Unlearning of Sciences through Open Data

2015.12.8

Shuichi Iwata

March 11, 2011(Fri)14:46 – Earthquake, Tsunami

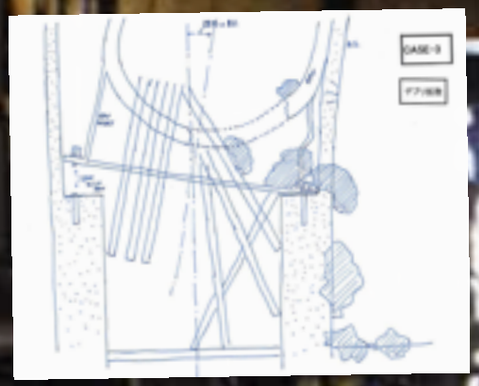
Presentation made by Tatsujiro Suzuki (The 3/11 Fukushima Nuclear Accident: What Happened and Lessons learned (so far)) May 2-4, 2011

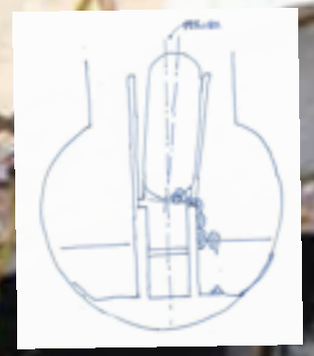
- Occurred 14:46 March 11, 2011
- Magnitude : 9.0 Mw
- Epicenter location : 38°6”N and 142°51”E, and 24km in depth
- Victims : 15,202 Dead
  8,718 Missing
  (as of May 25, 2011)

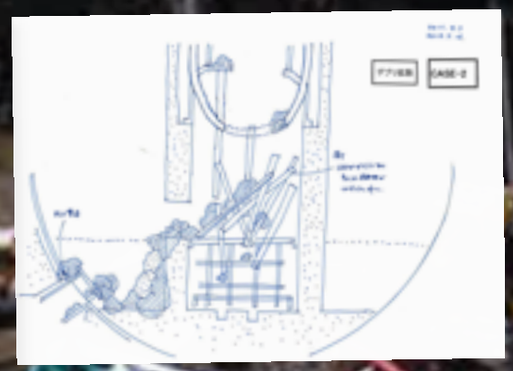
Many Things Happened!

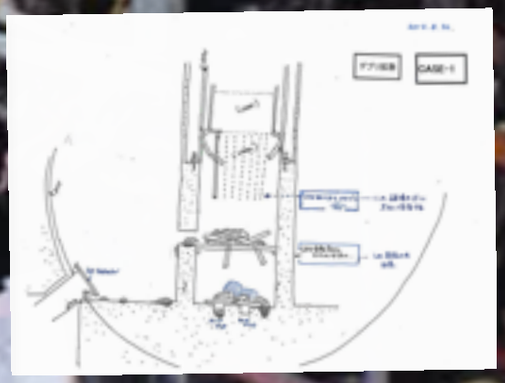
THE FIRST BIG ACCIDENT IN “BIG DATA” ERA
AT THE BIGGEST SCALE IN THE HISTORY

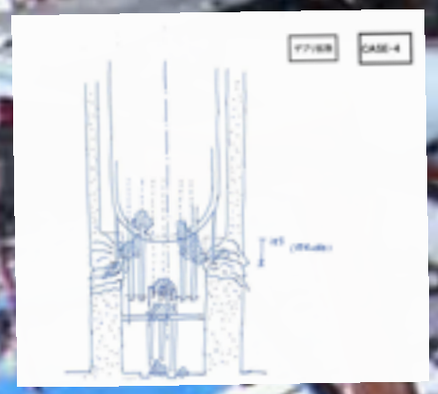
CAN WE OVERCOME WITH RESILIENCE BY DATA?

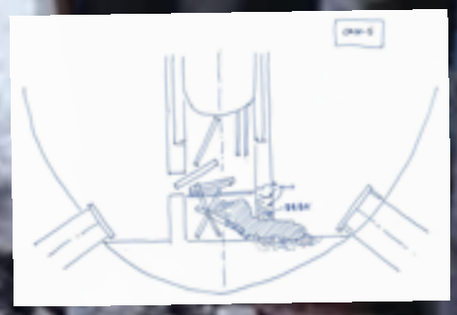

CASE-3



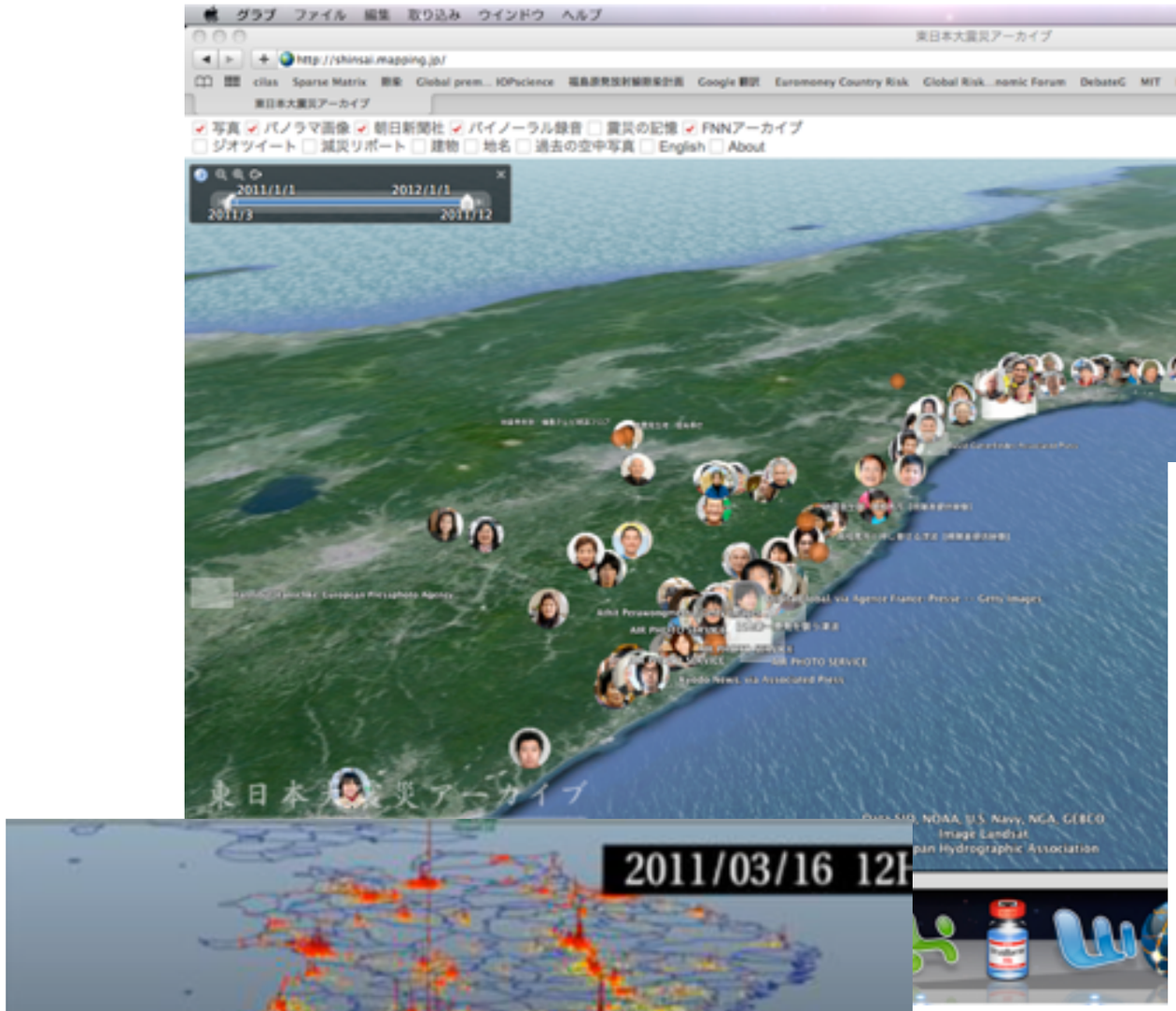

CASE-2

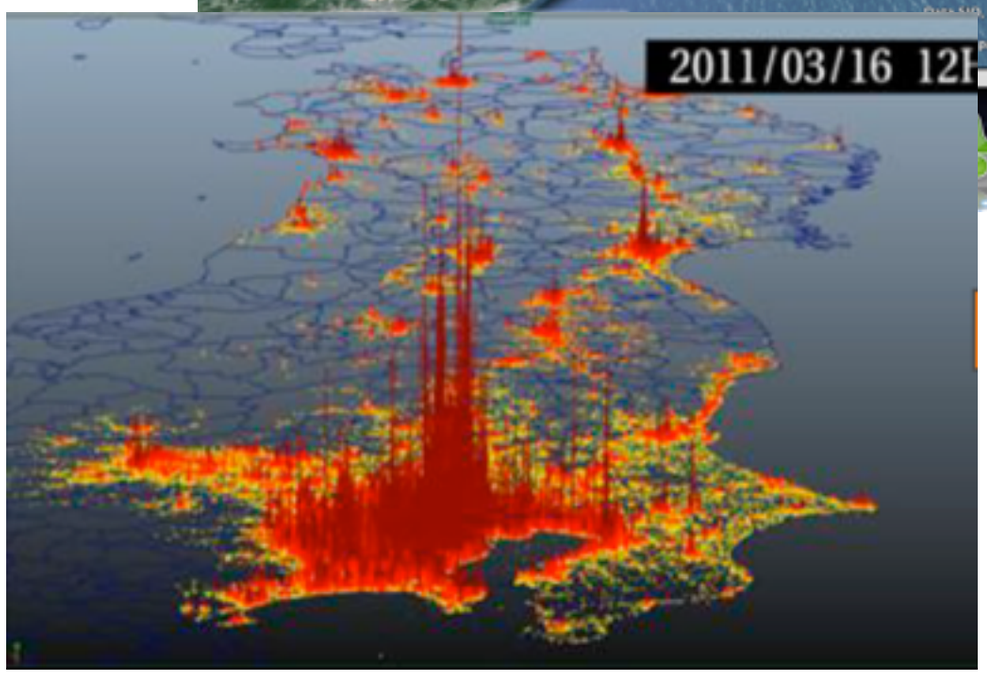

CASE-1

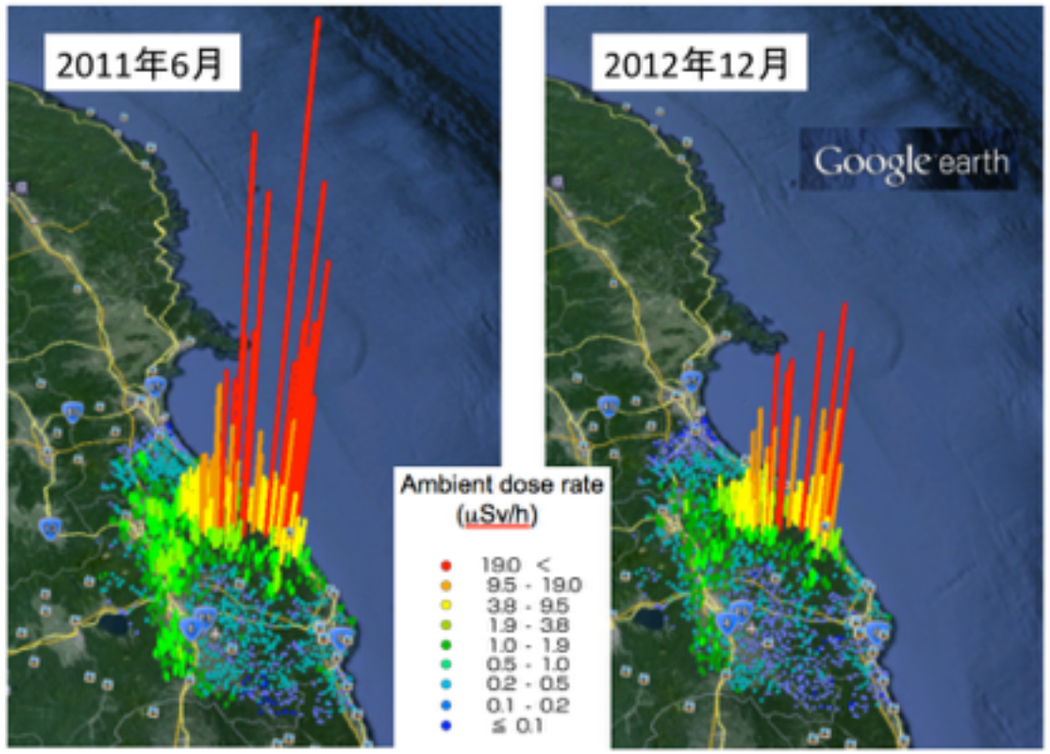

CASE-4



Data are open in general.







