/romsson/d3-gridding

Graphical Vocabulary

Partitioning



Nesting



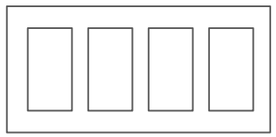
https://github.com/romsson/d3-gridding

Implementation

```
1  // Canvas properties
2  var width = 400, height = 300;
3
4  // Realistic data generation
5  var data = [], nb_year = 4, nb_flow = 2,
       nb_product = 10;
6  d3.range(nb_year).map(function(y) {
7    d3.range(nb_flow).map(function(f) {
8      d3.range(nb_product).map(function(p) {
9        data.push({"year": y, "flow": f, "product":
             p});
10     });
11   });
12 });
13 var nesting = ["year", "flow", "product"];
14
15 // Partitions parameters
16 var params = [{
17   "size": function() { return [width, height]; },
18   "offset": function(d) { return [0, 0]; },
19   "mode": "vertical",
20   "valueHeight": "__agg_sum",
21   "orient": "up",
22   "padding": 2
23 }, {
24   "size": function() { return [width, height]; },
```

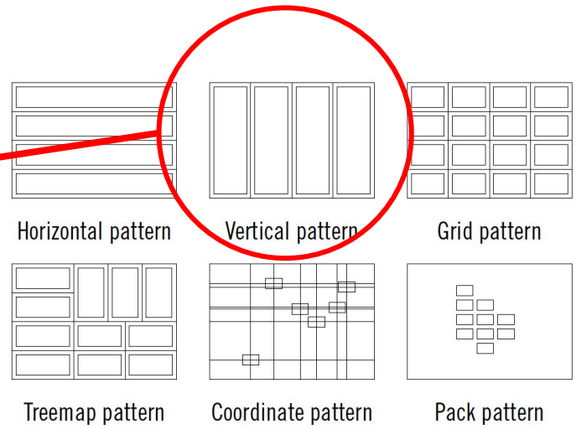
Offset Padding Orientation

```
[▼ Object                    ]
    years: [2005, 2006, 2007, 2008]
    flow: ["import", "export"]
    categories: Math.ceil(5 * Math.random())
    products: Math.ceil(10 * Math.random())
 ...
```



Grid

Nesting



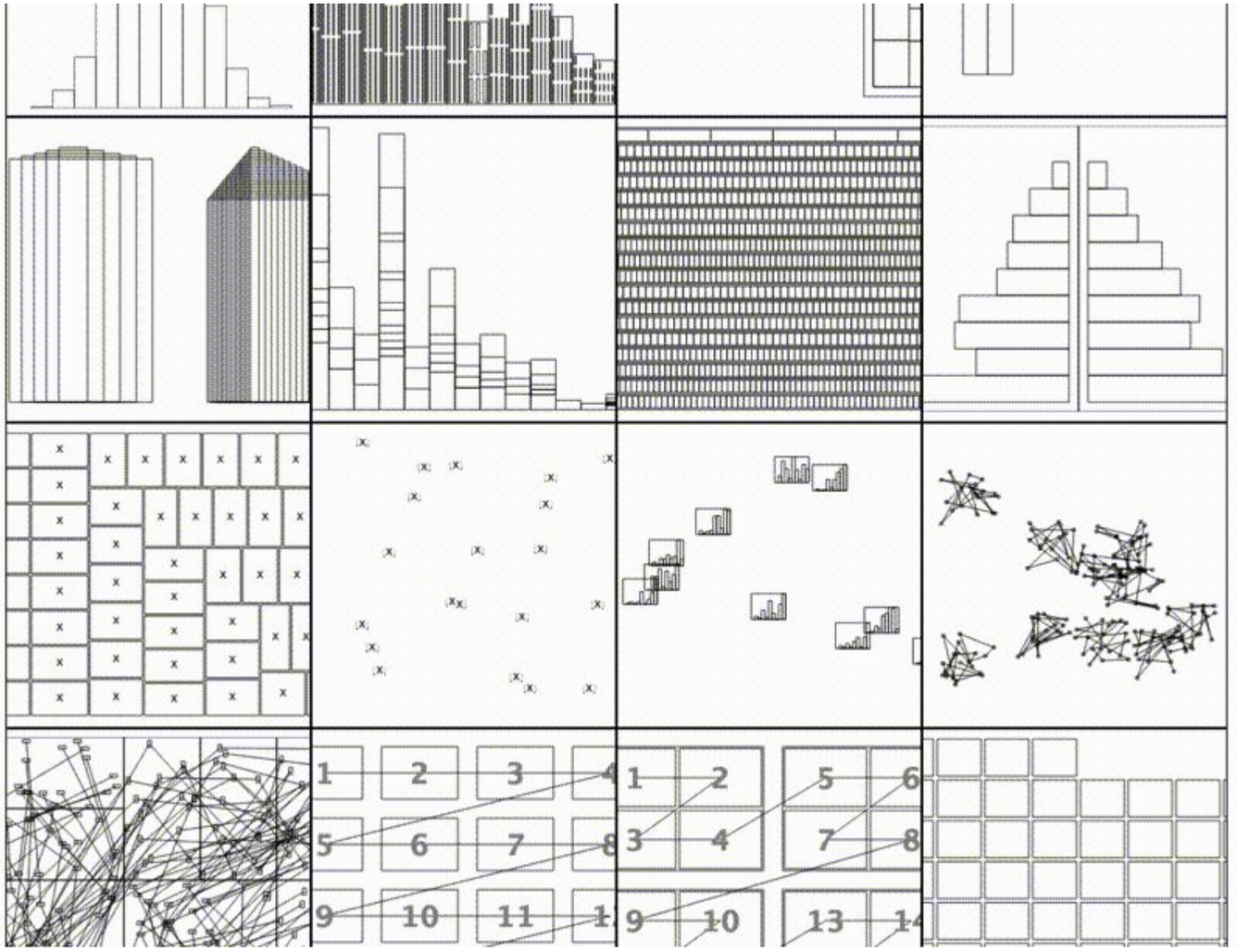
https://github.com/romsson/d3-gridding

Realistic data

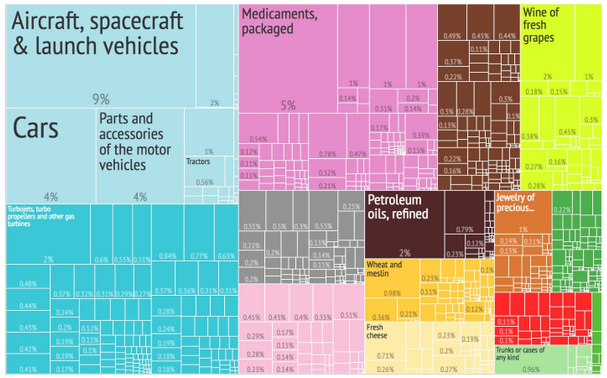
- Re-create a dataset's properties
  - Number of rows
  - Number of columns
  - Data type
  - Data distribution
  - Ordering
  - Etc.

