

PANAGIOTIS TOGIAS

MS.C. INFORMATICS FOR LIFE SCIENCES

MINIMIZING DATA & INFORMATION CHAOS IN HEALTHCARE

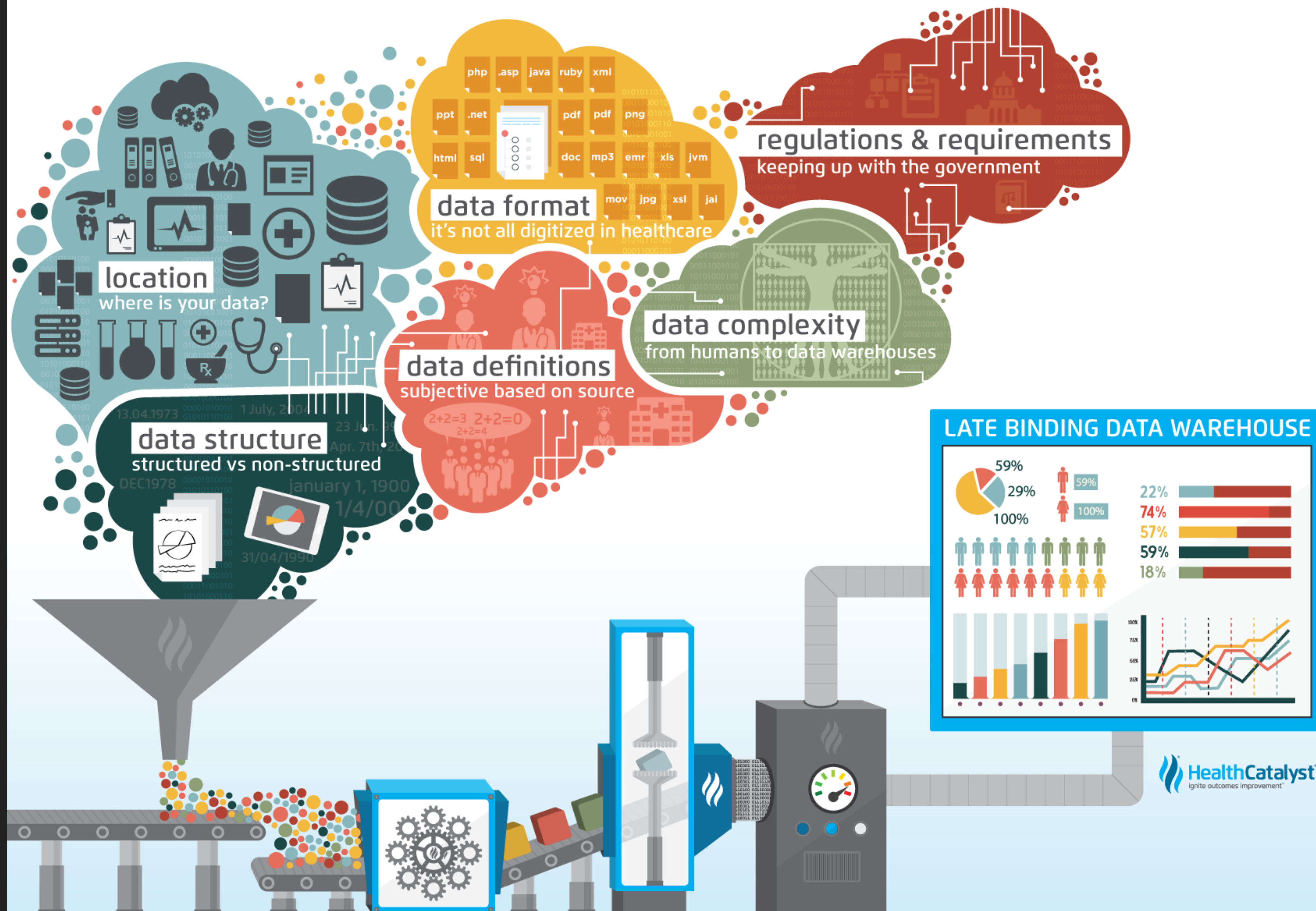
THE MADNESS IS ALREADY HERE

Those who work with data tend to think in very structured, linear terms

B to follows A and C follows B, not just some of the time, but all the time.
Healthcare data isn't that way