野村茂雄氏、斎藤公明氏提供

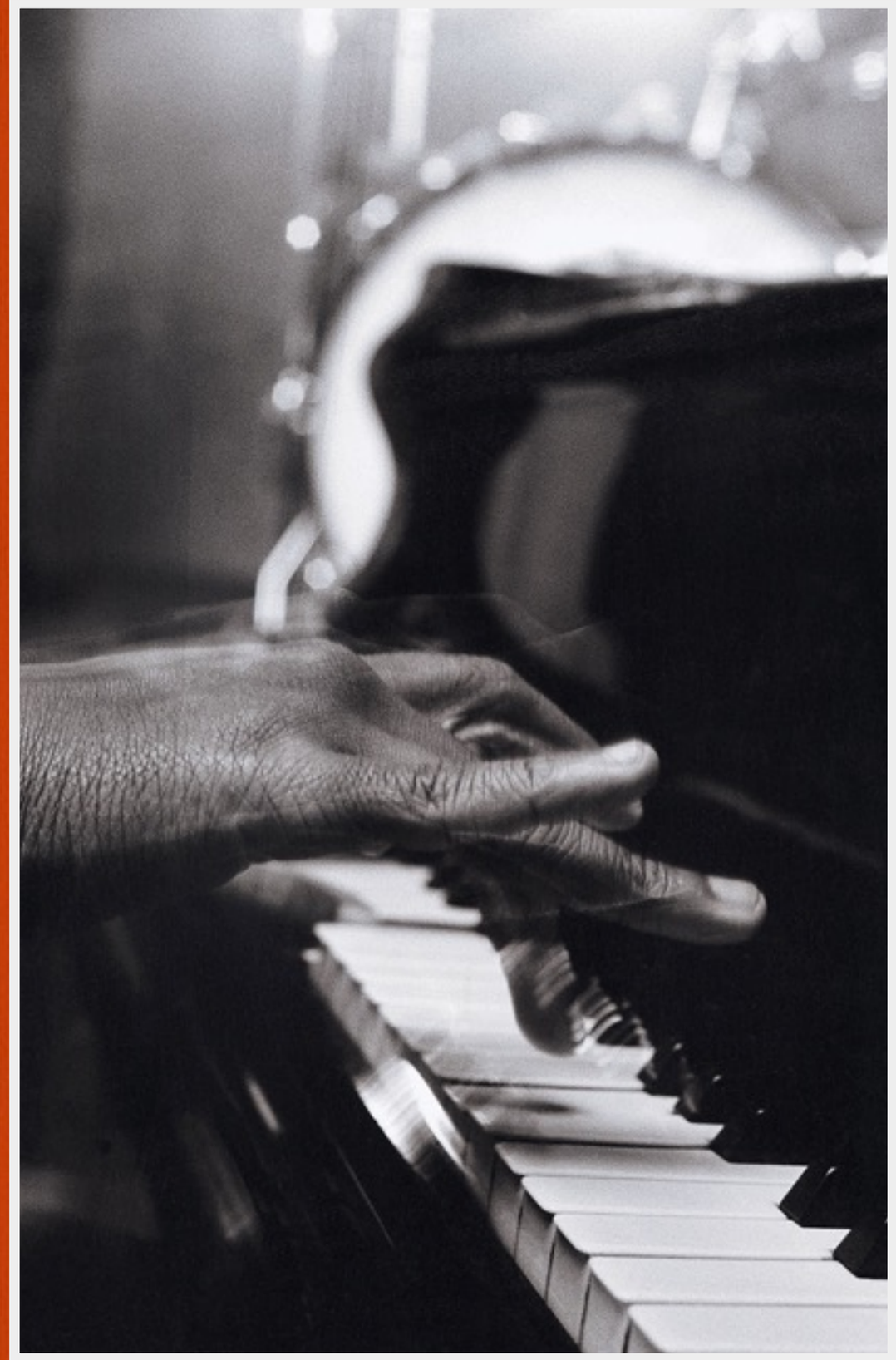
Issues

- ☑ Scientists have lost public trust.
  - ☑ overselling due to competitions
  - ☑ narrow biased to “edge” and not holistic
- ☑ Communities are destroyed.
  - ☑ path dependent developments with diversities are required-individual care
  - ☑ future visions and perspectives by forward & backcasting-commitments by all

SLL
DLL
TLL

Unlearning

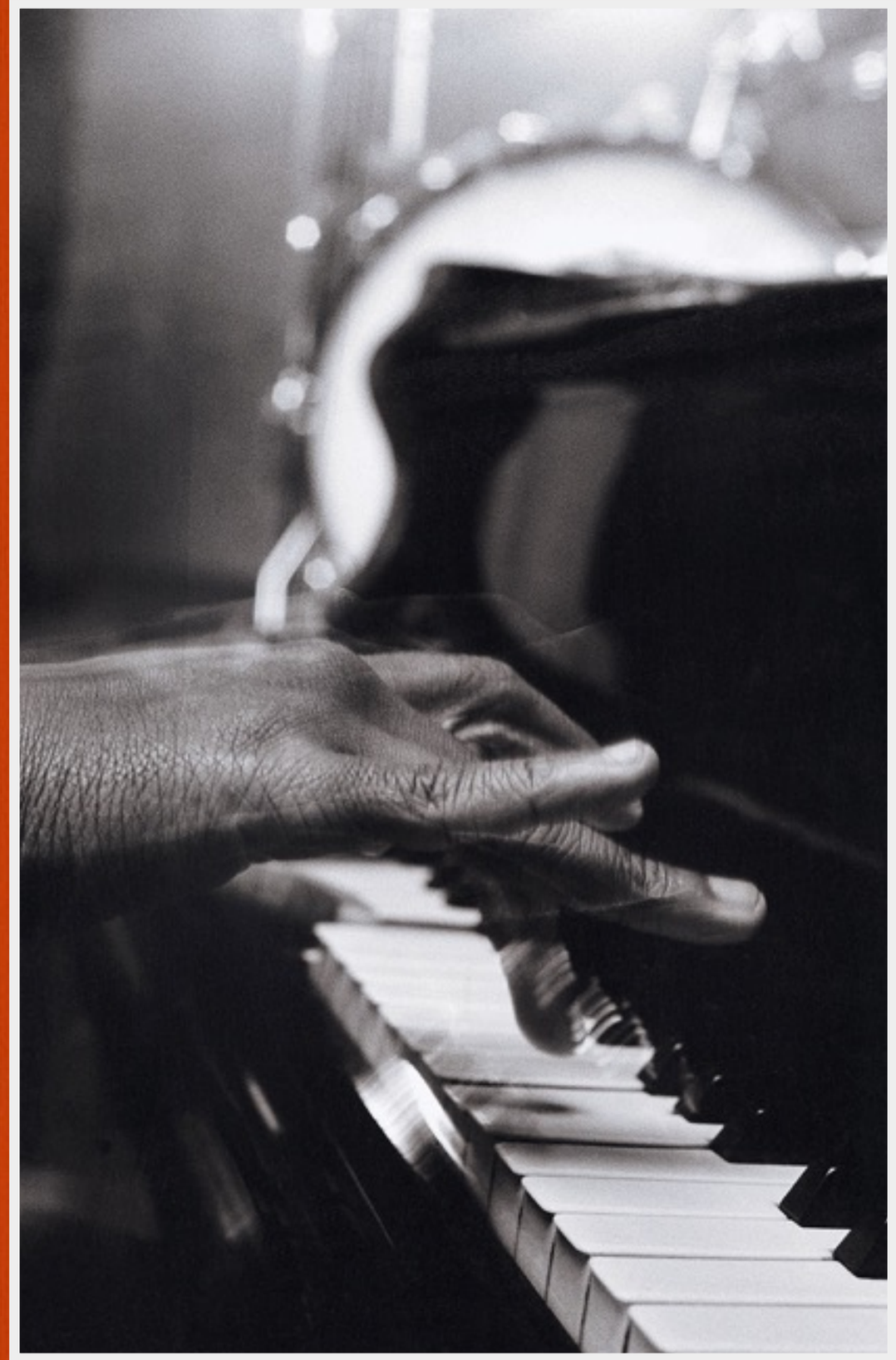
OS, ES, TS, CS, DS, DS



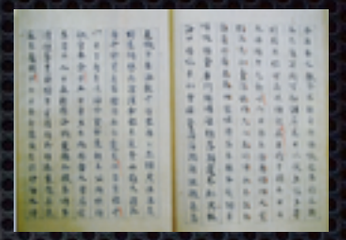
SLL
DLL
TLL

Unlearning toward Inclusive Design

OS, ES, TS, CS, DS, DS



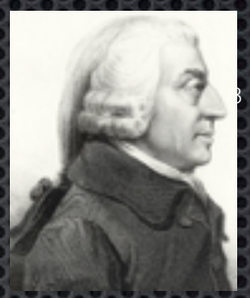
869 Jogan Sanriku Earthquake (Sugawara no Michizane et.al.)
>>Curse and Shrine



1755 Lisbon earthquake
>>Kant, Adam Smith, Voltaire, Rousseau (Enlightenment Thought)








1945 Hiroshima and Nagasaki
>>the Cold War between the East and the West
>>Imperative of Responsibility (1979 Hans Jonas)

1986 Chernobyl
>>гласность and Dissolution of the Soviet Union


2001 9.11 New York
>>Sustainability for Human Security/Fundamental Human Right.....

2011 3.11 The 2011 off the Pacific coast of Tohoku Earthquake
Fukushima Daiichi

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Competitive

Symbiotic

Pre 3.11

Deterministic/Conservative/Stable

Winners Take All

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Innovation Driven

Competitive

Symbiotic

Pre 3.11

Winners Take All

Deterministic/Conservative/Stable

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Innovation Driven

Competitive

Symbiotic

Pre 3.11

Structured Society

Winners Take All

Deterministic/Conservative/Stable

Heuristic/Evolutional/Dynamic

Inclusive Wealth

Data-Driven Design

Harmonized Stories

Innovation Driven

Competitive

Symbiotic

Pre 3.11

Structured Society

Winners Take All

Deterministic/Conservative/Stable

Inclusive Wealth

Heuristic/Evolutional/Dynamic

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Symbiotic

Strategic Data

Deterministic/Conservative/Stable

Winners Take All

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Leading Edge Data

Competitive

Symbiotic

Strategic Data

Deterministic/Conservative/Stable

Winners Take All

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Leading Edge Data

Competitive

Symbiotic

Strategic Data

Standard Data

Winners Take All

Deterministic/Conservative/Stable

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Leading Edge Data

Data for Discovery

Competitive

Symbiotic

Strategic Data

Standard Data

Deterministic/Conservative/Stable

Winners Take All

Heuristic/Evolutional/Dynamic

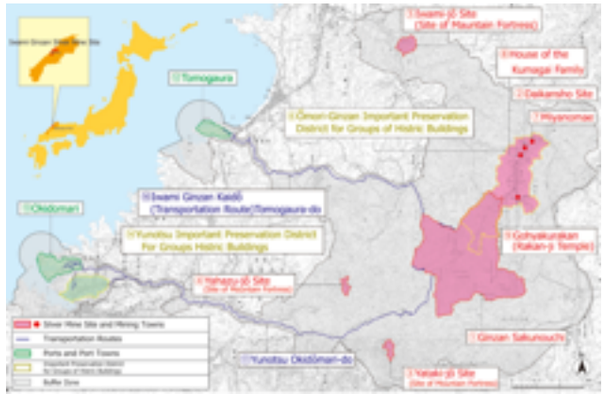
https://www.saesgetters.com/ja/research-innovation/research-innovation