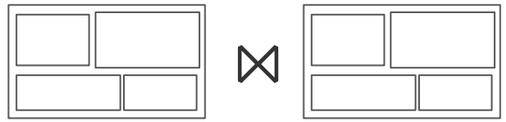
Région	Code zéro à Zone d'emploi	Nom de la Zone d'emploi	Population totale	Population totale	Evolution annuelle moyenne de la population totale (en %)	Population de moins de 20 ans et de 60 ans et plus	Population de 20 à 59 ans	Taux de dépendance économique	Population de moins de 25 ans	Population de 60 ans et plus	Indicateur de jeunesse	Revenu fiscal médian par UC	Revenu déclaré du revenu fiscal par UC	Population active de 15 à 64 ans	Population de 15 à 64 ans	Taux d'activité (en %)	Population active ayant un emploi de 15 à 64 ans	Population de 15 à 64 ans	Taux d'emploi des 15 à 64 ans (en %)	Population active ayant un emploi de 15 à 64 ans	Population de 15 à 64 ans	Taux d'emploi des 15 à 64 ans (en %)	Population de 55 à 64 ans	Taux d'emploi des 55 à 64 ans (en %)	Population des femmes de 15 à 64 ans	Taux d'emploi des femmes de 15 à 64 ans (en %)	Estimation d'emploi	Estimation d'emploi	Evolution « moyenne annuelle » des estimations d'emploi	Taux de chômage localisés	Taux de chômage localisés	Evolution des taux de chômage localisés (en points)	Demandeurs d'emploi de catégorie A	Demandeurs d'emploi de catégorie ABC
			Insee - RP 1999 (1999 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 1999 et 2009 (1997 et 2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RFL 2009	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - RP 2009 (2007 pour Mayotte)	Insee - 1998	Insee - 2009	Insee - 1998 et 2009	Insee - T3 2003 (T2 2003 pour estimations localisées pour Mayotte) et au 31/12/2003 et au 31/12/2007	Insee - T4 2011 (T2 2011 pour estimations localisées pour Mayotte) et au 31/12/2011 et au 31/12/2015	Insee - entre T1 2003 et T4 2011 (entre T2 2003 et T2 2011 pour Mayotte) et au 31/12/2003 et au 31/12/2011	Pôle emploi-Dares - Nombre moyen mensuel de demandeurs inscrits - décembre 2003	Pôle emploi-Dares - Nombre moyen mensuel de demandeurs inscrits - décembre 2011	
REGION	CODE_ZE	NOM_ZE	POP_TOT_99	POP_TOT_09	EVOL_POP_99_09	POP_M20A_J9_59A_09	POP_20A59A_09	TAUX_DEP_ECO_09	POP_M20A_09	POP_P60A_09	INDIC_JEUN_09	REV_PAR_UC_MED_09	REV_PAR_UC_D1_09	POP_ACT_3564A_09	POP_1564A_09	TX_ACT_09	POP_ACT_EMP_1564A_09	POP_1564A_09	TX_EMP_1564A_09	POP_ACT_EMP_1564A_09	POP_1564A_09	TX_EMP_1564A_09	POP_5564A_09	TX_EMP_5564A_09	POP_F_EMP_1564A_09	POP_F_15A64A_09	TX_EMP_F_1564A_09	EST_EMP_98	EST_EMP_09	EVOL_EST_EMP_98_09	TX_CHOM_T1_03	TX_CHOM_T4_11	EVOL_TX_CHOM_T1_03_T4_11	DE_A_11	DE_ABC_11
Picardie (22)	2209	Abbeville	67,448	69,923	0.4	34,434	35,489	97.1	16,970	17,484	97.1	15,969	5,433	30,087	43,928	68.5	25,963	43,928	59.1	2,853	9,447	30.2	11,976	22,198	53.9	22,413	23,842	0.6	9.8	11.6	1.8	3,657	5,091
Languedoc-Roussillon (91)	9107	Agde-Pézenas	64,291	77,878	1.9	41,698	36,180	115.3	17,309	24,389	71.0	15,575	4,919	30,873	46,602	66.2	25,309	46,602	54.3	3,140	11,372	27.6	11,843	24,012	49.3	17,692	23,517	3.0	13.8	15.7	1.9	6,636	8,470
Aquitaine (72)	7209	Agen	135,291	149,130	1.0	72,833	76,297	95.5	34,122	38,711	88.1	17,229	6,283	68,220	94,094	72.5	60,525	94,094	64.3	7,283	19,255	37.8	29,157	47,880	60.9	55,272	61,629	1.0	8	9.3	1.3	6,581	10,097
Provence-Alpes-Côte d'Azur (93)	9308	Aix-en-Provence	353,170	390,773	1.0	181,223	209,550	86.5	92,754	88,469	104.8	20,477	7,648	178,651	259,109	68.9	159,145	259,109	61.4	20,524	49,362	41.6	75,526	132,851	56.8	125,410	175,413	3.6	9.6	9.4	-0.2	18,294	26,196
Corse (94)	9401	Ajaccio	86,533	105,429	2.0	49,780	55,644	89.5	21,214	28,571	74.3	18,329	6,232	47,720	67,918	70.3	42,567	67,918	62.7	5,654	13,786	41.0	19,775	34,658	57.1	34,115	40,330	3.3	9	9.4	0.4	4,926	5,841
Midi-Pyrénées (73)	7311	Albi	131,339	165,981	0.9	84,891	81,090	104.7	35,775	49,316	72.8	17,010	6,409	70,757	102,034	69.3	62,859	102,034	61.6	8,260	23,132	35.7	30,580	52,074	58.7	59,300	63,702	0.7	8	10.4	2.4	7,929	11,755
Inter-régional	9521	Alençon	119,220	122,240	0.3	62,330	60,908	101.4	29,182	31,187	94.4	16,441	6,411	54,027	76,182	70.9	48,403	76,182	63.5	5,868	16,417	35.6	23,032	38,375	60.1	47,204	47,647	0.1	7.5	8.7	1.2	4,141	6,917
Languedoc-Roussillon (91)	9104	Alès	129,683	142,796	1.0	75,398	69,398	105.8	31,220	42,178	74.0	15,153	3,783	57,714	87,090	66.3	47,325	87,090	54.3	6,037	20,387	29.6	21,797	44,418	49.1	37,248	42,432	1.3	14.3	15.3	1.2	9,194	12,479
Rhône-Alpes (82)	8201	Ambérieu-en-Bugey	78,597	93,124	1.7	43,831	49,293	88.9	23,366	18,465	137.4	18,991	8,603	45,371	59,822	75.8	41,374	59,822	69.2	3,946	10,657	37.0	18,882	29,433	64.2	24,206	30,624	2.4	5.8	7.1	1.3	3,490	5,517
Auvergne (83)	8309	Ambert	21,726	20,987	-0.3	10,835	10,152	106.7	4,181	6,654	62.8	16,177	7,151	9,921	12,675	70.4	8,060	12,675	63.8	964	3,070	31.4	3,651	6,170	59.2	7,538	7,462	-0.1	6.5	8	1.5	685	1,163
Picardie (22)	2210	Amiens	373,431	385,716	0.3	177,472	208,244	85.2	98,912	78,560	125.9	17,344	5,964	178,168	256,603	69.4	154,777	256,603	60.3	16,270	46,238	35.2	72,863	129,449	56.3	143,879	153,030	0.6	9.8	11.6	1.8	19,983	30,328
Pays-de-la-Loire (52)	5203	Ancenis	38,735	44,813	1.5	21,629	23,224	93.1	12,142	9,406	128.9	16,742	8,323	21,643	28,134	76.9	20,090	28,134	71.4	1,691	5,124	33.0	9,223	13,774	67.0	17,166	20,370	1.3	5.3	6	0.5	1,274	2,712
Pays-de-la-Loire (52)	5205	Angers	424,917	451,895	0.6	215,166	237,749	90.3	120,763	98,385	127.9	17,797	7,557	210,868	294,384	71.6	199,465	294,384	64.6	19,853	52,067	38.1	91,135	149,940	60.8	172,070	190,502	1.0	8.3	9.3	1	19,666	33,381
Poitou-Charentes (54)	5403	Angoulême	264,176	275,403	0.4	136,773	138,630	98.7	60,095	76,678	78.4	16,900	6,310	122,556	171,943	71.3	108,213	171,943	62.9	13,217	30,275	34.5	50,636	86,205	58.7	103,346	104,765	0.1	8.4	10.4	2	12,913	20,089
Rhône-Alpes (82)	8218	Annecy	239,350	268,615	1.2	123,468	143,147	85.1	67,565	55,904	120.9	21,216	9,484	133,384	177,704	76.2	125,312	177,704	70.5	14,114	32,541	43.4	58,982	89,061	67.0	112,434	124,607	1.0	6.3	6.5	0.2	9,420	14,474
Rhône-Alpes (82)	8204	Annonay	47,818	51,388	0.7	25,654	25,734	99.7	13,596	13,058	96.5	17,296	7,515	22,739	31,971	71.1	20,344	31,971	64.3	2,239	6,904	32.2	9,570	15,979	59.9	19,249	18,224	-0.3	7.8	8.5	0.7	2,025	3,529
Basse-Normandie (23)	2311	Argentan	42,432	41,436	-0.2	20,427	21,009	97.2	9,895	10,532	93.9	16,339	6,402	18,103	26,270	68.9	15,865	26,270	60.4	1,992	5,801	33.4	7,473	12,780	58.5	15,037	14,547	-0.3	9	9.3	0.3	1,679	2,574
Provence-Alpes-Côte d'Azur (93)	9309	Arles	73,713	77,035	0.4	38,460	38,575	99.7	17,419	21,042	82.8	16,536	5,120	32,920	48,645	67.7	28,037	48,645	57.6	4,171	11,514	36.2	13,026	25,230	51.6	25,951	28,525	0.9	11.5	14.9	3.4	5,576	7,617
Nord-Pas-de-Calais (31)	3121	Arras	231,190	240,155	0.4	112,439	127,716	88.0	60,951	51,488	118.4	17,387	6,626	109,984	156,621	70.2	97,686	156,621	62.4	10,695	30,669	35.1	44,920	78,214	57.4	91,733	97,620	0.6	7.3	9.2	1.9	10,704	15,477
Rhône-Alpes (82)	8205	Aubenas	43,776	46,376	1.2	23,950	22,426	112.4	10,020	11,400	87.9	16,057	5,809	28,587	38,560	74.1	25,260	38,560	65.5	4,258	13,947	30.5	15,610	28,210	55.3	25,810	29,146	1.2	10.5	13.2	2.7	5,785	8,068
Midi-Pyrénées (73)	7307	Auch	109,005	114,889	0.5	59,539	55,350	107.6	23,613	35,925	65.7	16,776	6,649	49,769	69,592	71.5	45,375	69,592	65.2	6,976	17,166	40.6	21,601	35,131	61.5	43,039	44,210	0.2	5.7	7.6	1.9	3,885	6,121
Auvergne (83)	8304	Aurillac	82,080	82,746	0.1	40,859	41,887	97.5	17,085	23,776	71.9	17,140	7,485	37,609	51,818	72.6	34,674	51,818	66.9	4,256	11,623	36.4	16,571	25,988	64.0	33,923	35,269	0.4	5.7	6.6	0.9	2,543	4,113
Bourgogne (26)	2607	Autun	36,460	34,235	-0.6	18,158	16,142	112.1	7,391	10,798	68.3	16,577	6,822	14,419	20,505	70.3	12,854	20,505	62.4	1,750	5,038	34.6	5,956	10,251	58.1	12,582	11,684	-0.6	9.3	9.6	0.3	1,262	2,099
Bourgogne (26)	2612	Auxerre	208,674	211,813	0.1	106,455	105,358	101.0	49,359	57,096	86.4	17,573	6,727	94,590	131,222	72.1	83,817	131,222	63.9	10,699	29,516	36.2	39,522	65,851	60.0	81,999	82,732	0.1	7.1	9.1	2	8,467	13,194