It's too late to evade chaos when it comes to data and analytics

WHY HEALTHCARE DATA IS DIFFICULT



MY BIG FAT GREEK DATA MANAGEMENT

- ▶ All data (clinical, bio) is available
- ▶ Management and governance are NOT

Powerful algorithms and statistical tools are required

success story: Malta's Healthcare System



THE GOOD..

Klinikes	Year	Aneptigmenes klinikes	Arithmos eisagogon	Arithmos nosileuthedon	Mesi diarkeia nosileias	Hmeres nosileias	Plirotita
Nosilia aktinotherapeia	2009	2	167	168	1.00	168	23.01
Hmerisia nosileia kliniki xmrh	2009	13	10169	10161	1.00	10161	214.14
Monada eidikon loimokseon-sars	2009	4	2	2	4.50	9	0.62
pathologiki kliniki-A pteriga	2009	29	2376	2457	7.53	18497	174.75
Pathologiki kliniki-B pteriga	2009	29	2251	2319	7.69	17822	168.37
Pathologiki kliniki-G pteriga	2009	26	5158	5194	2.55	13235	139.46
Nosileia pirinikis-iodiou	2009	4	74	74	2.03	150	10.27
Aimat. anosokatestalmeno asthen	2009	21	659	792	8.24	6529	85.18
Mesogeiaiki anaimia enilikon	2009	15	4689	4670	1.00	4675	85.39
Matam. aim. Progonikon kuttaron	2009	4	20	24	28.00	672	46.03
Xeirourgiki kliniki-A pteriga	2009	27	1273	1327	5.11	6784	68.84
Xeirourgiki kliniki-B pteriga	2009	26	758	820	7.24	5938	62.57
Hmerisia nosileia ourologikis	2009	0	1110	1106	1.00	1106	0.00
Orthopediki kliniki-A pteriga	2009	26	1037	1012	7.43	7515	79.19
Orthopediki kliniki-B pteriga	2009	26	995	1082	6.46	6994	73.70
Neuroxeirourgiki kliniki	2009	26	1107	1225	6.93	8485	89.41
Kardiothorakoxeirourgiki kliniki	2009	0	359	430	5.01	2155	0.00
Kliniki apokatastasis	2009	5	0	0	0.00	0	0.00
Monada entatikis therapeias B	2009	0	37	86	18.62	1601	0.00
Orthopediki klinik-G pteriga	2009	0	933	956	4.38	4191	0.00
Xeirourgiki kliniki-G pteriga	2009	0	1164	1206	3.97	4782	0.00
Psuxiatriki kliniki	2009	24	313	358	32.08	11486	131.12

THE BAD..

VIEWTABLE: Work.Sample

	StudentID	Gender	DOB	Race	Ethnicity	Class	Weight	Height	Enrollment_Date	State_Residency
1	5	1	08/15/1991	2	1	1	226	70	08/15/2012	In state
2	9	1	11/01/1991	3	1	1	144	71	08/15/2012	In state
3	35	1	10/29/1990	1	.	1	.	.	08/15/2012	Out of state
4	70	2	04/06/1994	1	2	1	175	63	08/15/2012	In state
5	44	1	01/31/1991	1	2	2	170	77	.	In state
6	51	1	.	1	1	2	177	71	08/15/2011	Out of state
7	85	2	09/26/1991	.	.	2	141	.	.	Out of state
8	19	1	05/25/1991	.	.	3	184	.	.	In state
9	40	1	10/29/1990	1	2	3	170	67	08/15/2010	In state
10	43	1	02/03/1990	2	2	3	.	.	08/15/2010	Out of state
11	24	1	09/04/1993	1	2	4	167	73	08/15/2007	In state
12	39	1	08/12/1993	3	2	4	150	73	08/15/2006	Out of state
13	45	1	03/09/1994	1	2	4	161	71	08/15/2007	In state
14	79	2	02/16/1992	1	2	4	143	62	08/15/2008	In state
15	89	.	09/11/1993	1	2	4	128	64	08/15/2009	Out of state