http://www.surari.biz/blog/wp-content/uploads/2014/07/lgf01a201310091600.jpg

Competitive

Symbiotic

http://www.tepco.co.jp/index-j.html



http://ginzan.city.ohda.lg.jp/wh/en/culture/index.html

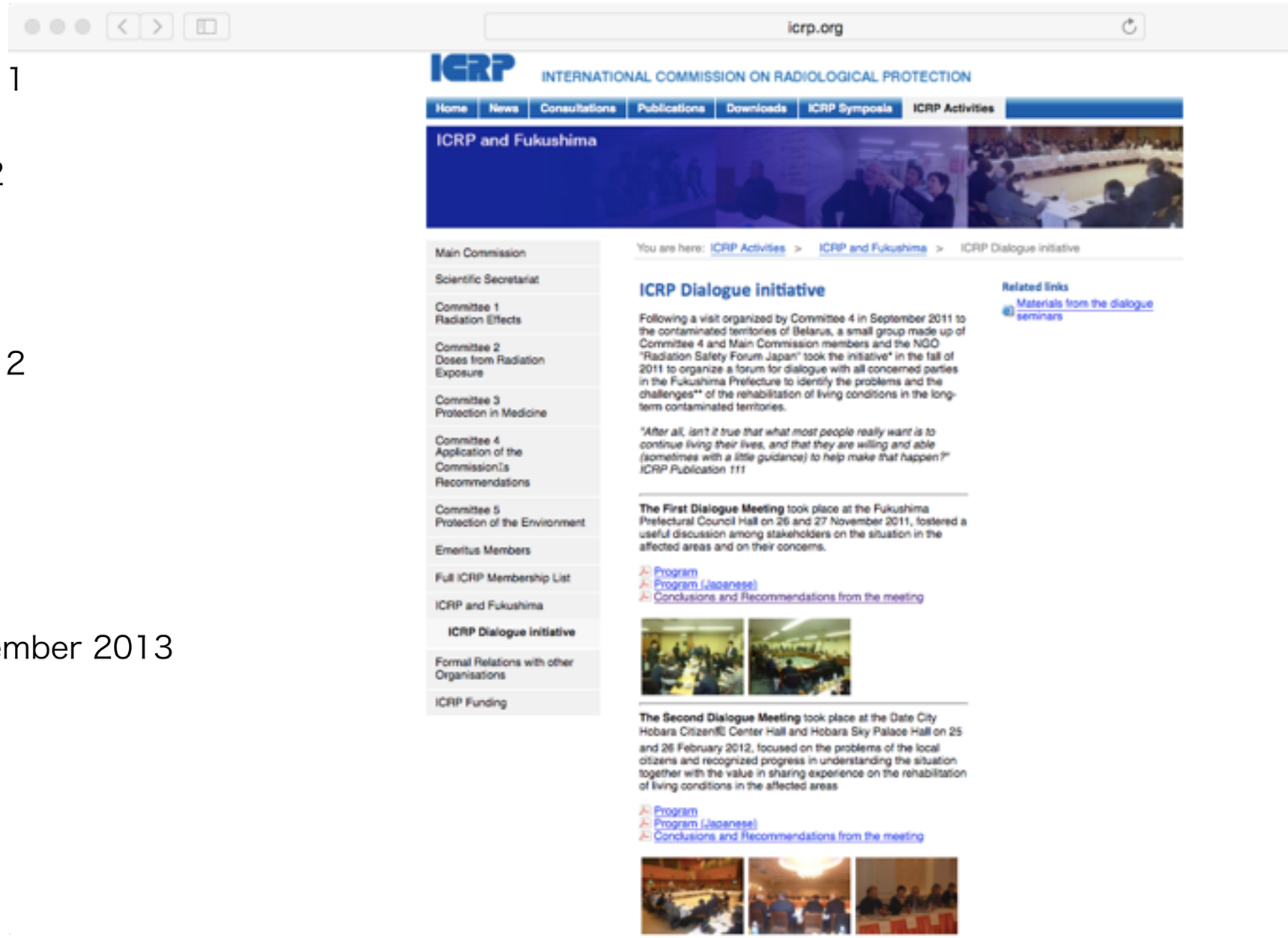
Deterministic/Conservative/Stable

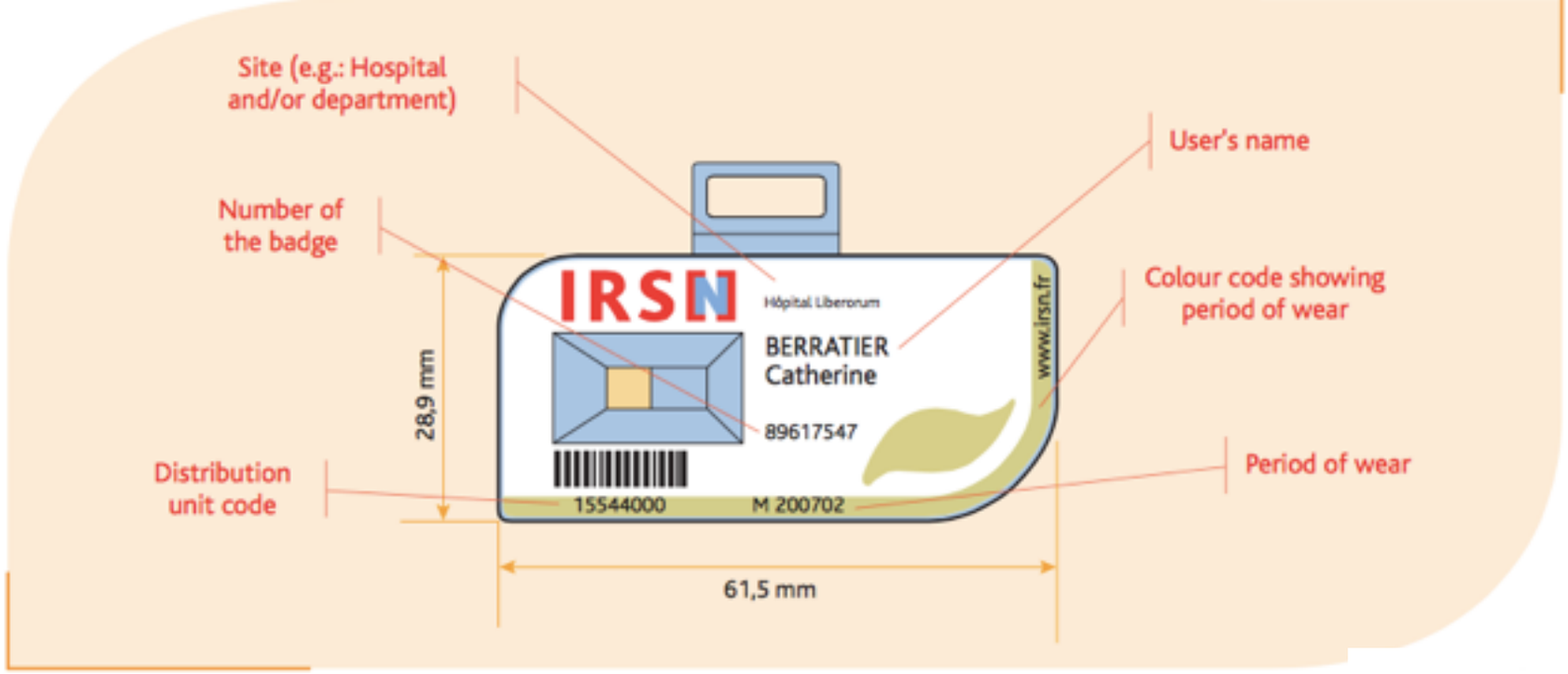
How to co-create a harmonized community by Data-driven Design

ICRP and Fukushima

ICRP Dialogue initiative

- 26 and 27 November 2011
- 25 and 26 February 2012
- 7 and 8 July 2012
- 10 and 11 November 2012
- 2 and 3 March 2013
- 6 and 7 July 2013
- 30 November and 1 December 2013
- 11-12 May 2014
- 30-31 August 2014
- 6-7 December 2014





IRSN
INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

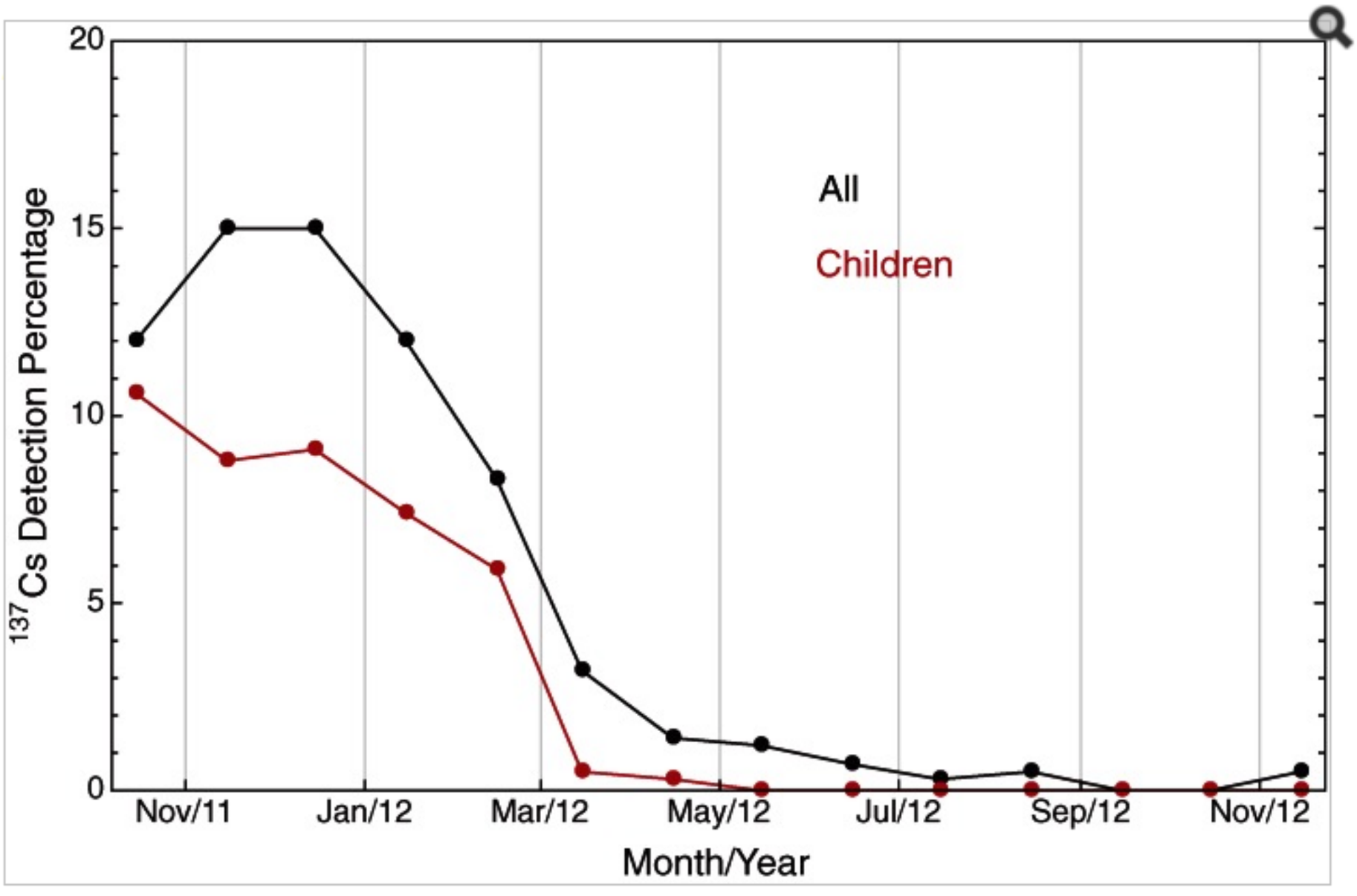
ERGONOMIC DESIGN

- The dosimeter badge is light (12 gr), robust and slim (8 mm)
- The person wearing the badge is clearly identified and colour-coding is used to show the period of wear
- Worn either on a strap around the neck or pinned to work clothes using a shirt clip which is kept by the wearer.
- Ready for immediate use
- RPL badges ensure com health and safety practice are shrink-wrapped befo issue This prevents them into direct skin contac successive wearers

PROCEEDINGS OF THE JAPAN ACADEMY, SERIES B
PHYSICAL AND BIOLOGICAL SCIENCES

PMC full text: Proc Jpn Acad Ser B Phys Biol Sci. 2013 Apr 11; 89(4): 157–163.
doi: 10.2183/pjab.89.157

Figure 5.

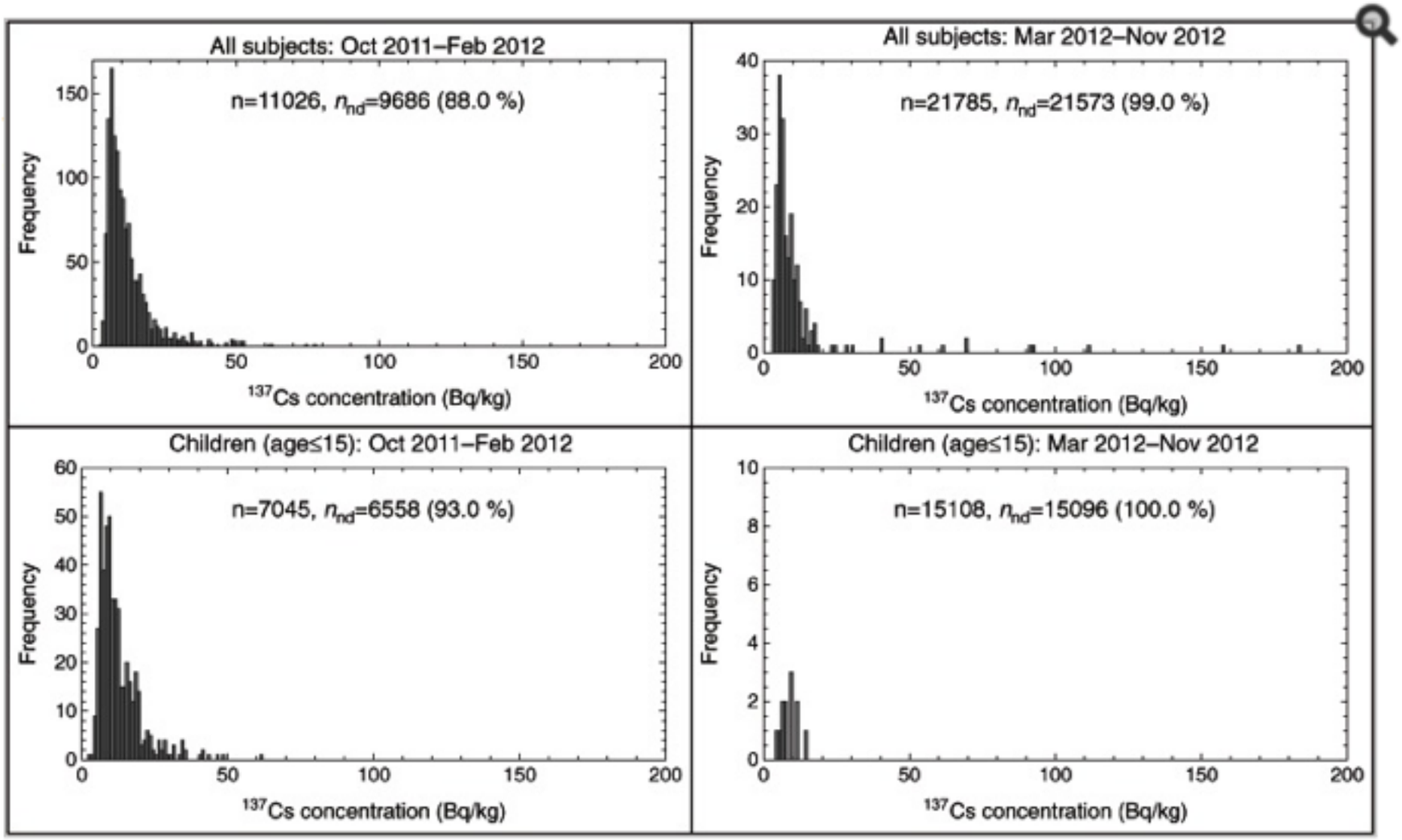


The temporal changes of the ^{137}Cs detection percentages for all subjects (black) and children (red).

PMC full text: Proc Jpn Acad Ser B Phys Biol Sci. 2013 Apr 11; 89(4): 157–163.
doi: 10.2183/pjab.89.157

<< Prev Figure 6. Next >>

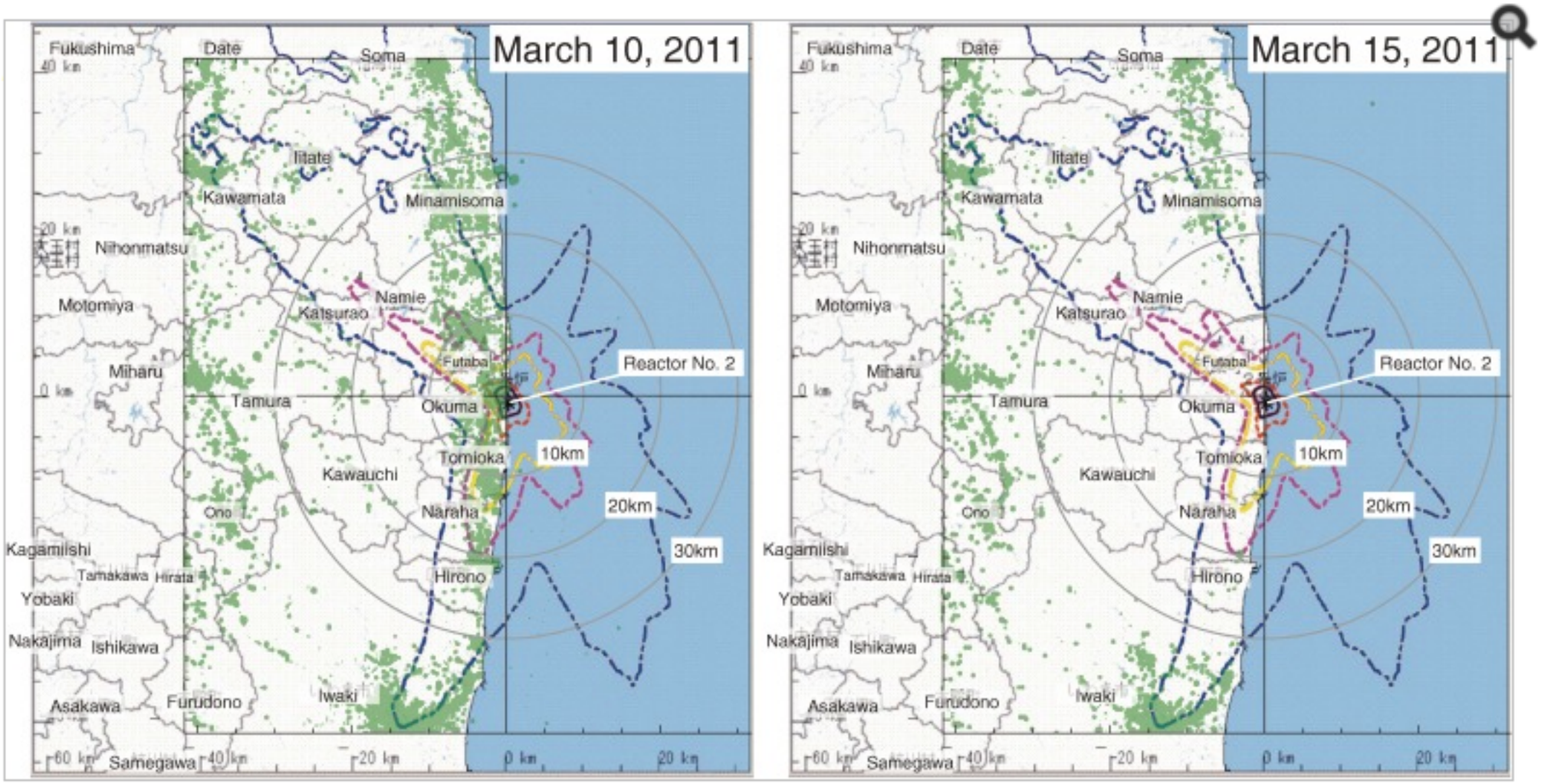
Figure 6.