Bourgogne (26)	2613	Avallon	25,238	24,919	-0.1	12,319	12,561	98.4	5,426	6,933	78.3	16,614	6,512	10,686	15,548	68.7	9,665	15,548	62.2	1,266	3,476	36.4	4,455	7,441	59.9	9,151	9,344	0.2	6.8	8.3	1.5	818	1,237
Inter-régional	9559	Aveyron	443,692	487,632	0.9	237,981	249,651	95.3	120,494	117,097	103.2	16,493	5,143	219,209	311,325	70.4	188,332	311,325	60.5	23,928	63,605	37.6	88,225	159,425	55.3	164,169	194,363	1.7	9.6	11.9	2.3	28,264	42,533
Basse-Normandie (25)	2506	Avranches	87,907	91,009	0.3	47,271	43,738	108.1	20,215	27,056	74.7	16,241	7,353	39,681	54,306	73.0	36,547	54,306	67.2	4,116	12,027	34.2	16,758	26,555	63.2	32,505	34,744	0.6	5.2	6.5	1.3	2,885	4,601
Languedoc-Roussillon (91)	9105	Bagnols-sur-Cèze	59,817	64,804	0.8	31,462	33,342	94.4	15,323	16,139	94.9	17,245	5,639	28,566	41,021	69.6	24,698	41,021	60.2	2,793	8,391	33.3	12,626	20,702	61.0	22,742	24,854	0.8	10.3	11.2	0.9	3,422	4,929
Lorraine (41)	4104	Bar-le-Duc	64,003	61,647	-0.4	29,193	32,454	90.0	14,218	14,975	94.9	17,607	7,215	28,661	40,027	71.6	25,408	40,027	63.5	3,222	8,860	36.4	11,763	19,893	59.1	29,513	27,618	-0.6	7.1	8.7	1.6	2,713	3,920
Guadeloupe (01)	9102	Basse-Terre	64,277	64,656	0.1	31,780	32,876	96.7	18,203	13,577	134.1	nd	nd	28,143	41,129	68.4	19,665	41,129	47.9	3,122	7,705	40.5	10,047	21,934	45.8	17,032	22,296	2.8	21.7	19.4	-2.3	8,163	9,062
Corse (94)	9404	Bastia	99,074	114,914	1.7	54,925	61,989	88.6	24,550	30,396	80.7	16,174	4,488	50,458	76,254	66.2	44,803	76,254	58.8	6,007	16,056	37.4	19,601	38,991	50.3	32,239	39,885	2.1	9	9.4	0.4	5,270	6,171
Basse-Normandie (25)	2503	Bayeux	49,510	51,368	0.4	25,622	25,746	99.5	12,119	13,513	89.6	17,069	7,083	22,856	32,200	71.0	20,424	32,200	63.4	2,438	7,350	33.2	9,477	16,060	59.0	18,396	17,533	-0.4	8	9	1	2,235	3,418
Aquitaine (72)	7212	Bayonne	278,734	310,314	1.1	151,666	158,648	95.6	66,262	85,404	77.6	18,733	8,125	140,439	195,458	71.9	126,436	195,458	64.7	14,667	41,144	35.6	60,299	98,894	61.0	105,646	121,723	1.4	8.1	8.6	0.5	13,852	21,140
Bourgogne (26)	2603	Beaune	48,540	50,592	0.4	24,248	26,344	92.0	11,965	12,283	97.4	18,973	8,118	24,391	32,559	75.4	22,284	32,559	68.9	2,773	6,608	42.0	10,574	16,257	65.0	21,864	23,592	0.7	6.3	7.2	0.9	1,817	2,899
Picardie (22)	2207	Beauvais	230,955	244,045	0.6	113,320	130,725	86.7	67,012	46,309	144.7	18,376	7,071	117,134	160,495	73.0	103,694	160,495	64.6	10,857	29,726	36.5	47,986	80,384	59.7	85,517	90,235	0.5	7.5	9.2	1.7	12,239	16,972
Franche-Comté (43)	4302	Bellort-Montbéliard-Héricourt	364,420	372,788	0.2	177,039	195,749	90.4	91,654	85,384	107.3	17,566	6,544	171,297	240,593	71.2	148,892	240,593	61.9	16,221	48,288	33.6	66,939	118,094	56.7	139,601	138,441	-0.1	8.2	11.2	3	18,428	27,275
Nord-Pas-de-Calais (31)	3127	Berck-Montreuil	99,249	105,288	0.6	51,949	53,339	97.4	25,430	26,518	95.9	16,150	6,180	44,563	66,697	66.8	39,055	66,697	58.6	4,441	14,792	30.0	17,974	33,574	53.5	35,329	37,341	0.3	7.1	9.7	2.6	4,950	7,069
Aquitaine (72)	7201	Bergerac	102,436	108,617	0.6	57,435	51,202	112.1	22,698	34,717	65.4	16,309	6,839	44,896	64,939	69.1	39,269	64,939	60.5	5,613	16,556	34.0	18,834	33,127	56.9	36,192	36,461	0.1	8.6	11.8	3.2	5,403	7,892
Haute-Normandie (23)	2303	Bernay	55,382	58,074	0.3	29,118	28,956	100.6	14,012	15,106	92.8	17,538	6,920	25,925	36,123	71.8	22,741	36,123	63.0	2,544	7,956	32.0	10,368	18,226	56.8	19,485	18,209	-0.6	8.6	10.8	2.2	2,767	4,327
Franche-Comté (43)	4303	Besançon	274,658	299,372	0.8	139,343	160,229	87.0	76,636	62,707	122.2	18,303	7,206	142,551	198,274	71.9	128,758	198,274	64.9	14,561	35,054	41.5	61,337	99,757	61.7	113,585	124,192	0.8	6.8	7.8	1	11,193	18,324
Nord-Pas-de-Calais (31)	3123	Béthune-Bruay	287,054	291,481	0.2	137,605	150,152	89.3	74,491	61,119	125.1	15,638	5,443	126,638	188,504	66.6	107,668	188,504	57.1	10,204	30,985	28.4	46,898	94,273	49.7	85,472	86,447	0.7	12.6	11.7	1.1	16,499	21,841
Languedoc-Roussillon (91)	9108	Béziers	191,738	215,747	1.2	113,139	102,608	110.3	48,283	64,935	74.4	15,242	3,903	86,707	129,965	66.7	72,633	129,965	55.9	9,361	30,509	30.7	34,328	66,590	51.6	63,813	70,509	1.0	11.8	14.6	2.8	14,085	19,071
Centre (24)	2413	Blois	167,983	175,349	0.4	86,419	88,890	97.3	41,924	44,535	94.1	18,661	7,650	80,763	109,811	73.5	72,395	109,811	65.9	8,755	23,042	38.0	34,877	55,214	63.2	69,618	77,512	1.0	7	8.6	1.1	7,017	11,285
Aquitaine (72)	7204	Bordeaux	1,074,135	1,191,193	1.0	534,431	656,762	81.4	283,603	250,830	113.1	19,381	7,497	572,407	800,338	71.5	511,077	800,338	63.9	60,330	144,872	41.6	248,100	409,787	60.5	467,663	543,060	1.5	8.8	9.6	0.8	59,844	90,591
Nord-Pas-de-Calais (31)	3126	Boulogne-sur-mer	163,157	162,595	0.0	77,432	85,143	91.0	44,045	33,407	131.8	15,395	4,870	70,939	105,370	67.3	60,394	105,370	57.3	6,254	20,051	31.2	27,344	53,761	50.9	52,346	58,225	1.0	11.9	13.7	1.8	9,542	14,054
Rhône-Alpes (82)	8202	Bourg-en-Bresse	115,446	127,149	1.0	61,981	65,168	95.1	31,705	30,065	105.2	18,787	8,204	60,228	80,716	74.6	55,582	80,716	68.9	6,518	16,116	40.4	26,427	40,362	65.5	36,137	40,868	0.8	4.9	6.6	1.7	6,196	6,583
Centre (24)	2401	Bourges	196,274	195,228	-0.1	94,611	100,617	94.0	44,403	50,208	88.4	18,273	7,240	89,532	124,602	71.9	80,058	124,602	64.3	9,441	26,435	35.7	37,556	62,063	60.5	76,582	79,632	0.4	7.4	9.3	1.9	8,451	12,170
Rhône-Alpes (82)	8206	Bourgoin-Jallieu	177,223	209,267	1.7	98,233	111,034	88.5	60,722	37,511	161.9	18,424	7,829	101,273	135,977	74.5	90,818	135,977	66.8	8,775	23,769	36.9	41,957	67,859	61.8	63,667	75,216	1.7	7.3	9	1.7	9,190	14,037
Poitou-Charentes (54)	5412	Bressuire	68,087	71,298	0.5	35,252	36,046	97.8	17,467	17,785	98.2	15,969	7,559	32,891	44,155	74.5	30,374	44,155	68.8	2,811	8,985	31.3	13,724	21,524	63.8	26,678	27,955	0.4	5.9	6	0.1	2,002	3,901
Bretagne (53)	5306	Brest	431,125	449,382	0.4	213,415	233,967	90.4	112,522	100,893	111.5	18,247	8,237	203,990	290,079	70.3	183,853	290,079	63.4	18,694	54,091	34.6	85,043	142,732	59.6	166,298	179,116	0.7	7.2	8.2	1	18,004	28,181
Provence-Alpes-Côte d'Azur (93)	9303	Briançon	32,228	34,597	0.7	16,187	18,410	87.9	8,238	7,949	103.6	17,789	8,012	16,896	22,324	75.0	15,974	22,324	71.9	1,893	4,718	40.1	7,636	11,190	68.2	13,089	17,755	1.6	7.2	7.8	0.6	1,106	2,149
Auvergne (83)	8302	Brioude	62,919	64,165	0.3	32,520	21,645	104.0	9,185	13,336	68.9	15,361	6,030	19,171	26,783	71.6	17,228	26,783	64.3	2,053	6,282	32.7	7,774	12,999	59.8	14,675	15,349	0.4	7	9	2	1,650	2,920
Inter-régional	9557	*Brive-la-Gaillarde*	176,410	169,168	0.7	86,491	83,077	103.7	38,457	57,434	67.4	17,473	7,723	83,336	115,658	72.1	76,159	115,658	65.8	9,643	26,602	36.4	35,819	57,545	62.2	67,144	71,793	0.6	6.2	7.7	1.5	6,921	11,213
Basse-Normandie (25)	2502	Caen	444,059	468,417	0.5	217,684	250,733	86.8	119,985	98,299	121.5	18,461	7,562	218,828	309,342	70.7	195,338	309,342	63.1	22,382	57,733	38.8	94,126	156,857	60.0	179,142	197,692	0.9	8.8	9.3	0.5	21,421	33,118
Midi-Pyrénées (73)	7308	Cahors	84,298	91,398	0.8	47,652	43,746	108.9	18,650	29,002	64.3	17,032	6,509	39,077	55,498	70.4	34,537	55,498	62.2	5,192	14,358	36.2	16,966	28,336	59.8	34,108	33,212	-0.2	8	11.1	3.1	4,403	6,358
Nord-Pas-de-Calais (31)	3125	Calais	158,974	163,153	0.3	75,027	87,496	86.3	46,534	29,123	159.8	15,206	4,491	72,149	107,204	67.3	59,557	107,204	55.6	5,319	18,876	28.2	25,737	53,619	48.0	53,688	50,299	-0.6	12.6	16.2	3.6	10,675	13,448
Corse (94)	9405	Calvi-L'Ile-Rousse	17,805	20,501	1.4	9,655	10,846	89.0	4,187	5,468	76.6	15,746	5,238	9,258	13,136	70.5	7,979	13,136	60.7	957	2,600	36.8	2,981	6,147	48.5	5,426	7,528	3.2	11.5	10.5	-1	1,577	1,731
Nord-Pas-de-Calais (31)	3118	Cambrai	176,277	178,279	0.1	85,181	93,098	91.5	46,311	38,870	119.1	15,738	5,362	79,331	113,882	69.7	67,439	113,882	59.2	6,930	22,035	31.4	30,022	56,690	53.0	57,738	55,331	-0.4	9.3	12.8	3.5	9,989	14,715