Missing numeric values are a period.

Missing character values are blank.

AND THE UGLY

Notes: - 1st daily direct feed

Day	OCT.		NOV.		DEC.		JAN.		FEB.		MAR.		Day	APR.		MAY		JUNE		JULY		AUG.		SEPT.		Day	4th	3rd	2nd	1st	Quarter	Compiled	Checked	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge		Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge									Gage height
1							6.00	5,020	6.80	6,090	26.20	49,300	1	11.20	13,500	2.00	7,870	4.10	2,240	6.10	5,150	11.00	13,000	3.10	1,780	1								
2							12.60	16,600	6.30	5,410	27.10	51,400	2	11.00	13,000	6.60	5,810	4.10	2,740	6.60	5,810	18.46	30,700	3.00	1,620	2								
3							14.50	21,200	5.90	4,900	28.40	54,600	3	10.40	11,800	5.60	4,540	4.20	2,860	6.50	5,670	20.98	36,700	2.90	1,540	3								
4							13.20	18,100	5.60	4,540	30.10	58,600	4	10.10	11,300	5.20	4,060	5.50	4,420	6.30	5,410	20.50	35,600	2.80	1,460	4								
5							10.30	11,700	5.30	4,180	31.90	63,000	5	9.70	10,600	5.20	4,060	5.10	3,940	6.30	5,410	17.20	27,700	3.00	1,620	5								
6							9.70	10,600	5.20	4,060	33.10	65,800	6	9.30	9,950	5.40	4,300	4.80	3,580	6.50	5,670	14.60	21,400	3.00	1,620	6								
7							8.50	8,670	5.70	4,660	33.40	66,600	7	8.70	8,990	7.60	7,270	4.50	3,220	9.90	11,000	13.90	19,800	2.90	1,540	7								
8							7.90	7,720	6.00	5,020	32.95	65,500	8	8.20	8,190	6.90	6,230	4.50	3,220	11.50	14,100	12.60	16,600	2.80	1,460	8								
9							7.40	6,970	6.50	5,670	30.85	60,400	9	8.00	7,870	5.90	4,900	4.40	3,100	10.60	12,200	13.00	17,600	2.80	1,460	9								
10							6.60	5,810	7.30	6,820	26.05	48,900	10	7.60	7,270	5.40	4,300	4.20	2,860	6.10	5,150	12.60	16,600	2.80	1,460	10								
11							6.00	5,020	8.30	8,350	22.20	39,700	11	7.40	6,970	5.60	4,540	4.10	2,740	7.80	7,570	11.90	15,000	2.70	1,400	11								
12							5.70	4,660	10.40	11,800	18.95	31,900	12	7.20	6,670	5.40	4,300	4.10	2,740	6.80	6,090	11.10	13,200	2.70	1,400	12								
13							5.30	4,180	11.10	13,200	19.20	32,500	13	7.00	6,370	5.40	4,300	4.60	3,340	6.20	5,280	10.30	11,700	2.60	1,320	13								
14							5.00	3,820	11.60	14,400	17.90	29,400	14	6.90	6,230	5.20	4,060	5.00	3,820	5.90	4,900	9.50	10,300	2.60	1,320	14								
15							4.80	3,580	10.50	12,000	16.00	24,800	15	6.80	6,090	5.00	3,820	6.00	5,020	5.40	4,300	9.00	9,470	2.50	1,260	15								
16							4.80	3,580	9.80	10,800	15.40	23,400	16	6.60	5,810	7.30	6,820	6.00	5,020	5.20	4,060	8.10	8,030	2.40	1,200	16								
17							5.40	4,300	13.20	18,100	14.20	20,500	17	6.60	5,810	7.00	6,370	5.50	4,120	5.00	3,820	7.60	7,270	2.40	1,200	17								