^{137}Cs concentration for all subjects (top) and for children only (bottom), in 1 Bq/kg increments. The right-hand panels are for the period when a change of clothes was instituted for all subjects to minimize spurious readings from surface contamination. Note the different ordinate scale for each panel. Nonexposed (non-detected) subjects are excluded from the plot.

PMC full text: Proc Jpn Acad Ser B Phys Biol Sci. 2013 May 10; 89(5): 196–199.
doi: 10.2183/pjab.89.196

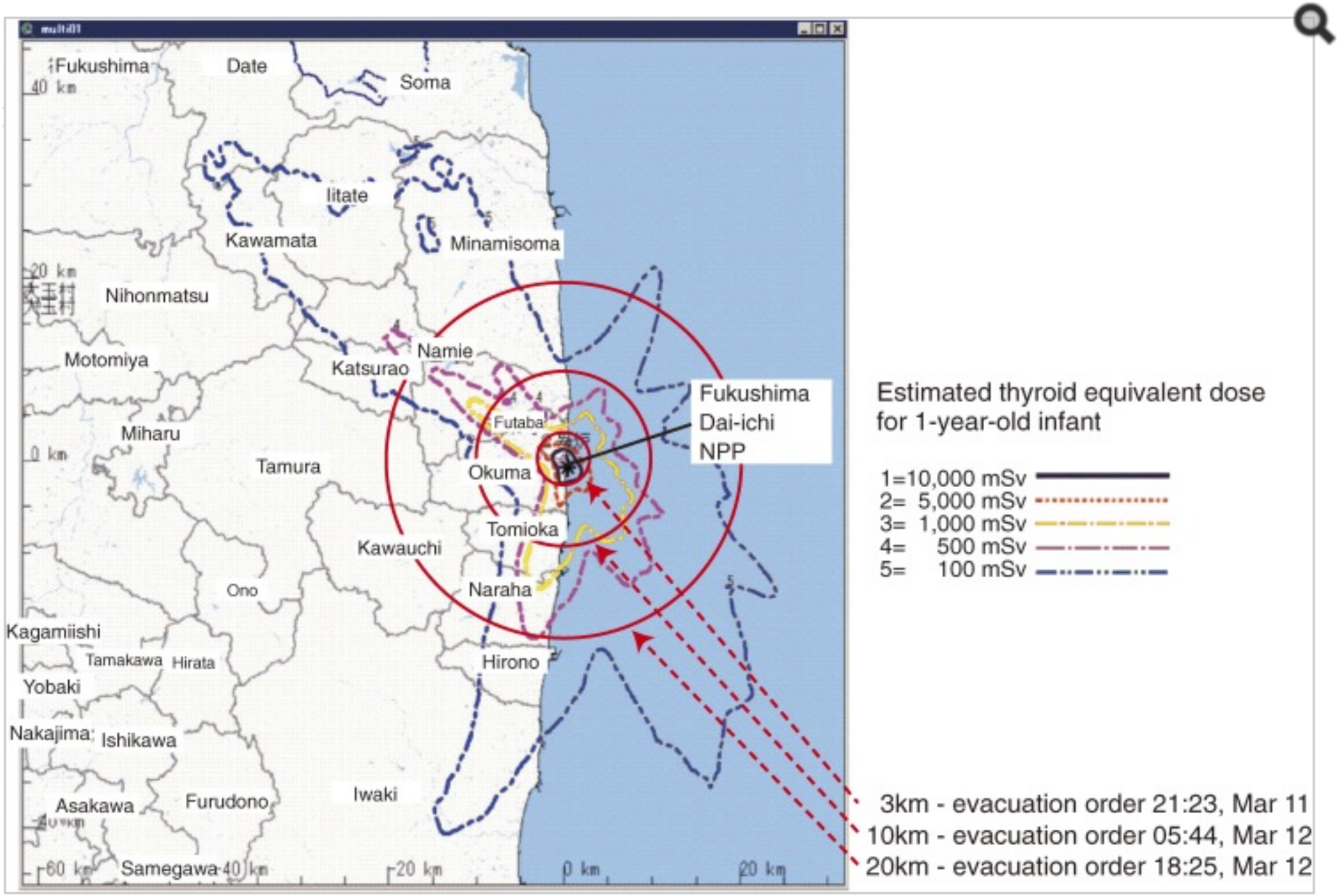
Figure 2.



The 24-hour integrated distribution of people on March 10, 2011 (left) and on March 15, 2011 (right).

PMC full text: Proc Jpn Acad Ser B Phys Biol Sci. 2013 May 10; 89(5): 196–199.
doi: 10.2183/pjab.89.196

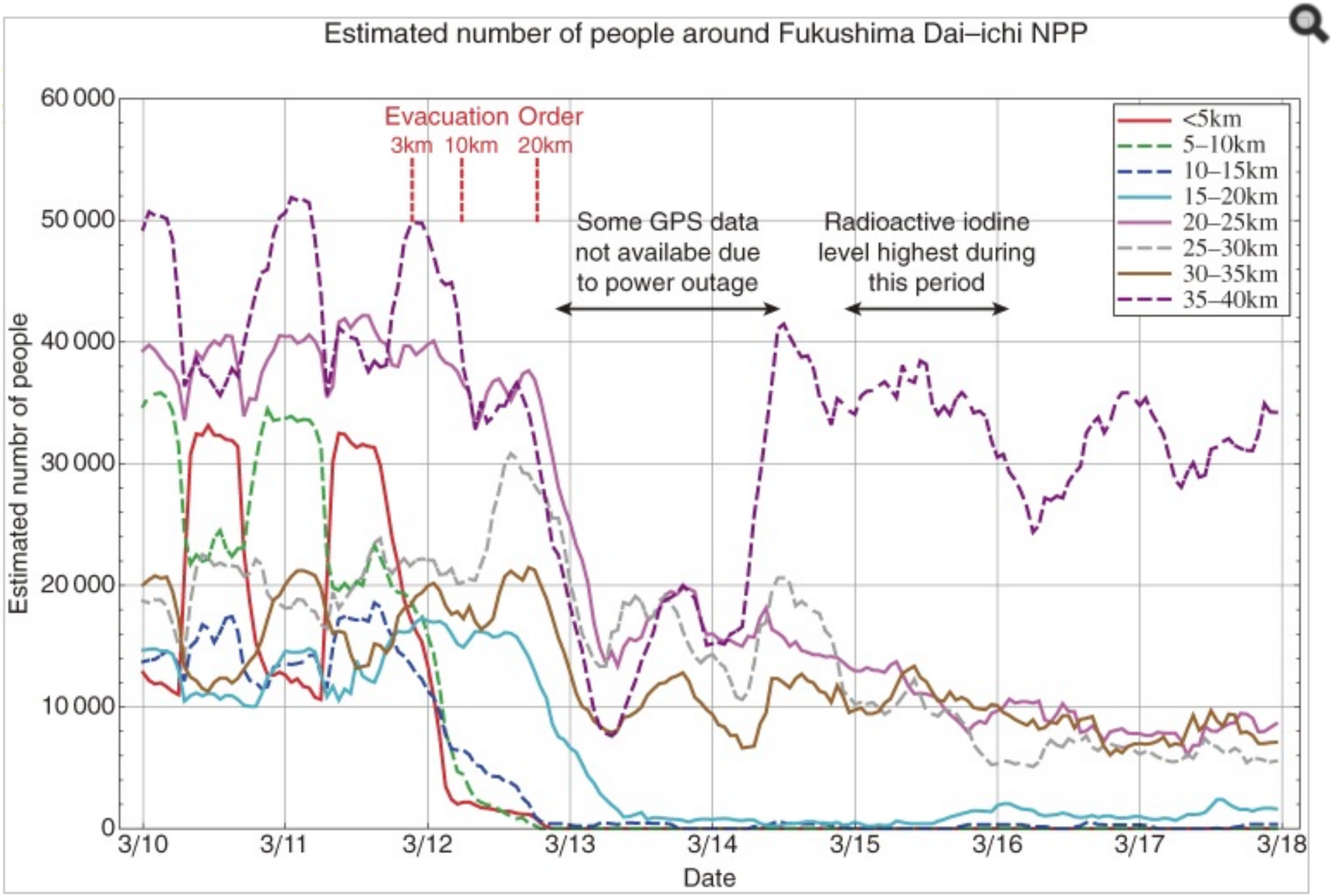
Figure 1.



The thyroid equivalent dose (for 1-year-old infant) contours estimated by the Japanese government using the SPEEDI system. The 3 km, 10 km and 20 km evacuation radii are also shown. Figure adopted from Ref. 2.

PMC full text: Proc Jpn Acad Ser B Phys Biol Sci. 2013 May 10; 89(5): 196–199.
doi: 10.2183/pjab.89.196

Figure 3.



The estimated number of people for each hour between concentric circles of 5 km increments, centered at the Fukushima Dai-ichi NPP, from March 10, 2011, to March 18, 2011.

SLL

CITIZEN'S SCIENCE

This joint effort between ICRP and volunteers working through social media, new for ICRP, has been a positive experience. We would welcome similar constructive collaboration in the future.
ICRP Scientific Secretary Christopher H. Clement

OS

Political Rationality for Coexistence

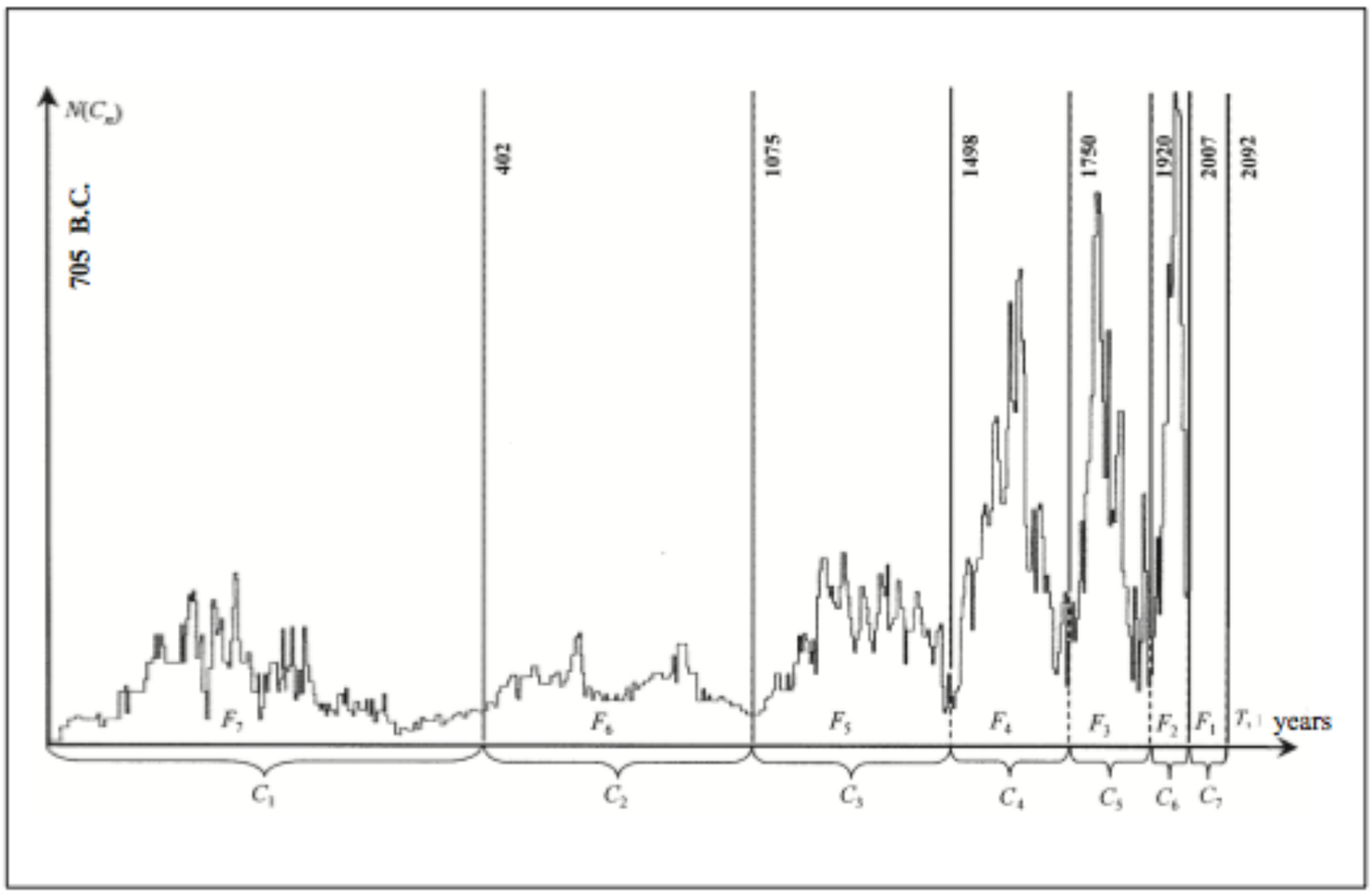


Fig. 1. Structural portrait of C_n-waves of global system conflicts.