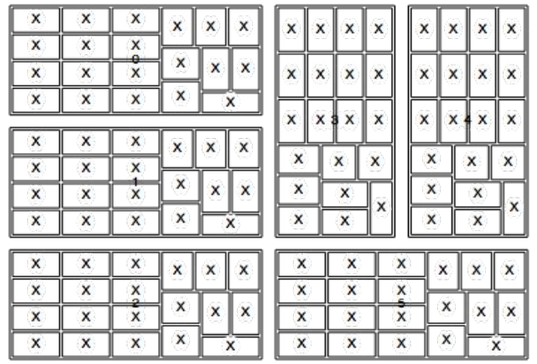
https://github.com/romsson/d3-gridding

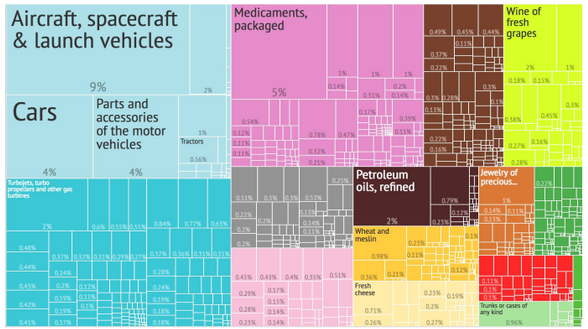


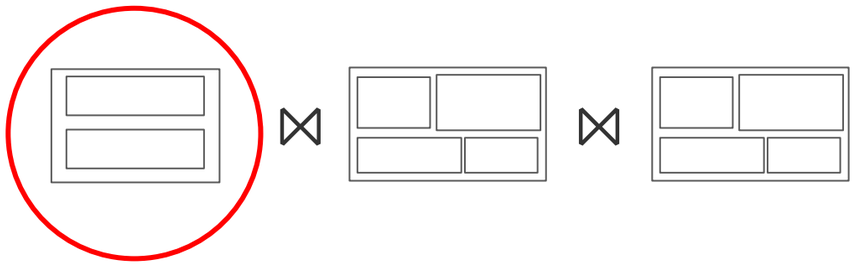
Examples

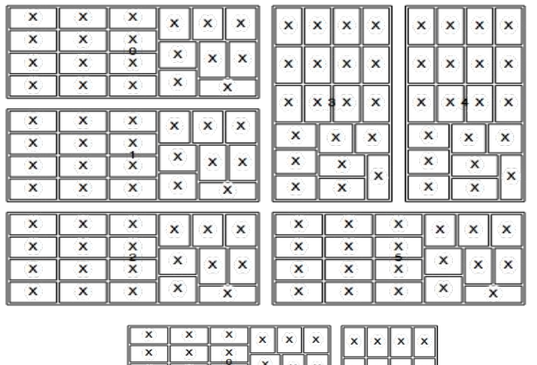

Aircraft, spacecraft & launch vehicles
9%
Cars
4%
Parts and accessories of the motor vehicles
4%
Tractors
Medicaments, packaged
5%
Wine of fresh grapes
Petroleum oils, refined
2%
Jewelry of precious...
Wheat and meslin
Fresh cheese
Trunks or cases of any kind

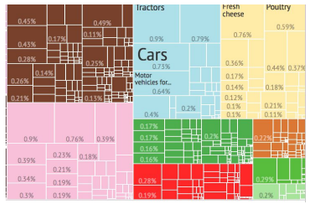


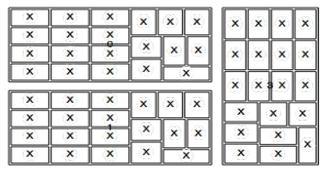



Aircraft, spacecraft & launch vehicles
9%
Cars
4%
Parts and accessories of the motor vehicles
4%
Tractors
Medicaments, packaged
5%
Wine of fresh grapes
Petroleum oils, refined
2%
Jewelry of precious...
Wheat and meslin
Fresh cheese
Trunks or cases of any kind

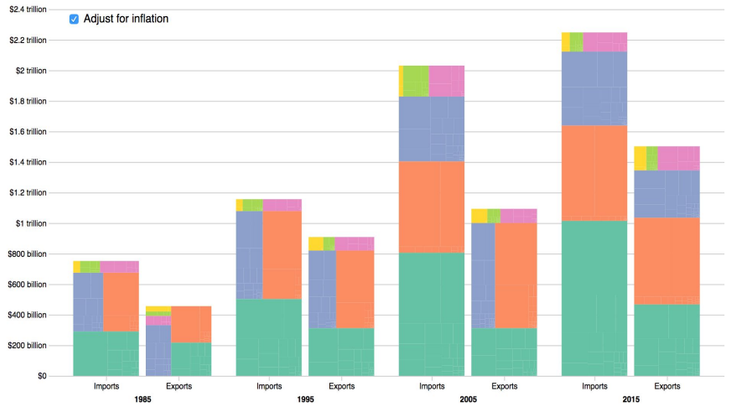


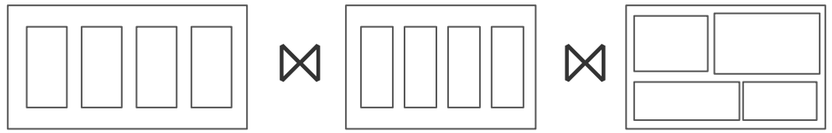


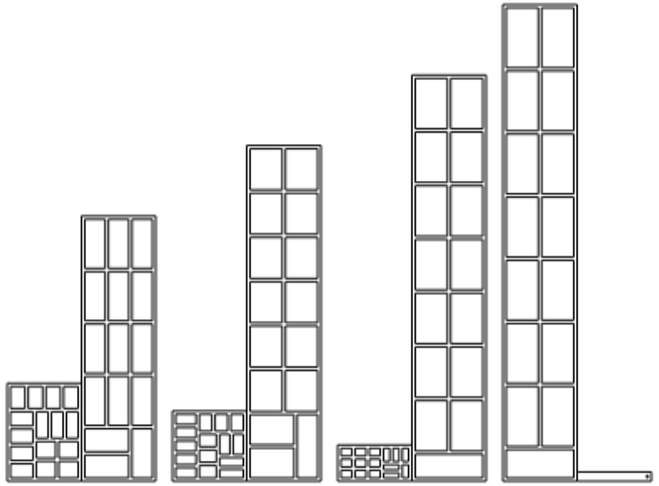

Tractors
Cars
Fresh cheese
Poultry

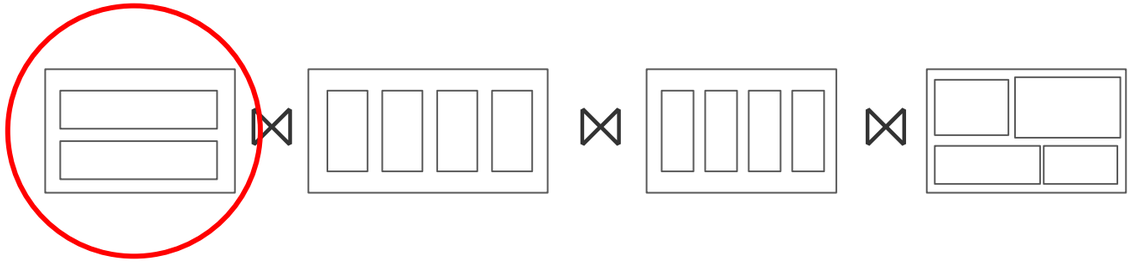


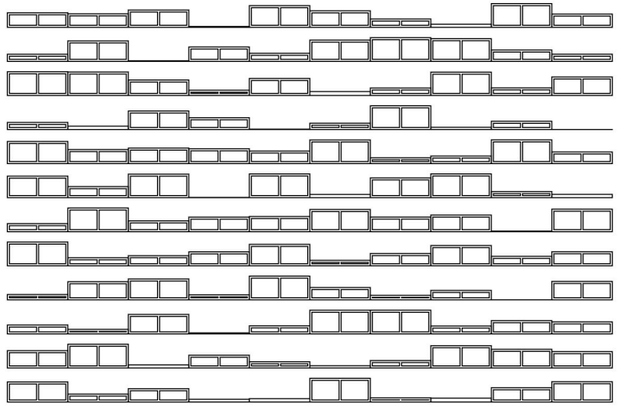
Examples


Adjust for inflation
$2.4 trillion
$2.2 trillion
$2 trillion
$1.8 trillion
$1.6 trillion
$1.4 trillion
$1.2 trillion
$1 trillion
$800 billion
$600 billion
$400 billion
$200 billion
$0
Imports
Exports
1985
1995
2005
2015