18							6.00	5,020	19.20	32,500	12.00	15,300	18	6.60	5,810	6.30	5,410	5.30	4,180	5.00	3,820	7.80	7,570	2.30	1,160	18								
19							6.70	5,850	21.00	36,800	12.00	15,300	19	6.50	5,670	5.60	4,540	5.00	3,820	4.90	3,700	7.00	6,370	2.30	1,160	19								
20							5.90	4,900	21.20	37,300	11.80	14,800	20	6.30	5,410	5.20	4,060	6.20	5,280	4.60	3,340	6.30	5,410	2.20	1,100	20								
21							6.00	5,020	20.60	35,800	15.90	24,600	21	6.00	5,020	5.00	3,820	6.40	5,540	4.60	3,340	6.10	5,150	2.20	1,100	21								
22							6.50	5,670	19.80	33,900	21.90	39,000	22	5.80	4,780	4.60	3,340	6.00	5,020	4.30	2,980	5.60	4,540	2.10	1,060	22								
23							6.60	5,810	18.40	30,600	23.60	43,000	23	5.70	4,660	4.30	2,980	5.70	4,660	4.00	2,630	4.90	3,700	2.10	1,060	23								
24							6.30	5,410	16.90	27,000	22.10	39,400	24	5.50	4,420	4.30	2,980	5.30	4,180	3.90	2,520	4.50	3,220	2.10	1,060	24								
25							7.00	6,370	15.20	22,900	18.50	30,800	25	5.60	4,540	4.20	2,860	5.00	3,820	3.60	2,200	4.10	2,740	2.10	1,060	25								
26							7.90	7,720	15.20	22,900	15.00	22,400	26	5.90	4,900	4.20	2,860	5.00	3,820	3.40	2,000	3.90	2,520	2.10	1,060	26								
27							7.50	7,120	20.60	35,800	13.00	17,600	27	5.30	4,180	4.30	2,980	4.80	3,580	3.30	1,900	3.70	2,300	2.10	1,060	27								
28							7.30	6,820	24.90	46,200	12.20	15,700	28	5.20	4,060	4.30	2,980	4.50	3,220	2.90	1,540	3.60	2,200	2.40	1,200	28								
29							7.60	7,270			11.70	14,600	29	5.60	4,540	4.40	3,100	4.60	3,340	3.00	1,620	3.30	1,900	2.40	1,200	29								
30							7.10	6,520			11.40	13,900	30	5.80	4,780	4.30	2,980	5.80	4,780	3.20	1,800	3.40	2,000	2.60	1,260	30								
31							7.10	6,520			11.50	14,100	31			4.20	2,860			5.40	4,300	3.20	1,800			31								
TOTAL							227,650		501,700		1,106,800			209,190		135,300		115,020		149,280		362,090		339,140		2,846,170								
Mean							7340		17,900		35,700			6,970		4,360		3,830		4,820		11,700		1,300		10,400								
Sec.-ft. per square mile																																		
Run-off, depth in inches																																		
Run-off in acre-feet							451,000		994,000		2,200,000			415,000		268,000		228,000		296,000		719,000		774,000		5,650,000								
Maximum							21,200		46,200		66,600			13,500		7,870		5,540		14,100		36,700		1,720		66,600								

SO WHAT NOW?

- ▶ Better understanding of data
- ▶ Will power to improve things
- ▶ Educational programs for hospital employees and nurses/doctors

The need of data experts has to be expressed

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