By Michael Zgurovsky

https://it.wikipedia.org/wiki/Galleria_degli_Uffizi

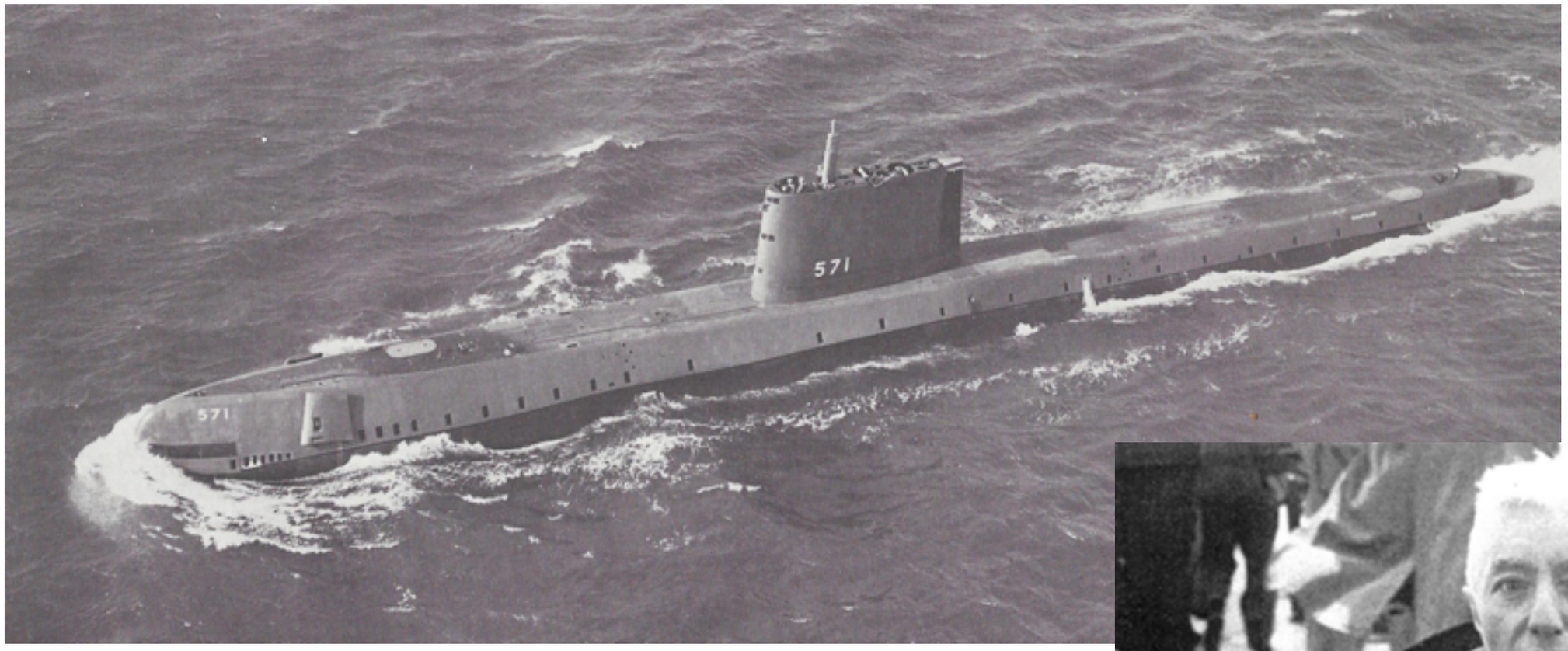
Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812 ~1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par des largeurs des zônes colorées à raison d'un millimètre pour dix mille hommes ; ils sont de plus écrits en travers des zônes. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de MM. Thiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

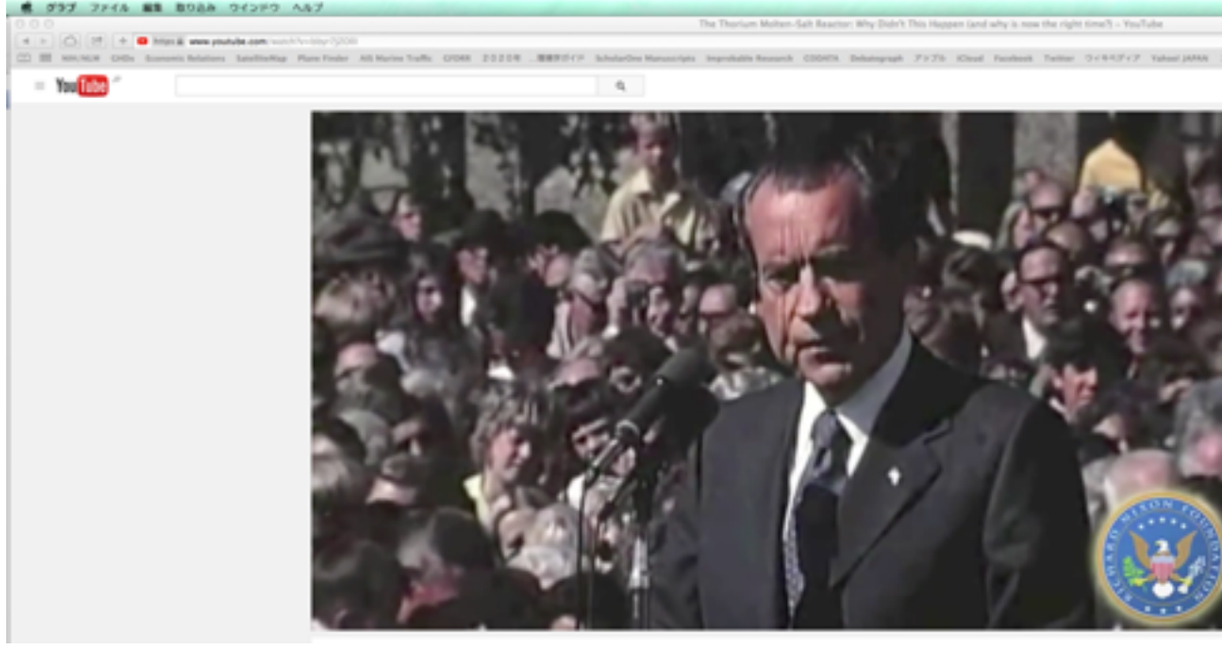
Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow et ne rejoignaient vers Orscha et Witebsk, auraient toujours marché avec l'armée.

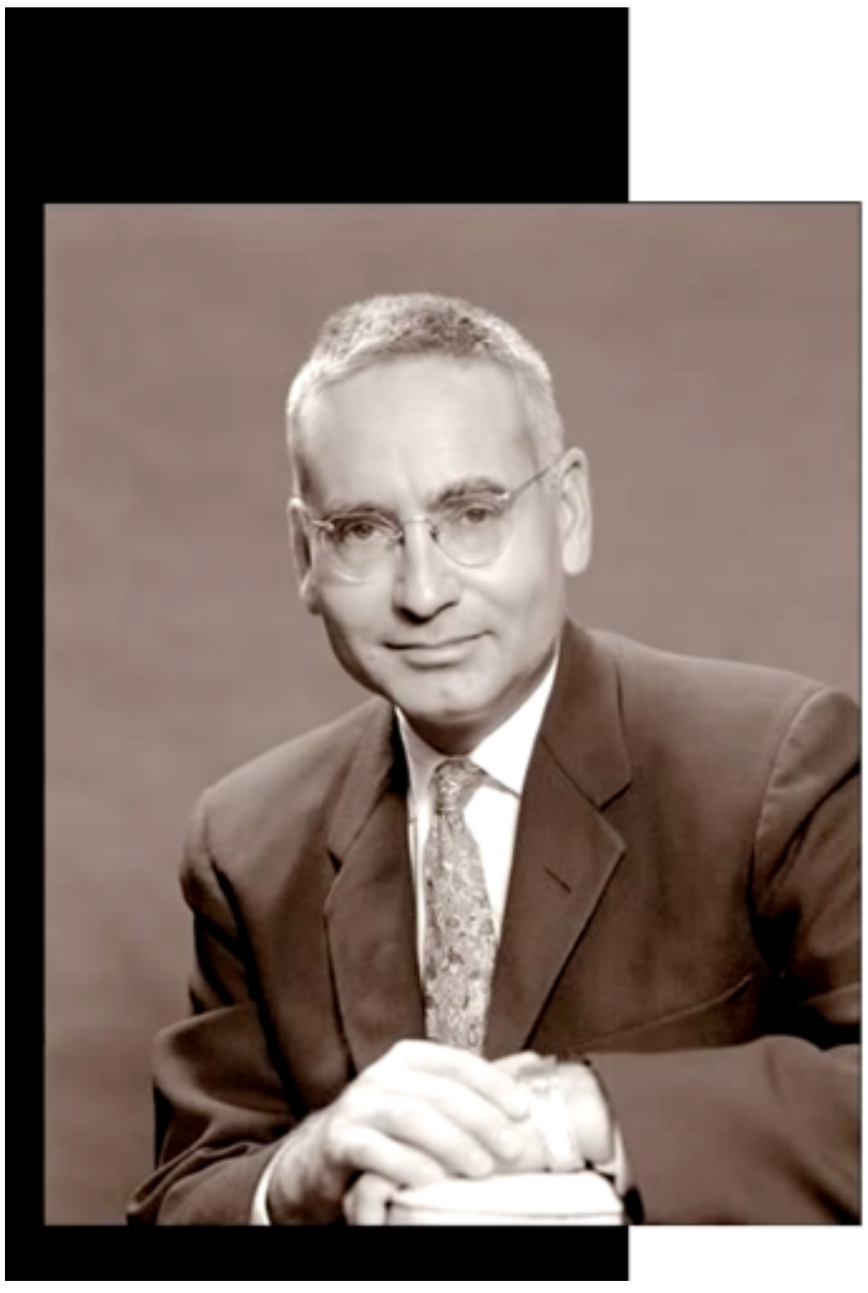
...., School of Mines, University of Glasgow, École polytechnique, TU, UT, RPI, MIT, Landau School, CMU/Stanford U., ...



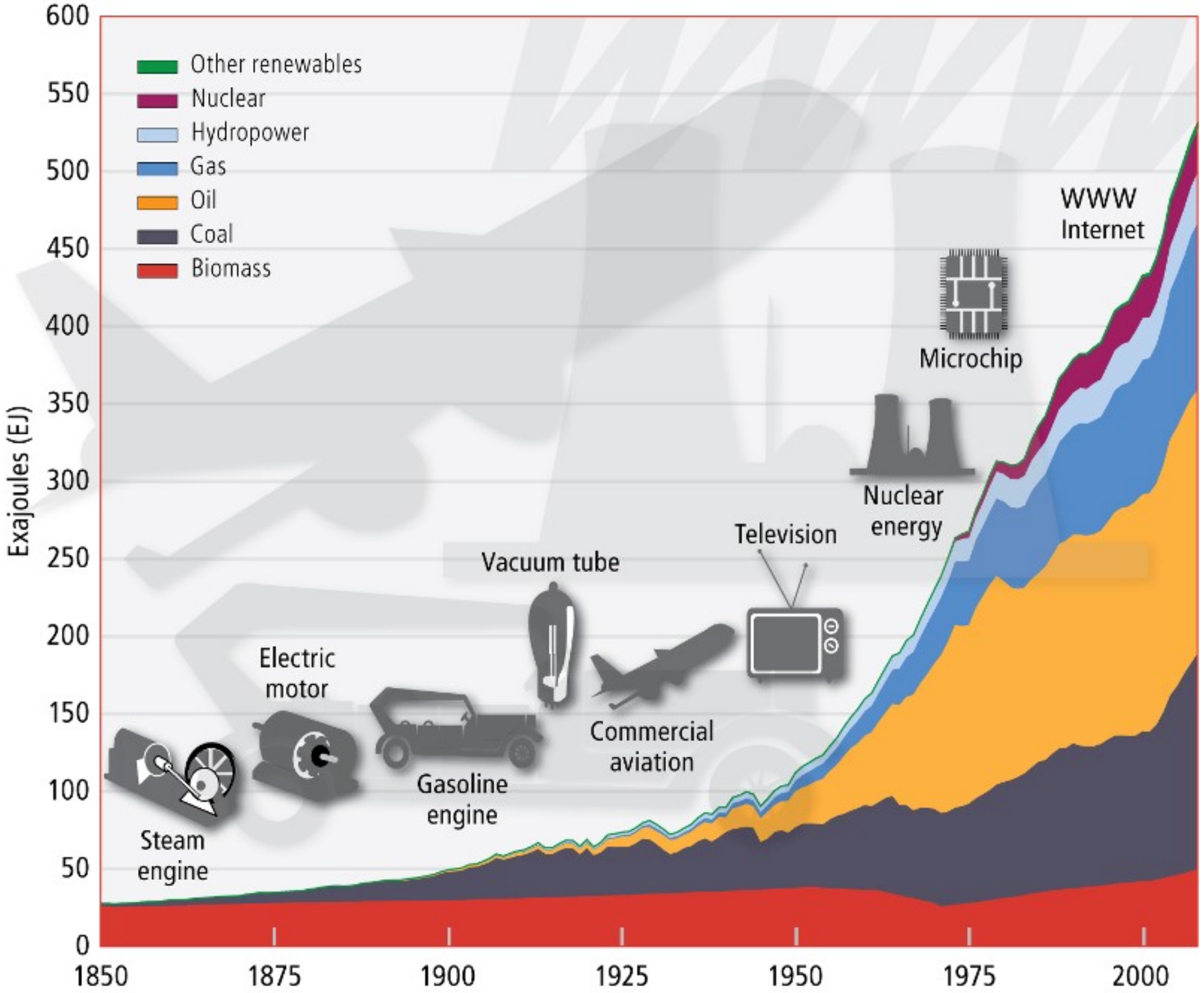
PWR & Zircaloy

MSR and LWR/FBR





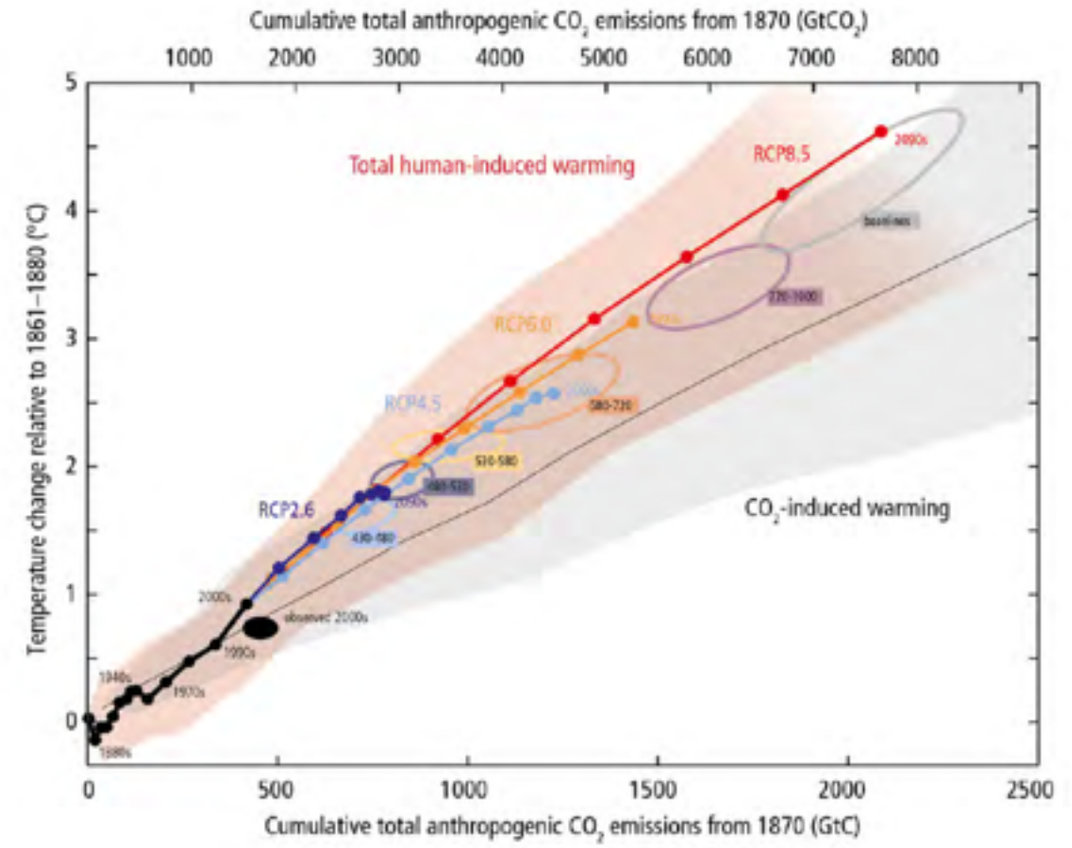
"As I look back on these events, I realize that leaving ORNL was the best thing that could have happened to me. My views about nuclear energy were at variance with those of [the AEC and Congressional leadership]. After all, it was I who had called nuclear energy a Faustian bargain, who continued to promote the molten-salt breeder…"



http://www.iiasa.ac.at/web/home/about/achievments/scientificachievementsandpolicyimpact/Sustainable.en.html