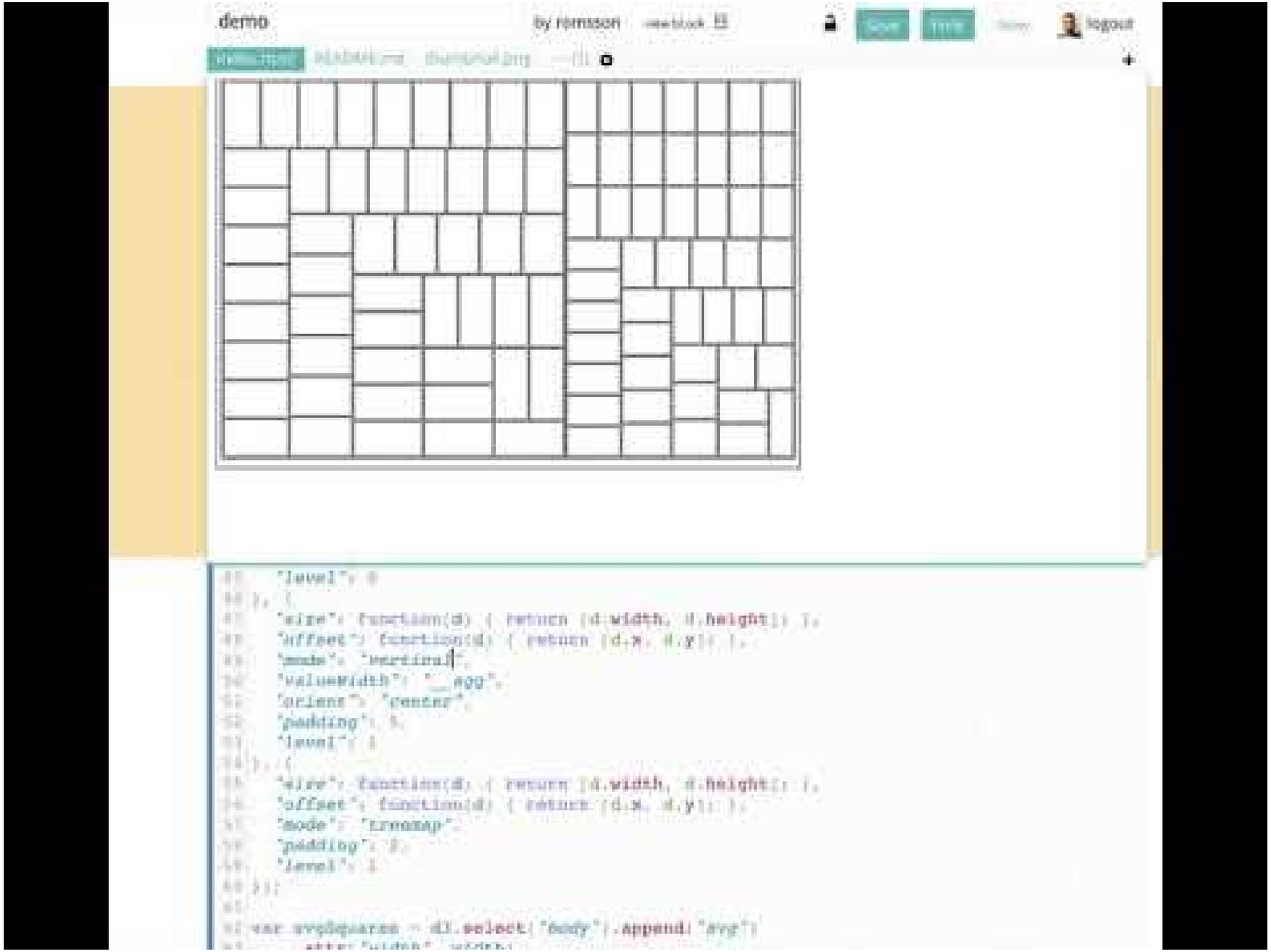




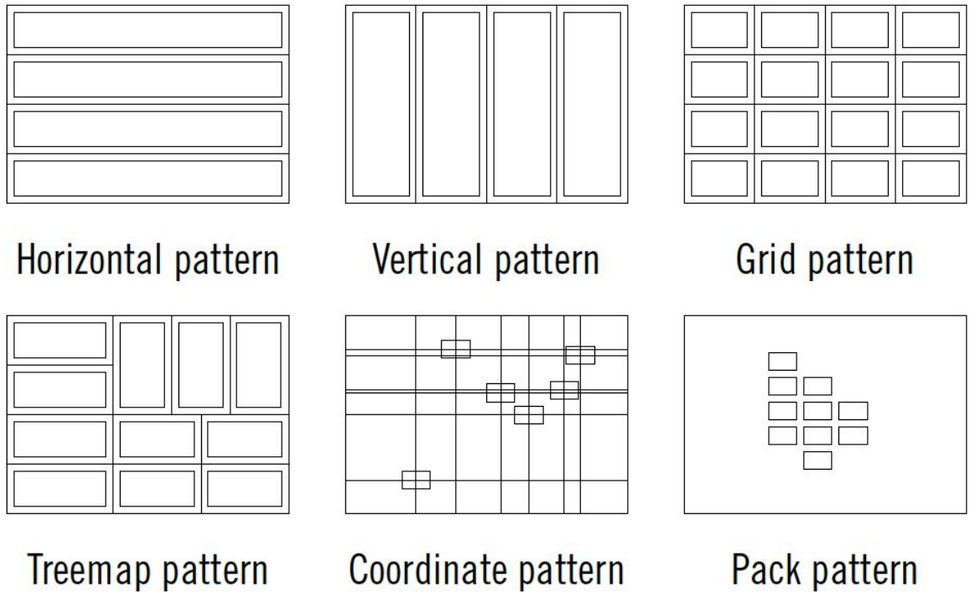


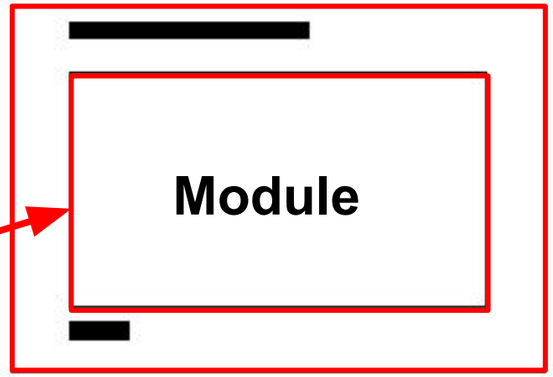


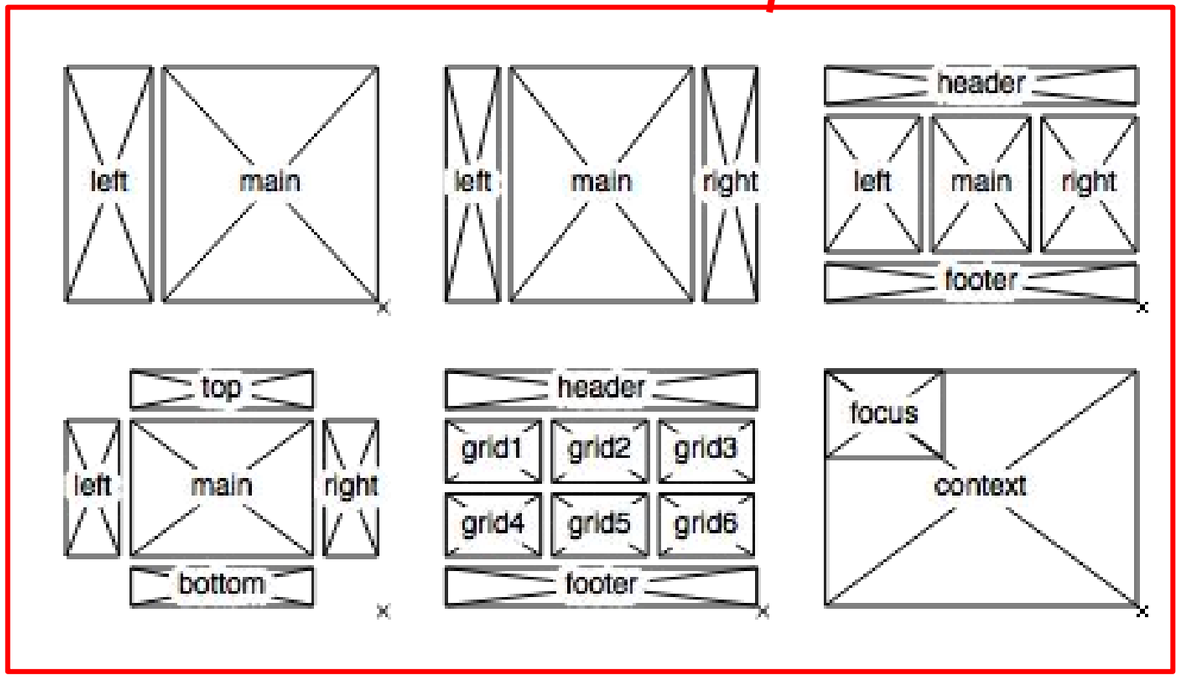
Demo!


demo
by romsson
logout
"level": 0
"size": function(d) { return [d.width, d.height]; },
"offset": function(d) { return [d.x, d.y]; },
"mode": "vertical",
"valueWidth": "__agg",
"orient": "center",
"padding": 5,
"level": 1
"size": function(d) { return [d.width, d.height]; },
"offset": function(d) { return [d.x, d.y]; },
"mode": "treemap",
"padding": 2,
"level": 1
var svgSquares = d3.select("body").append("svg")