地球エンジニアリング

Figure 2.3 [FIGURE SUBJECT TO FINAL COPYEDIT AND QUALITY CONTROL]



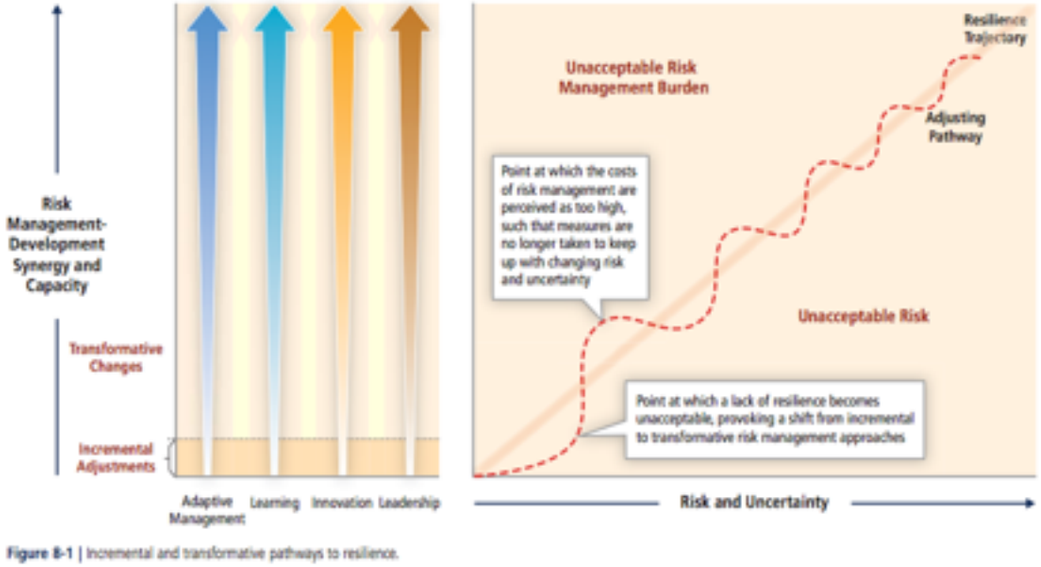
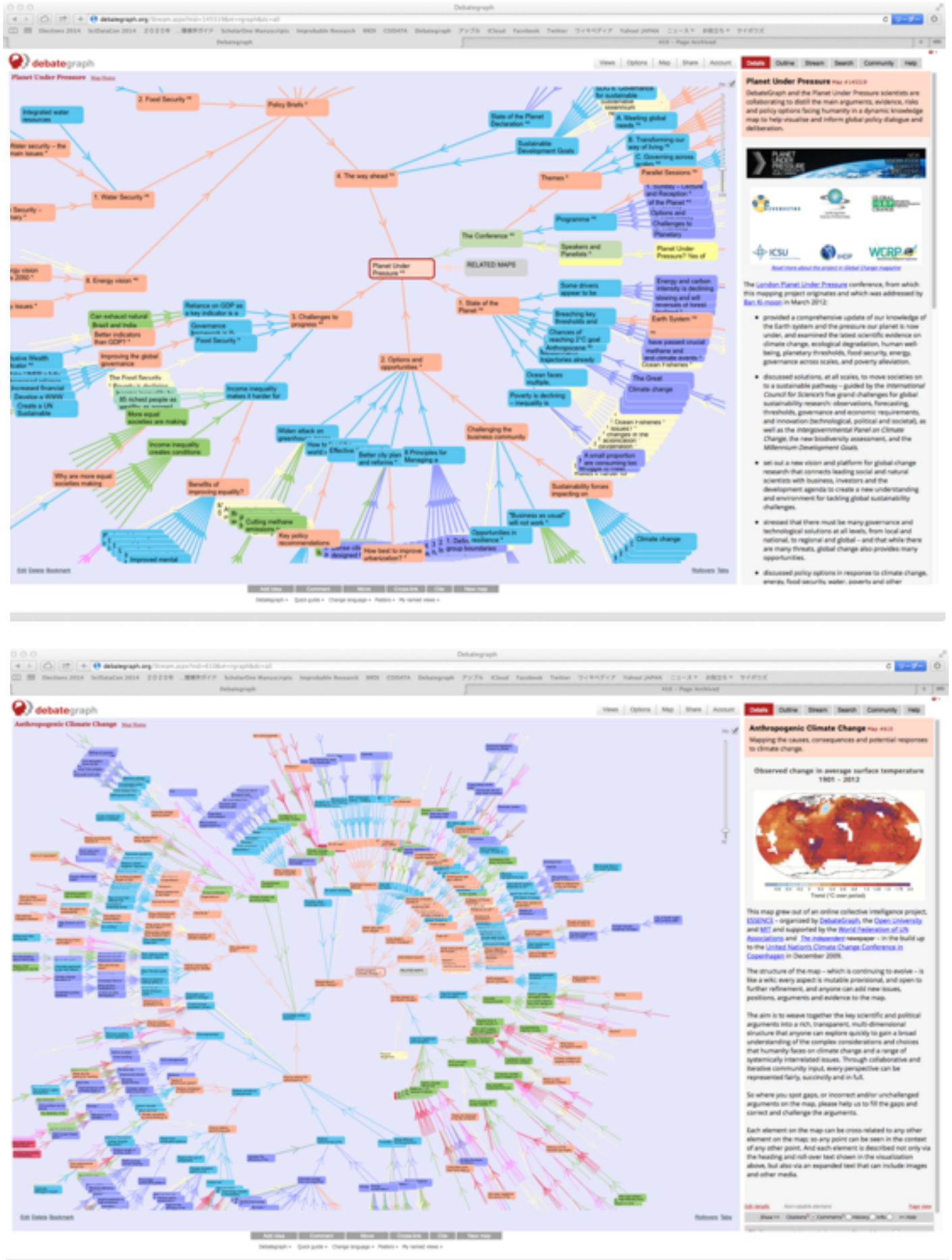


Figure 8-1 | Incremental and transformative pathways to resilience.



SLL-DLL-TLL & Unlearning

Debate Traceability for Evaluation by History

Truth? Language? Logic? Data? Democracy? Decision?

Why? Why? Why? Why? Why? ???????

Scientific Rationality

EFFIGIES TYCHONIS BRAHE: OTTONI DAN=
ÆTATIS SVÆ ANNO 50. COMPLETO.

QVO POST DIVTINVM IN PATRIA
EXILIVM LIBERTATI DESIDERATÆ
DIVINO PROVISV
RESTITVTVS EST.

Tycho Brahe's Mars Observations

Source: Tychonis Brahe Dani Opera Omnia
Input by: Wayne Pafko (March 24, 2000)
[MS] = Mars Symbol (you know the "male" sign)

Brahe's Declination Data Converted to Numbers
(not adjusted to current dates)

1582.89

Year	Day	Time	Quote	Volume	Page	Year	Month	Day	*Day (adj)*	Hour	Min	*Days since 1 AD*	*Date*		Dec (deg)	Dec (min)	Dec (sec)	Declination
1582	DIE 12 NOUEMBRIS, MANE.		Declinatio [MS] 23 7 B	10	174	1582	11	12	*22*			*578150.50*	*1582.89*	1.00	23	7		23.12
1582	DIE 30 DECEMBRIS		Aft. R. [MS] 107o 56' Declin. 26o 36' B.	10	197	1582	12	30	*40*			*578198.50*	*1583.02*	1.00	26	56		26.93
1582	DIE 27 DECEMBRIS		declinatio [MS] 26o 22 1/3' et Alcenfio Recta [!	10	200	1582	12	27	*37*			*578195.50*	*1583.01*	1.00	26	22	20	26.37
1583	DIE 18 JANUARII, VESPERI.		Declinatio 27 18 minus bona	10	244	1583	1	18	*28*			*578217.50*	*1583.07*	1.00	27	18		27.30
1584	DIE 13 NOUEMBRIS, A.M.	H.13 26 P.M.	Declinatio [MS] B. 15 54	10	321	1584	11	13	*23*	13	26	*578883.06*	*1584.90*	1.00	15	54		15.90
1584	DIE 27 NOUEMBRIS	H.2 15'	Declinatio [MS] 14 42	10	322	1584	11	27	*37*	2	15	*578896.59*	*1584.93*	1.00	14	42		14.70
1584	DIE 20 DECEMBRIS AD VESPERAS.		Decl. [MS] (erat prope horizont.) 14 24	10	322	1584	12	20	*30*			*578919.50*	*1585.00*	1.00	14	24		14.40
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio [MS] 14 21 1/2	10	322	1584	12	21	*31*			*578920.50*	*1585.00*	1.00	14	21	30	14.36
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio [MS] 14 21 1/4	10	322	1584	12	21	*31*			*578920.50*	*1585.00*	1.00	14	21	15	14.35
1585	DIE 7 JANUARII.		Declin. [MS] I 15 35 II 15 35	10	382	1585	1	7	*17*			*578937.50*	*1585.04*	1.00	15	35		15.58
1585	DIE 9 JANUARII.	A.M.	Decl. [MS] 15 50 per Arm. Bor.	10	383	1585	1	9	*19*			*578939.50*	*1585.05*	1.00	15	50		15.83
1585	Die 14 Januarij	H. 16 M. 40 P.M.	Decl. eius B. 16 27	10	384	1585	1	14	*24*	16	40	*578945.19*	*1585.07*	1.00	16	27		16.45
1585	Die 22 Jan.	H.14 55 P.M.	Decl. [MS] B. 17 31 0	10	388	1585	1	22	*32*	14	55	*578953.12*	*1585.09*	1.00	17	31		17.52
1585	Die 31 Jan. circa mediam noctem.		Decl. [MS] Sept. 18 43 0	10	388	1585	1	31	*41*			*578961.50*	*1585.11*	1.00	18	43		18.72
1585	DIE 3 FEBRUARII.	H.9 M.43	Decl. [MS] fept. 19 1 1/6 per Armillas Auftrale	10	389	1585	2	3	*13*	9	43	*578964.90*	*1585.12*	1.00	19	1	10	19.02
1585	DIE 3 FEBRUARII.	H.9 M.39	Declinatio [MS] per Armillas Boreales 19 3	10	389	1585	2	3	*13*	9	39	*578964.90*	*1585.12*	1.00	19	3		19.05
1585	Die 3 Feb.	H. 6 1/4 P.M.	Declinatio [MS] 19 2 0	10	389	1585	2	3	*13*	6	15	*578964.76*	*1585.12*	1.00	19	2		19.03
1585	DIE 4 FEBRUARII.	H.9 M.14	Decl. [MS] fept. 19 9 3/4 per Armillas Boreales	10	389	1585	2	4	*14*	9	14	*578965.88*	*1585.12*	1.00	19	9	45	19.16
1585	DIE 4 FEBRUARII.	H.8 M.16	Decl. [MS] 19 8 per Armilas Auftrales.	10	389	1585	2	4	*14*	8	16	*578965.84*	*1585.12*	1.00	19	8		19.13
1585	DIE 4 FEBRUARII.	H.6.40 P.M.	Decl. [MS] B. 19 9 45.	10	389	1585	2	4	*14*	6	40	*578965.78*	*1585.12*	1.00	19	9	45	19.16
1585	DIE 17 FEBRUARII.	H.9.45	Decl. [MS] 20 21 45	10	391	1585	2	17	*27*	9	45	*578978.91*	*1585.16*	1.00	20	21	45	20.36
1585	DIE 17 FEBRUARII.	H. 9 1/2	Decl. [MS] 20 21 1/2	10	392	1585	2	17	*27*	9	30	*578978.90*	*1585.16*	1.00	20	21	30	20.36
1585	DIE 17 FEBRUARII.	H. 9 5/6	Decl. [MS] 20 21 1/2 B.	10	392	1585	2	17	*27*	9	50	*578978.91*	*1585.16*	1.00	20	21	30	20.36
1585	Die 12 Martij	H. 9 1/3 P.M.	Declinatio [MS] B. 20 32 3/4	10	397	1585	3	12	*22*	9	20	*579001.89*	*1585.22*	1.00	20	32	45	20.55
1585	Die 16 Martij	H. 7 5/6	Declin. [MS] B. 20 23 0	10	397	1585	3	16	*26*	7	50	*579005.83*	*1585.23*	1.00	20	23		20.38
1585	Die 19 Marij	H. 8 1/4	Declin. [MS] 20 5 30	10	397	1585	3	19	*29*	8	15	*579008.84*	*1585.24*	1.00	20	5	30	20.09
1585	DIE 26 MARTII.	H. 8 1/3 P.M.	Declinatio [MS] B. 19 44 0	10	398	1585	3	26	*36*	8	20	*579015.85*	*1585.26*	1.00	19	44	0	19.73
1585	DIE 15 APRILIS.	H. 9 48'	Decl. [MS] Bor. 17o 38 2/3'.	10	398	1585	4	15	*25*	9	48	*579035.91*	*1585.31*	1.00	17	38	40	17.64
1585	Die 15 Aprils	H. 9 50	Declin. [MS] B. 17 38 3/4	10	399	1585	4	15	*25*	9	50	*579035.91*	*1585.31*	1.00	17	38	45	17.65
1585	DIE 26 APRILIS.	H. 9 50	Decl. [MS] B. 16 8 1/2 per Armillas Boreales.	10	399	1585	4	26	*36*	9	50	*579046.91*	*1585.34*	1.00	16	8	30	16.14
1585	DIE 7 MAII.	H. 11 24 1/2	Declinatio [MS] 14 22 1/2 per Armillas Auftral	10	401	1585	5	7	*17*	11	24.5	*579057.98*	*1585.37*	1.00	14	22	30	14.38
1585	DIE 7 MAII.	H. 9 1/3	Decl. [MS] 14 22	10	401	1585	5	7	*17*	9	20	*579057.89*	*1585.37*	1.00	14	22		14.37
1585	DIE 7 MAII.	H. 11 1/4	Decl [MS] 14 22 1/2 B.	10	401	1585	5	7	*17*	11	15	*579057.97*	*1585.37*	1.00	14	22	30	14.38
1585	DIE 12 MAII.		declinatio [MS] B. 13o 30 1/4' per Auftrales Ar	10	401	1585	5	12	*22*			*579062.50*	*1585.39*	1.00	13	30	15	13.50
1585	DIE 17 MAII.	H.11 30	Decl. [MS] B. 12 38 1/2 per Arm. auft.	10	401	1585	5	17	*27*	11	30	*579067.98*	*1585.40*	1.00	12	38	30	12.64
1585	DIE 18 MAII.	H.10 40	Decl. [MS] 12 27 B. per Arm. auft.	10	402	1585	5	18	*28*	10	40	*579068.94*	*1585.40*	1.00	12	27		12.45
1586	DIE 23 SEPTEMBRIS.	H.5 M.12 P.M.N.	Declin. [MS] B. 18 5 1/2	11	63	1586	9	23	*33*	5	12	*579561.72*	*1586.75*	1.00	18	5	30	18.09
1586	DIE 24 SEPTEMBRIS A.M.	H.3 M.55	Declin. [MS] Bor. 17 56 1/2	11	64	1586	9	24	*34*	3	55	*579562.66*	*1586.76*	1.00	17	56	30	17.94
1586	DIE 10 OCTOBRIS.	H.2 M.32	Declin. [MS] per Armillas 15 3 3/4 B.	11	64	1586	10	10	*20*	2	32	*579578.61*	*1586.80*	1.00	15	3	45	15.06
1586	DIE 10 OCTOBRIS.	H.2 M.32	alt. pinnac. 15 3 1/2	11	64	1586	10	10	*20*	2	32	*579578.61*	*1586.80*	1.00	15	3	30	15.06
1586	DIE 10 OCTOBRIS.	H.6 M.14	Declin. [MS] B. vno 13 0 1/2	11	64	1586	10	10	*20*	6	14	*579578.76*	*1586.80*	1.00	13	0	30	13.01
1586	DIE 10 OCTOBRIS.	H.6 M.14	alt. pinnac. 13 0 2/3	11	64	1586	10	10	*20*	6	14	*579578.76*	*1586.80*	1.00	13	0	40	13.01
1586	DIE 24 OCTOBRIS.	H.6 M.35	Declin. [MS] B. 12 39 3/4	11	64	1586	10	24	*34*	6	35	*579592.77*	*1586.84*	1.00	12	39	45	12.66
1586	DIE 25 OCTOBRIS A.M.	H.5 M.11	Declinatio [MS] 12 29 1/3	11	64	1586	10	25	*35*	5	11	*579593.72*	*1586.84*	1.00	12	29	20	12.49
1586	DIE 25 OCTOBRIS A.M.	H.5 M.16	Repetita Decl. [MS] 12 29 1/3	11	64	1586	10	25	*35*	5	16	*579593.72*	*1586.84*	1.00	12	29	20	12.49
1586	DIE 25 OCTOBRIS A.M.	H.5 M.32	Declin. [MS] vt prius 12 29 1/3	11	64	1586	10	25	*35*	5	32	*579593.73*	*1586.84*	1.00	12	29	20	12.49
1586	DIE 1 NOUEMBRIS A.M.	H.5 M.6	Declin. [MS] Bor. 11 2 3/4	11	64	1586	11	1	*11*	5	6	*579600.71*	*1586.86*	1.00	11	2	45	11.05
1586	DIE 2 NOUEMBRIS A.M.	H.4 M.46 1/6	Declin. [MS] Bor. 11 3	11	64	1586	11	2	*12*	4	46.16666	*579601.70*	*1586.86*	1.00	11	3		11.05
1586	DIE 8 NOUREMBRIS A.M.	H.6 M.34	Declin. [MS] Bor. 10 4 1/2	11	65	1586	11	8	*18*	6	34	*579607.77*	*1586.88*	1.00	10	4	30	10.08
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.20	Declin. Bor. 9 32 1/2	11	65	1586	11	10	*20*	7	20	*579609.81*	*1586.89*	1.00	9	32	30	9.54
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.28 1/2	Repetita Declin. [MS] 9 33	11	65	1586	11	10	*20*	7	28.5	*579609.81*	*1586.89*	1.00	9	33		9.55
1586	DIE 11 NOUEMBRIS A.M.	H.4 M.19 S.50	Declin [MS] Bor. 9 25 1/2	11	65	1586	11	11	*21*	4	19.8333	*579610.68*	*1586.89*	1.00	9	25	30	9.43
1586	DIE 11 NOUEMBRIS A.M.	H.7 M.6 45"	Decl. ex alt. 9 25 0	11	65	1586	11	11	*21*	7	6.75	*579610.80*	*1586.89*	1.00	9	25		9.42
1586	DIE 23 NOUEMBRIS A.M.	H.6 M.15	Declin. [MS] B. vno 7 19 3/4	11	65	1586	11	23	*33*	6	15	*579622.76*	*1586.92*	1.00	7	19	45	7.33
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	Declin. [MS] B. vno pinn. 7 19 2/3	11	66	1586	11	23	*33*	7	24	*579622.81*	*1586.92*	1.00	7	19	40	7.33
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	altero pinac. 7 19 5/6	11	66	1586	11	23	*33*	7	24	*579622.81*	*1586.92*	1.00	7	19	50	7.33
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Declin. [MS] Bor. 6 2 1/6	11	66	1586	12	1	*11*	7	35.5	*579630.82*	*1586.94*	1.00	6	2	10	6.04
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Alt. pinnac. 6 2 1/4	11	66	1586	12	1	*11*	7	35.5	*579630.82*	*1586.94*	1.00	6	2	15	6.04
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	Decl. [MS] per Armillas 3 53 1/2	11	66	1586	12	16	*26*	6	4	*579645.75*	*1586.98*	1.00	3	53	30	3.89
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	alt. pinn. 3 54	11	66	1586	12	16	*26*	6	4	*579645.75*	*1586.98*	1.00	3	54		3.90
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	Declin. [MS] Bor. vno 2 40	11	66	1586	12	27	*37*	4	8	*579656.67*	*1587.01*	1.00	2	40		2.67
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	alt. pin. 2 40	11	66	1586	12	27	*37*	4	8	*579656.67*	*1587.01*	1.00	2	40		2.67
1586	DIE 27 DECEMBRIS A.M.	H.7 M.2 S.50	Declin. Martis repet. 2 38 3/4	11	66	1586	12	27	*37*	7	2.83333	*579656.79*	*1587.01*	1.00	2	38	45	2.65
1586	DIE 27 DECEMBRIS A.M.	H. 3 5/6	Declinatio [MS] tis 2 39 1/2 B.	11	66	1586	12	27	*37*	3	50	*579656.66*	*1587.01*	1.00	2	39	30	2.66
1586	DIE 27 DECEMBRIS A.M.	H.4 0	Declinatio 2 39 2/3 B.	11	66	1586	12	27	*37*	4	0	*579656.67*	*1587.01*	1.00	2	39	40	2.66
1587	DIE 1 JANUARII A.M.	H.7 M.8	Declin. [MS] per Armill. fubt. 2 11 1/2 Bor.	11	177	1587	1	1	*11*	7	8	*579661.80*	*1587.03*	1.00	2	11	30	2.19

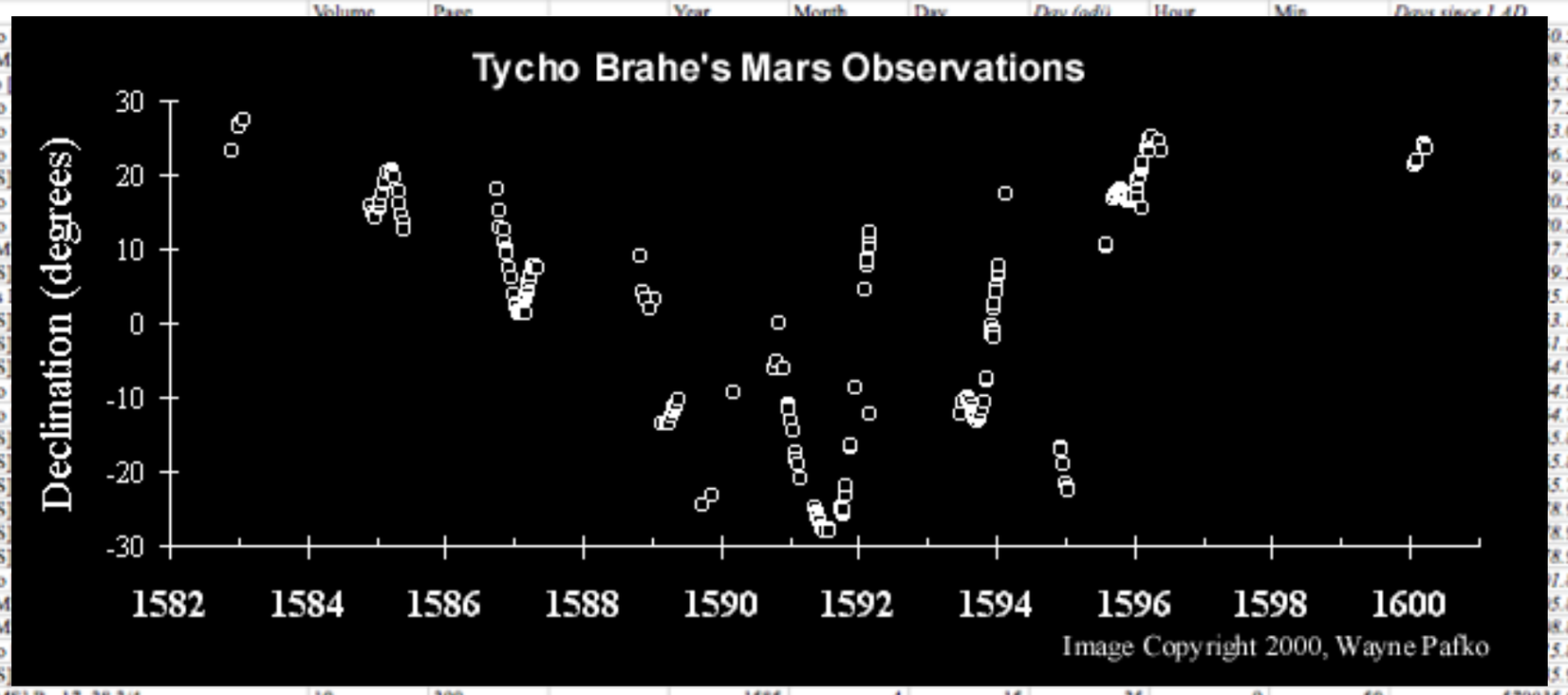
Tycho Brahe's Mars Observations

Source: Tychonis Brahe Dani Opera Omnia

Input by: Wayne Pafko (March 24, 2000)

[MS] = Mars Symbol (you know the "male" sign)

Brahe's Declination Data Converted to Numbers
(not adjusted to current dates)