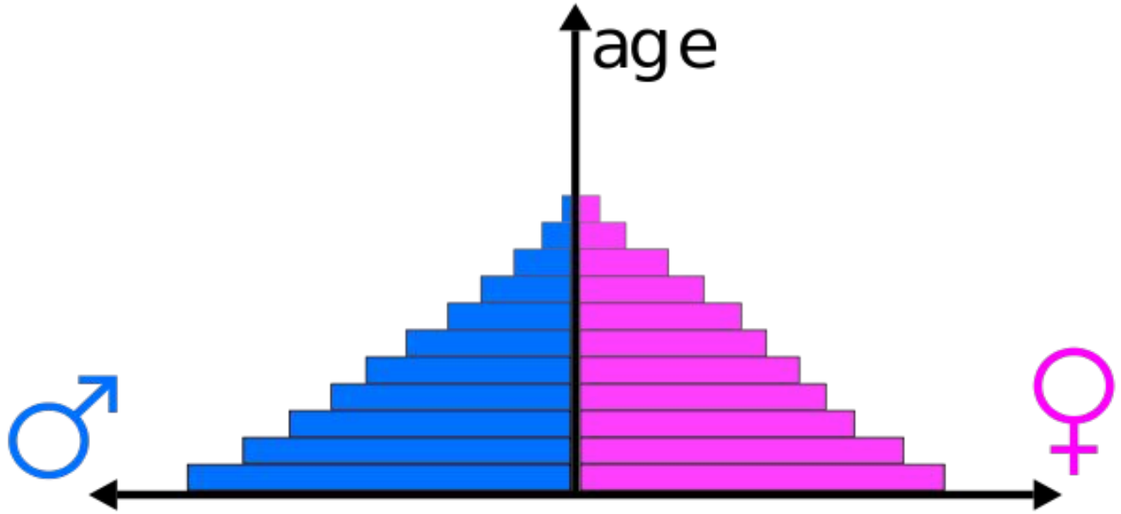
Parametric toolkit: page layouts

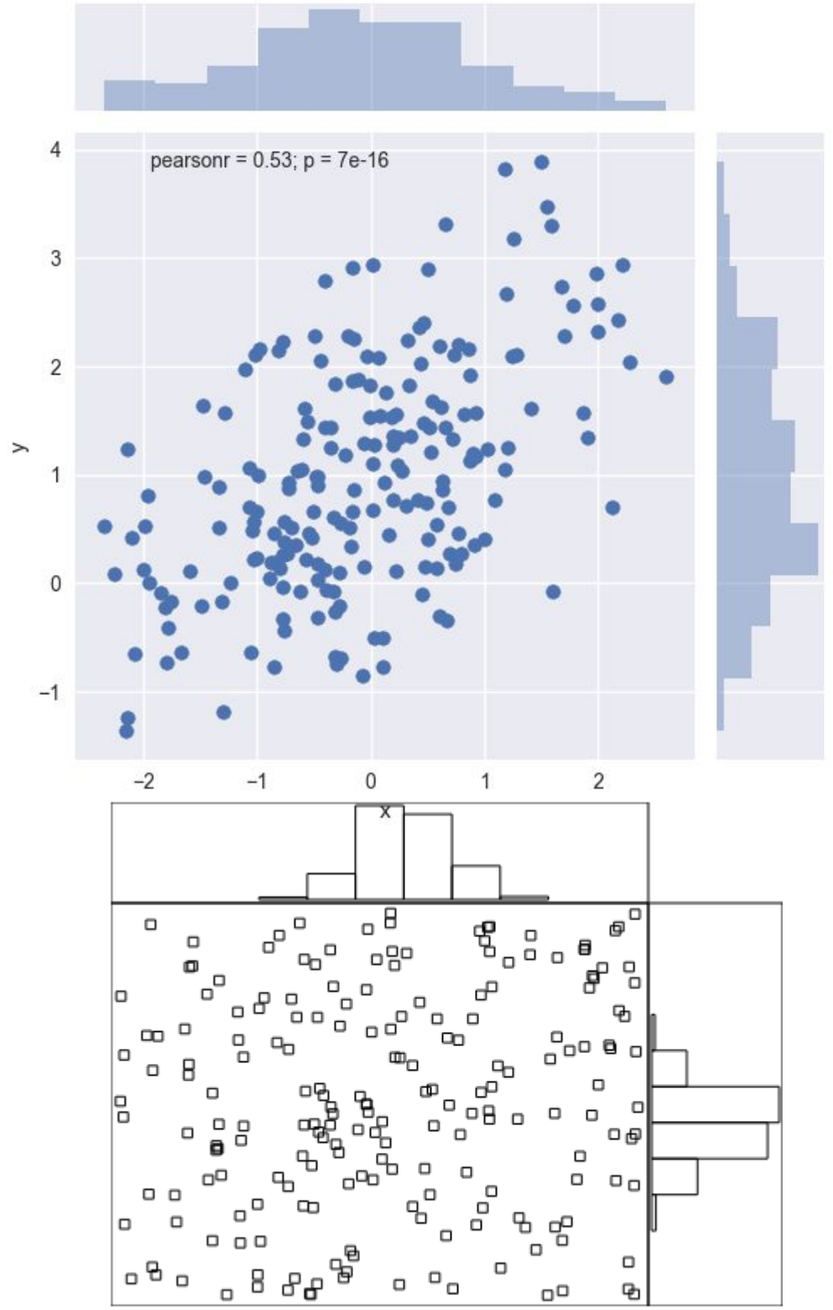


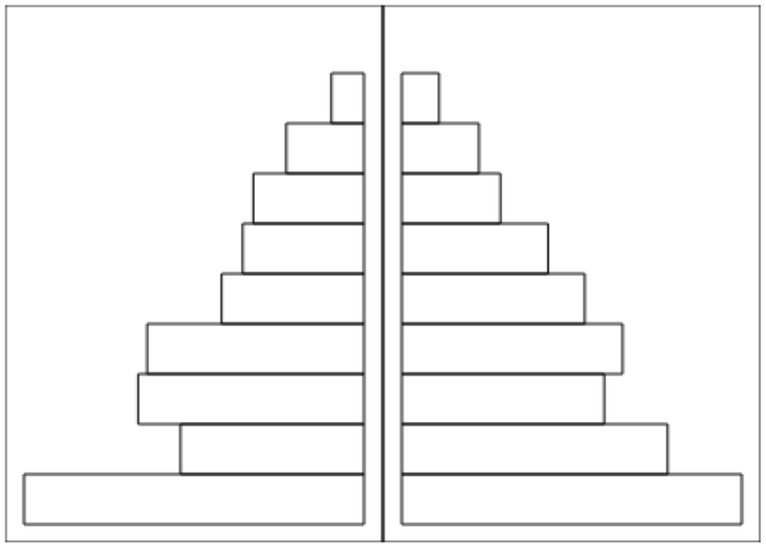




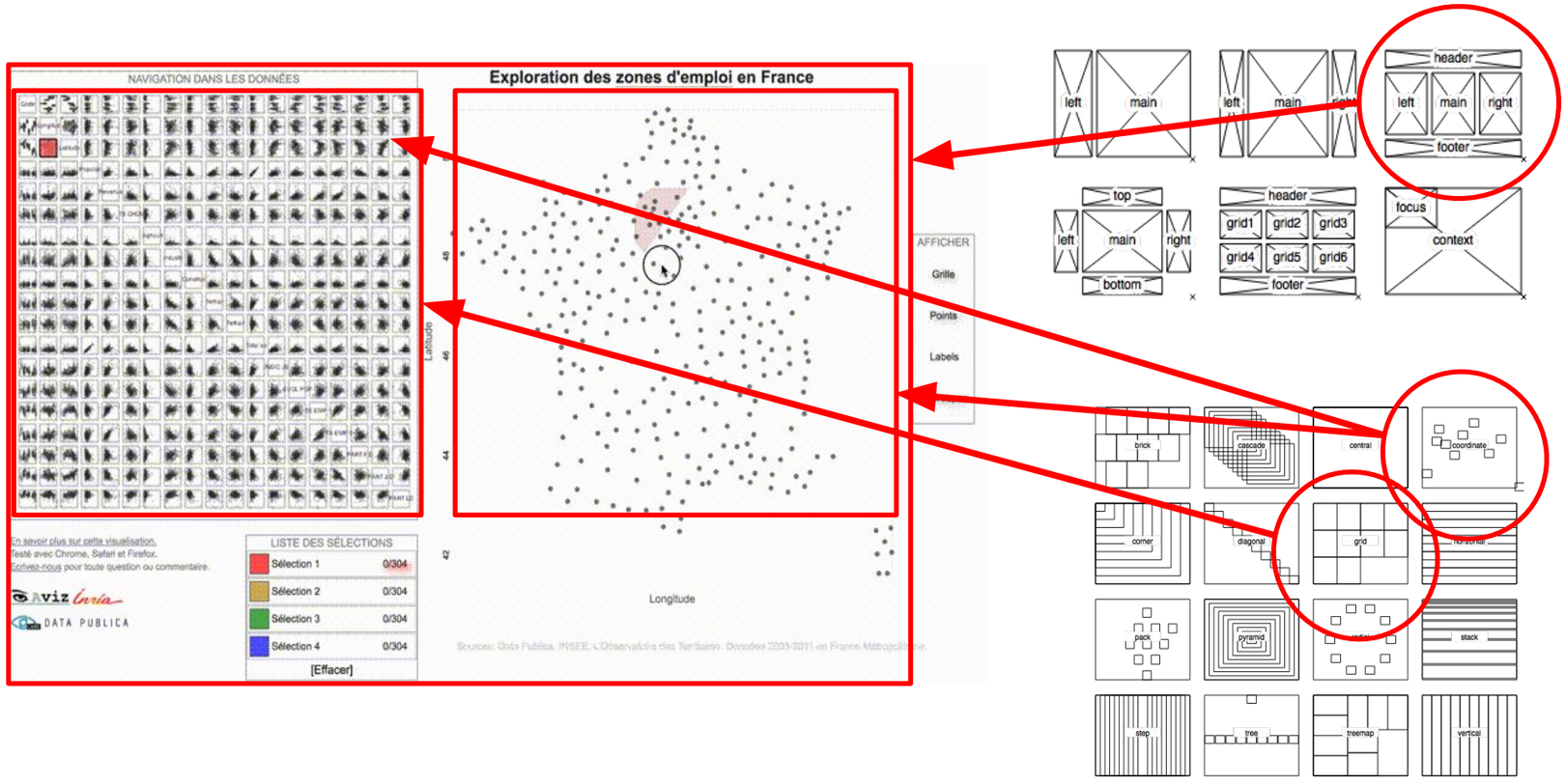
LIVE Demo!

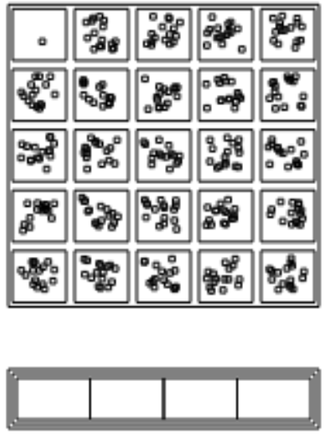


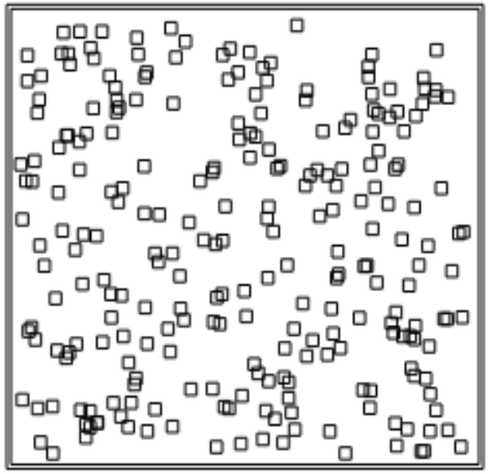




Advanced dataviz: ScatterDice (http://labs.data-publica.com/emploi/)

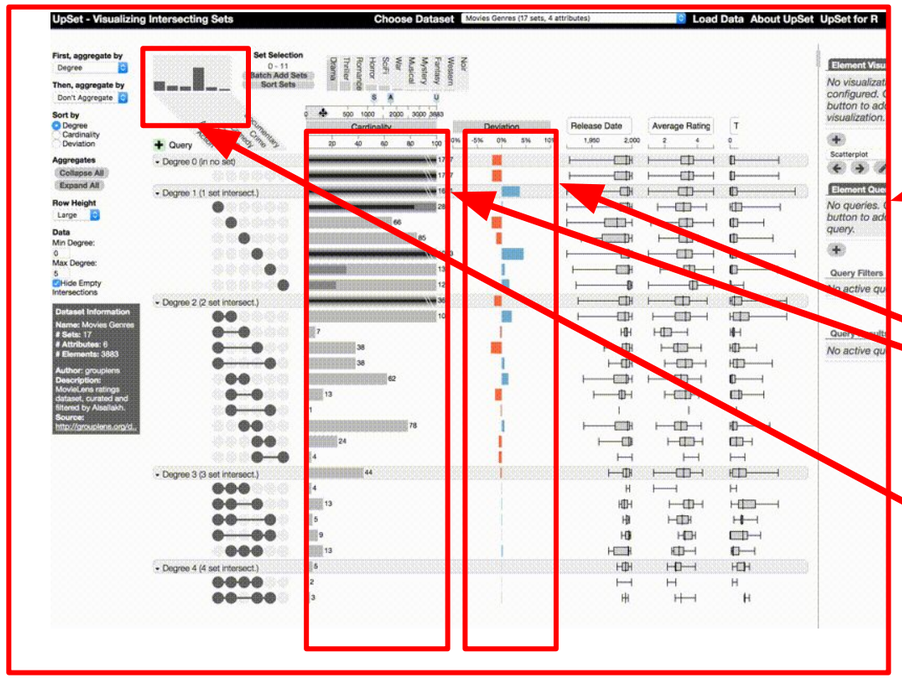


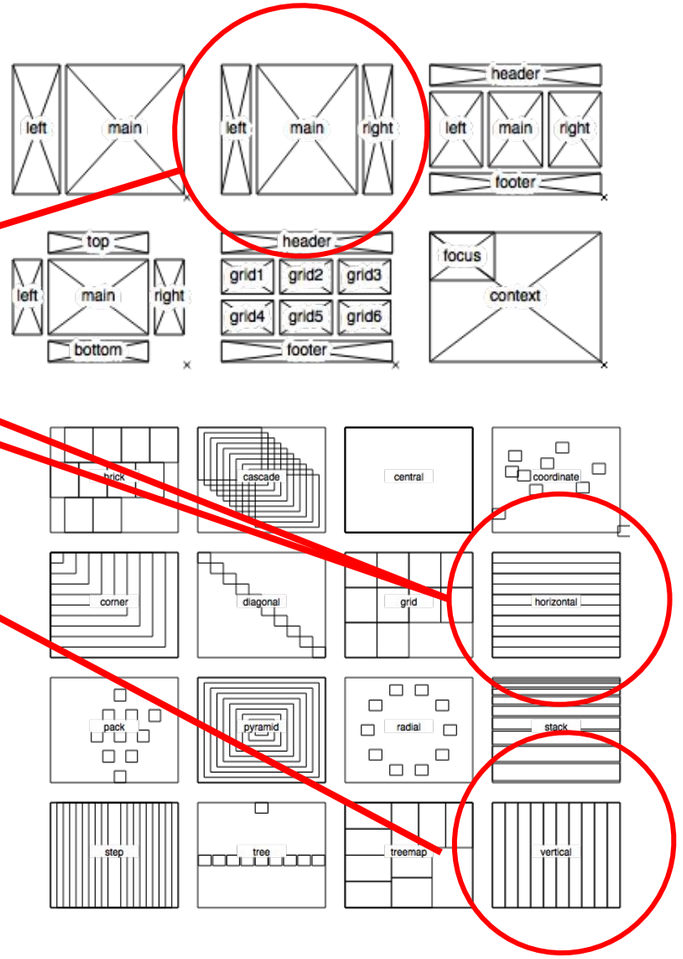


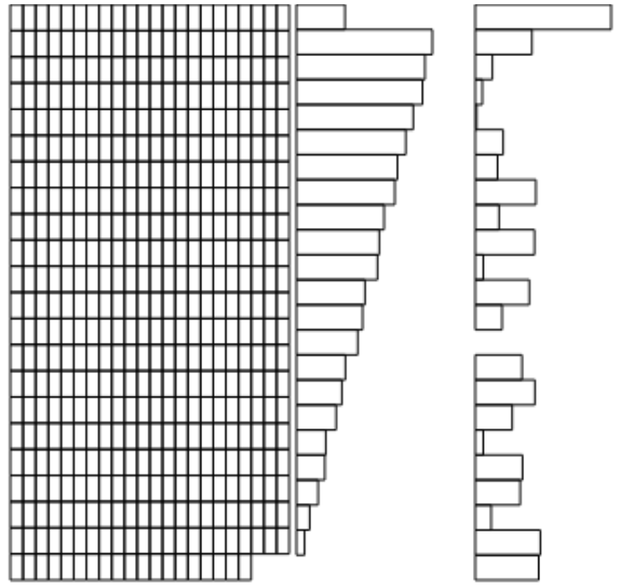


Advanced dataviz: UpSet

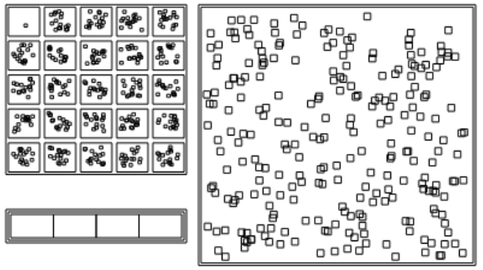
(http://vcg.github.io/upset/)

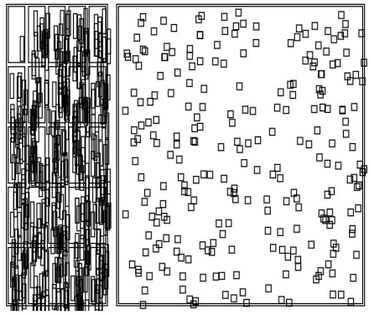


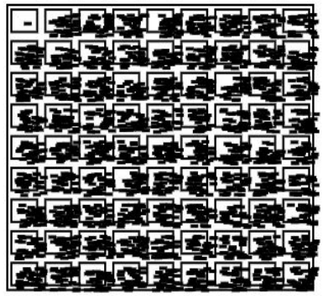


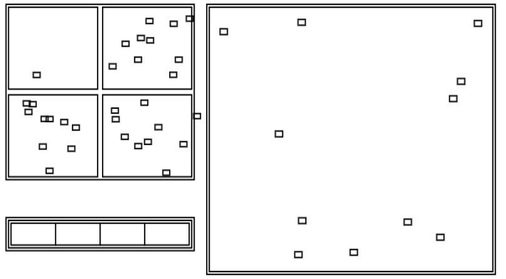


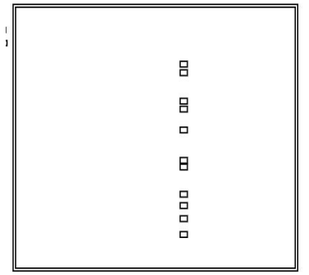
Application: benchmarking ScatterDice & UpSet

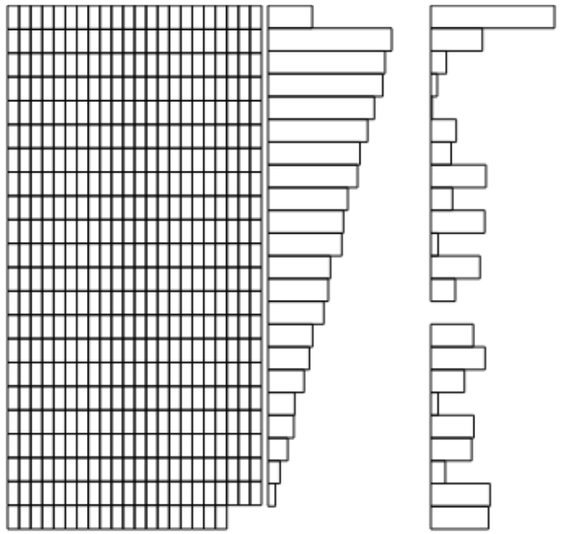


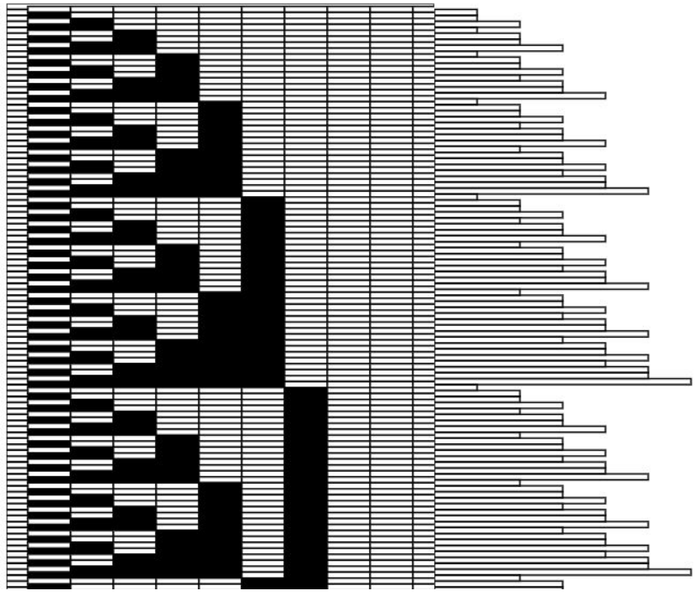










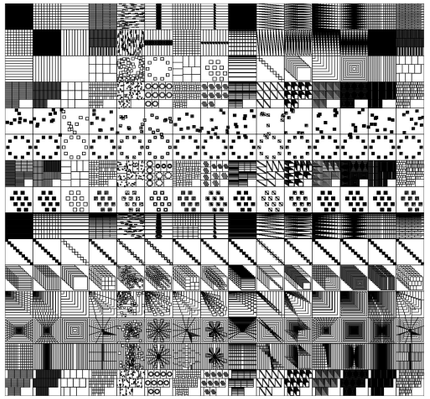


- Different layout
- More dimensions
- Less dimensions
- Data distribution
- More compact
- Etc.

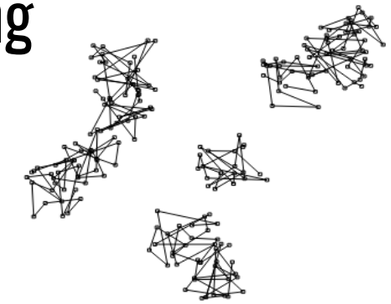
https://github.com/romsson/d3-gridding

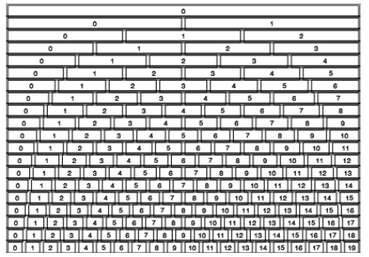
Wrap up

- Graphic design grids and modules principles allow to build **realistic dataviz mock-ups** in the graphical space

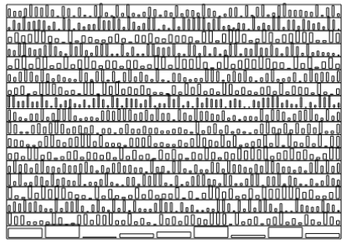


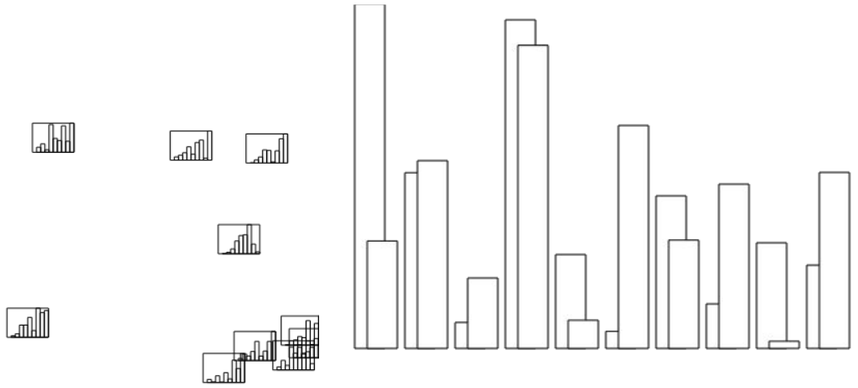
- Using a parametric and a GUI toolkits allow **rapid prototyping**



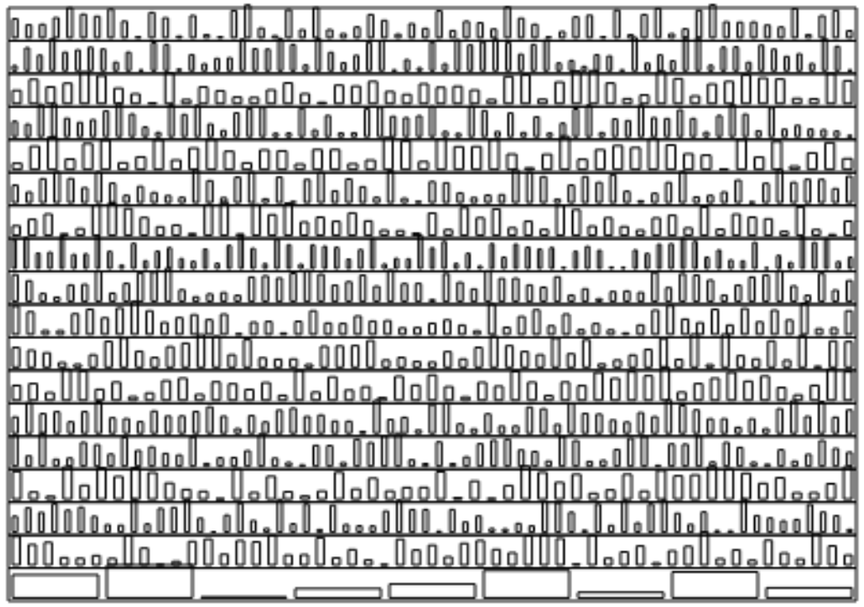


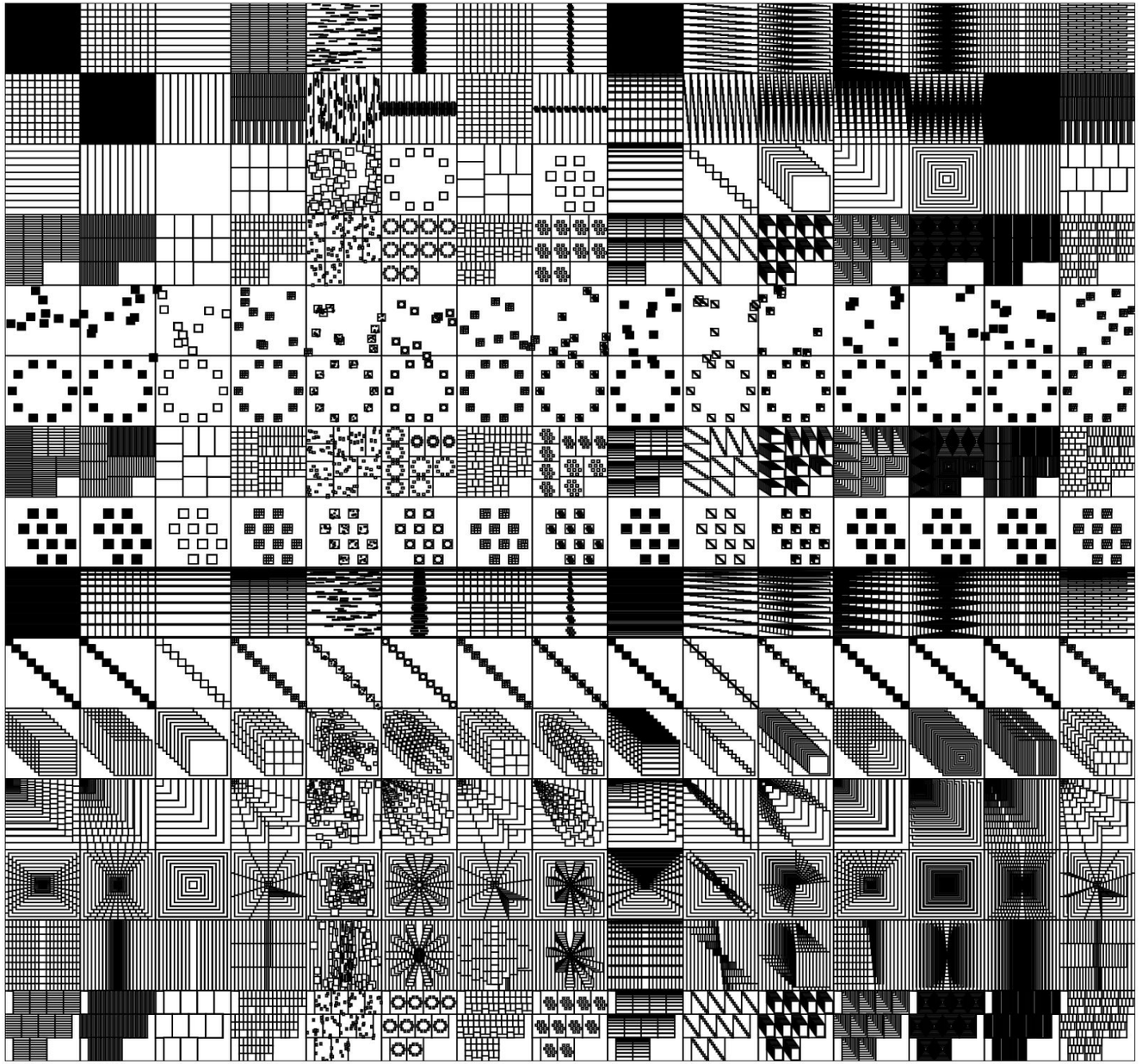
- **Generative**

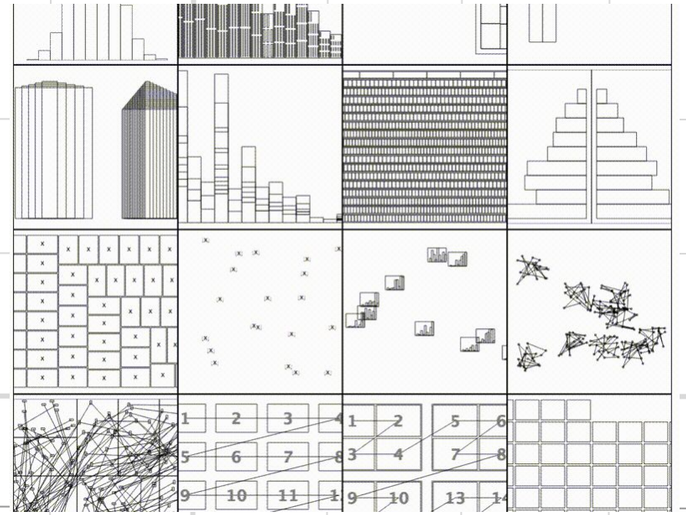




Generative







https://github.com/romsson/d3-gridding

Thank You!

Romain Vuillemot

@romsson

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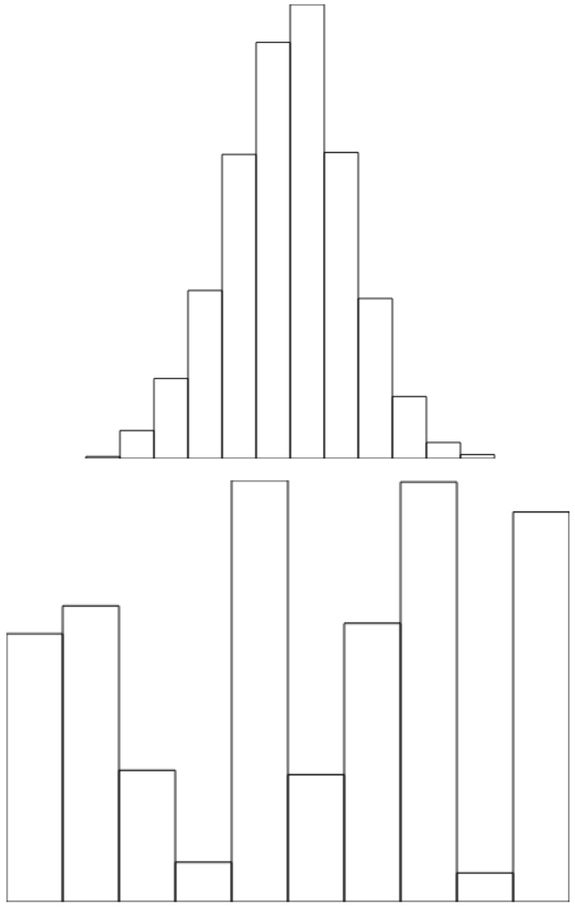
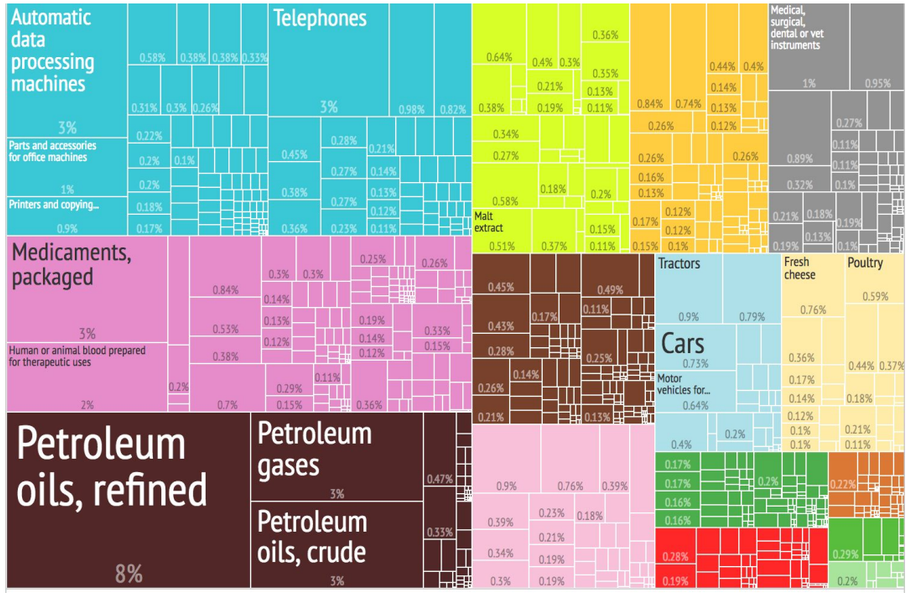
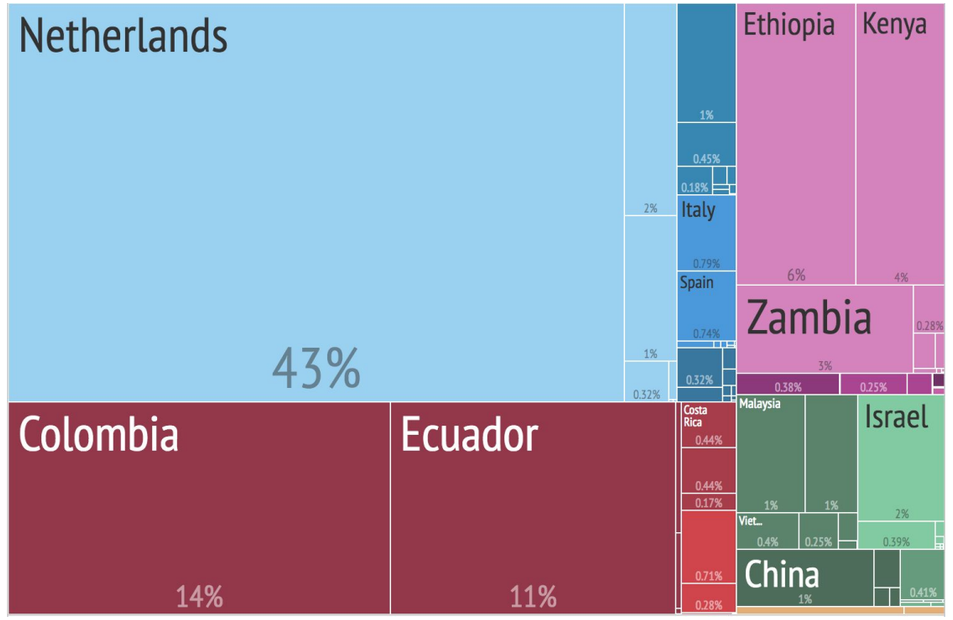
ÉCOLE CENTRALE LYON

LIRIS

Impact of data on the visual