Year	Day	Time	Quote	Volume	Page	Year	Month	Day	Day (adj)	Hour	Min	Days since J.4D	Date
1582	DIE 12 NOUEMBRIS, MANE.		Declinatio									0.50	1582.85
1582	DIE 30 DECEMBRIS		Afc. R. [M									18.50	1583.02
1582	DIE 27 DECEMBRIS		declinatio									15.50	1583.04
1583	DIE 18 JANUARIJ, VESPERI.		Declinatio									7.50	1583.07
1584	DIE 13 NOUEMBRIS, A.M.	H.13 26 P.M.	Declinatio									3.06	1584.90
1584	DIE 27 NOUEMBRIS	H.2 15'	Declinatio									6.59	1584.93
1584	DIE 20 DECEMBRIS AD VESPERAS.		Decl. [MS]									9.50	1585.00
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio									0.50	1585.00
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio									0.50	1585.00
1585	DIE 7 JANUARIJ.		Declin. [M									7.50	1585.04
1585	DIE 9 JANUARIJ.	A.M.	Decl. [MS]									9.50	1585.05
1585	Die 14 Januarij	H. 16 M. 40 P.M.	Decl. eius									15.19	1585.07
1585	Die 22 Jan.	H.14 55 P.M.	Decl. [MS]									13.12	1585.09
1585	Die 31 Jan. circa mediam noctem.		Decl. [MS]									1.50	1585.12
1585	DIE 3 FEBRUARIJ.	H.9 M.43	Decl. [MS]									4.90	1585.12
1585	DIE 3 FEBRUARIJ.	H.9 M.39	Declinatio									4.90	1585.12
1585	Die 3 Feb.	H. 6 1/4 P.M.	Declinatio									4.76	1585.12
1585	DIE 4 FEBRUARIJ.	H.9 M.14	Decl. [MS]									5.88	1585.12
1585	DIE 4 FEBRUARIJ.	H.8 M.16	Decl. [MS]									5.84	1585.12
1585	DIE 4 FEBRUARIJ.	H.6.40 P.M.	Decl. [MS]									5.78	1585.12
1585	DIE 17 FEBRUARIJ.	H.9.45	Decl. [MS]									8.91	1585.16
1585	DIE 17 FEBRUARIJ.	H. 9 1/2	Decl. [MS]									8.90	1585.16
1585	DIE 17 FEBRUARIJ.	H. 9 5/6	Decl. [MS]									8.91	1585.16
1585	Die 12 Martij	H. 9 1/3 P.M.	Declinatio									1.89	1585.22
1585	Die 16 Martij	H. 7 5/6	Declin. [M									5.83	1585.23
1585	Die 19 Marij	H. 8 1/4	Declin. [M									8.84	1585.26
1585	DIE 26 MARTIJ.	H. 8 1/3 P.M.	Declinatio									5.85	1585.26
1585	DIE 15 APRILIS.	H. 9 48'	Decl. [MS]									5.91	1585.33
1585	Die 15 Aprils	H. 9 50	Declin. [MS] B. 17 38 3/4	10	399	1585	4	15	25	9	50	579035.91	1585.34
1585	DIE 26 APRILIS.	H. 9 50	Decl. [MS] B. 16 8 1/2 per Armillas Boreales.	10	399	1585	4	26	36	9	50	579046.91	1585.34
1585	DIE 7 MAIJ.	H. 11 24 1/2	Declinatio [MS] 14 22 1/2 per Armillas Auftral	10	401	1585	5	7	17	11	24.5	579057.98	1585.35
1585	DIE 7 MAIJ.	H. 9 1/3	Decl. [MS] 14 22	10	401	1585	5	7	17	9	20	579057.89	1585.35
1585	DIE 7 MAIJ.	H. 11 1/4	Decl [MS] 14 22 1/2 B.	10	401	1585	5	7	17	11	15	579057.97	1585.35
1585	DIE 12 MAIJ.		declinatio [MS] B. 13o 30 1/4' per Auftrales Ar	10	401	1585	5	12	22			579062.50	1585.39
1585	DIE 17 MAIJ.	H.11 30	Decl. [MS] B. 12 38 1/2 per Arm. auft.	10	401	1585	5	17	27	11	30	579067.98	1585.40
1585	DIE 18 MAIJ.	H.10 40	Decl. [MS] 12 27 B. per Arm. auft.	10	402	1585	5	18	28	10	40	579068.94	1585.40
1586	DIE 23 SEPTEMBRIS.	H.5 M.12 P.M.N.	Declin. [MS] B. 18 5 1/2	11	63	1586	9	23	33	5	12	579561.72	1586.75
1586	DIE 24 SEPTEMBRIS A.M.	H.3 M.55	Declin. [MS] Bor. 17 56 1/2	11	64	1586	9	24	34	3	55	579562.66	1586.76
1586	DIE 10 OCTOBRIS.	H.2 M.32	Declin. [MS] per Armillas 15 3 3/4 B.	11	64	1586	10	10	20	2	32	579578.61	1586.80
1586	DIE 10 OCTOBRIS.	H.2 M.32	alt. pinnac. 15 3 1/2	11	64	1586	10	10	20	2	32	579578.61	1586.80
1586	DIE 10 OCTOBRIS.	H.6 M.14	Declin. [MS] B. vno 13 0 1/2	11	64	1586	10	10	20	6	14	579578.76	1586.80
1586	DIE 10 OCTOBRIS.	H.6 M.14	alt. pinnac. 13 0 2/3	11	64	1586	10	10	20	6	14	579578.76	1586.80
1586	DIE 24 OCTOBRIS.	H.6 M.35	Declin. [MS] B. 12 39 3/4	11	64	1586	10	24	34	6	35	579592.77	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.11	Declinatio [MS] 12 29 1/3	11	64	1586	10	25	35	5	11	579593.72	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.16	Repetita Decl. [MS] 12 29 1/3	11	64	1586	10	25	35	5	16	579593.72	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.32	Declin. [MS] vt prius 12 29 1/3	11	64	1586	10	25	35	5	32	579593.73	1586.84
1586	DIE 1 NOUEMBRIS A.M.	H.5 M.6	Declin. [MS] Bor. 11 2 3/4	11	64	1586	11	1	11	5	6	579600.71	1586.86
1586	DIE 2 NOUEMBRIS A.M.	H.4 M.46 1/6	Declin. [MS] Bor. 11 3	11	64	1586	11	2	12	4	46.16666	579601.70	1586.86
1586	DIE 8 NOUREMBRIS A.M.	H.6 M.34	Declin. [MS] Bor. 10 4 1/2	11	65	1586	11	8	18	6	34	579607.77	1586.88
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.20	Declin. Bor. 9 32 1/2	11	65	1586	11	10	20	7	20	579609.81	1586.89
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.28 1/2	Repetita Declin. [MS] 9 33	11	65	1586	11	10	20	7	28.5	579609.81	1586.89
1586	DIE 11 NOUEMBRIS A.M.	H.4 M.19 S.50	Declin [MS] Bor. 9 25 1/2	11	65	1586	11	11	21	4	19.8333	579610.68	1586.89
1586	DIE 11 NOUEMBRIS A.M.	H.7 M.6 45"	Decl. ex alt. 9 25 0	11	65	1586	11	11	21	7	6.75	579610.80	1586.89
1586	DIE 23 NOUEMBRIS A.M.	H.6 M.15	Declin. [MS] B. vno 7 19 3/4	11	65	1586	11	23	33	6	15	579622.76	1586.92
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	Declin. [MS] B. vno pinn. 7 19 2/3	11	66	1586	11	23	33	7	24	579622.81	1586.92
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	altero pinac. 7 19 5/6	11	66	1586	11	23	33	7	24	579622.81	1586.92
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Declin. [MS] Bor. 6 2 1/6	11	66	1586	12	1	11	7	35.5	579630.82	1586.94
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Alt. pinnac. 6 2 1/4	11	66	1586	12	1	11	7	35.5	579630.82	1586.94
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	Decl. [MS] per Armillas 3 53 1/2	11	66	1586	12	16	26	6	4	579645.75	1586.98
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	alt. pinn. 3 54	11	66	1586	12	16	26	6	4	579645.75	1586.98
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	Declin. [MS] Bor. vno 2 40	11	66	1586	12	27	37	4	8	579656.67	1587.01
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	alt. pin. 2 40	11	66	1586	12	27	37	4	8	579656.67	1587.01
1586	DIE 27 DECEMBRIS A.M.	H.7 M.2 S.50	Declin. Martis repet. 2 38 3/4	11	66	1586	12	27	37	7	2.83333	579656.79	1587.01
1586	DIE 27 DECEMBRIS A.M.	H. 3 5/6	Declinatio [MS] tis 2 39 1/2 B.	11	66	1586	12	27	37	3	50	579656.66	1587.01
1586	DIE 27 DECEMBRIS A.M.	H.4 0	Declinatio 2 39 2/3 B.	11	66	1586	12	27	37	4	0	579656.67	1587.01
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	Declin. [MS] per Armill. fubt. 2 11 1/2 Bor.	11	177	1587	1	1	11	7	8	579661.80	1587.03
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	altero pinnacidio 2 12 1/2	11	177	1587	1	1	11	7	8	579661.80	1587.03
1587	DIE 9 JANUARIJ A.M.	H.6 M.35 S.56	Declin. [MS] vno 1 39 1/2	11	178	1587	1	9	19	6	35.9	579669.77	1587.05

Tycho Brahe's Mars Observations

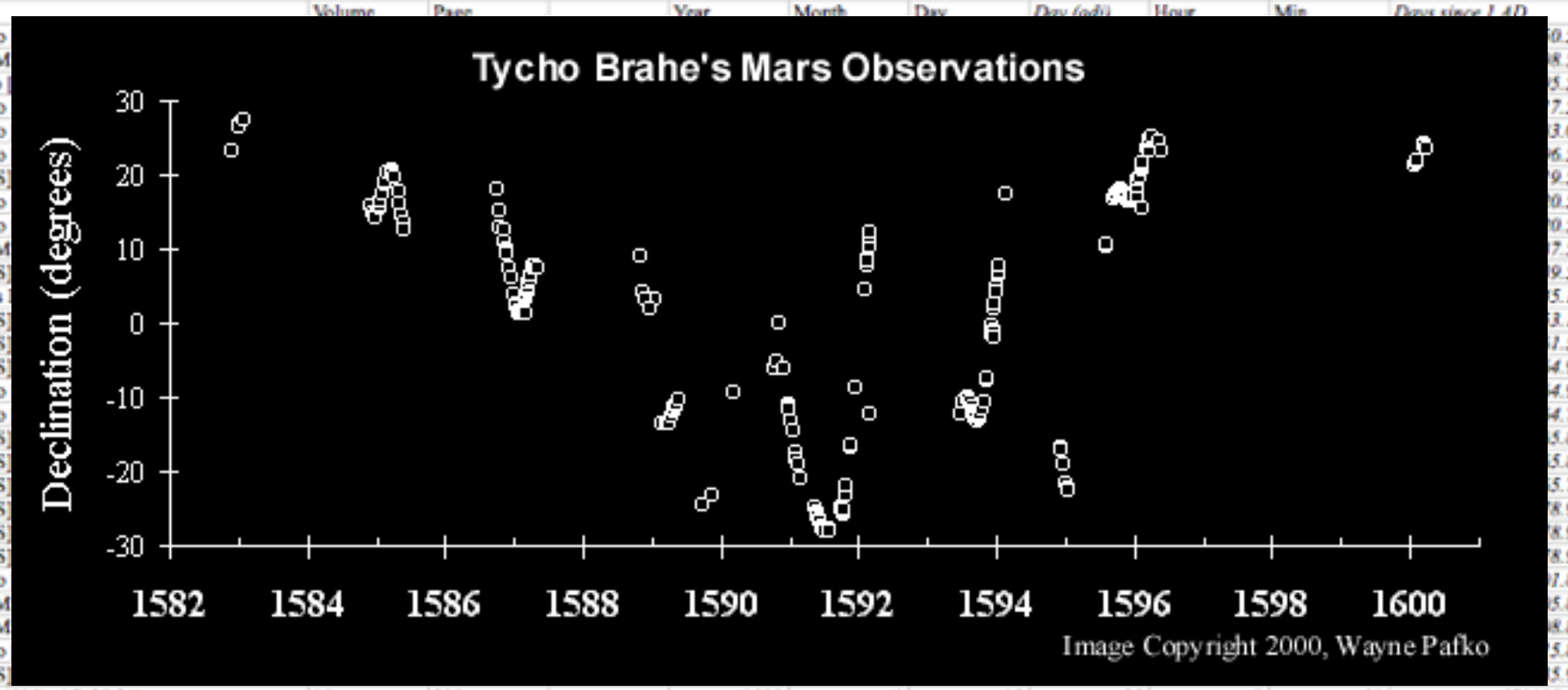
Source: Tychonis Brahe Dani Opera Omnia

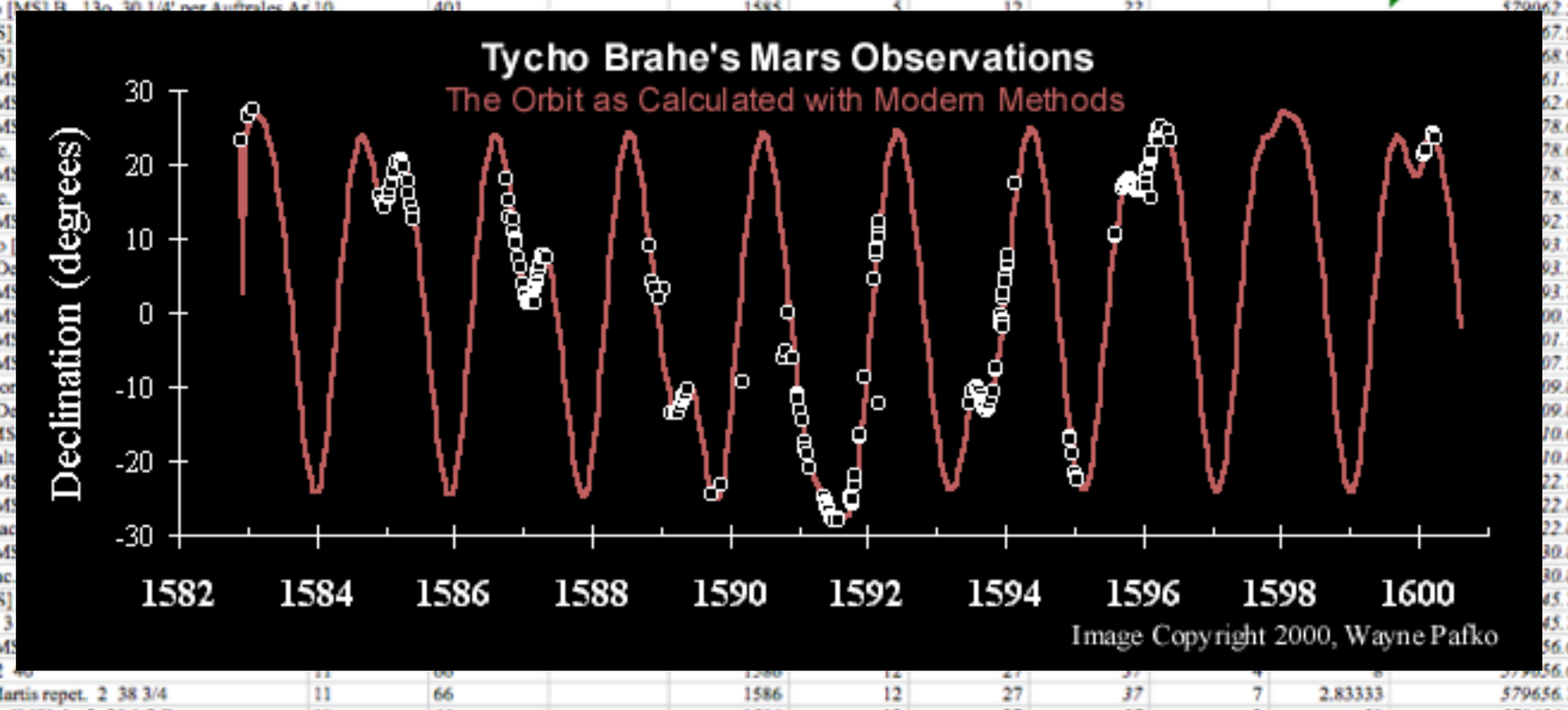
Input by: Wayne Pafko (March 24, 2000)

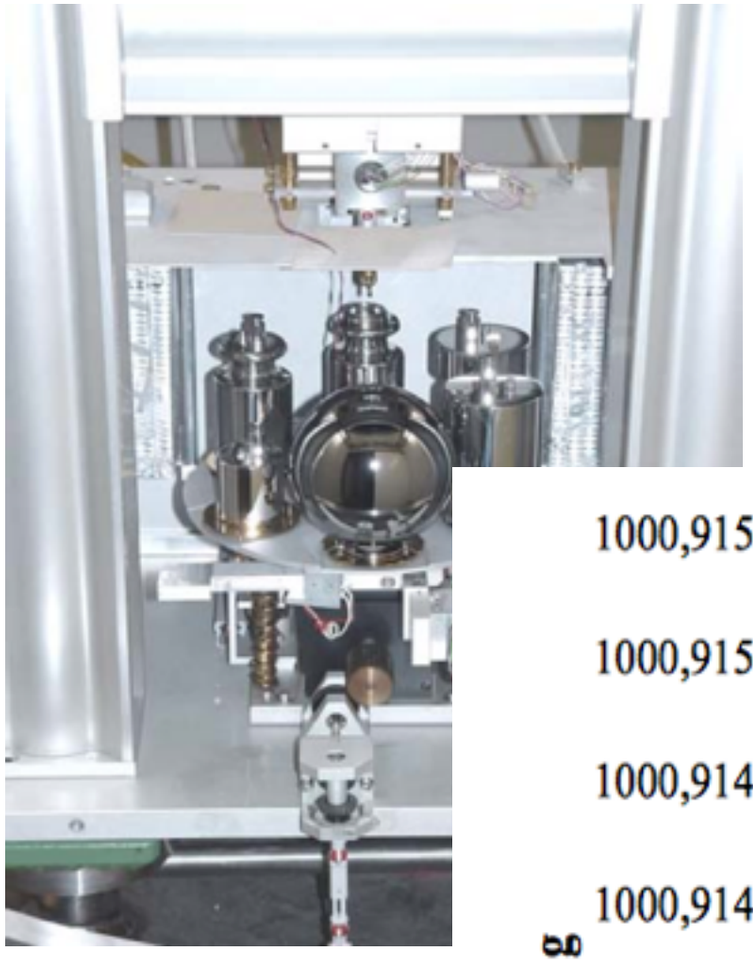
[MS] = Mars Symbol (you know the "male" sign)

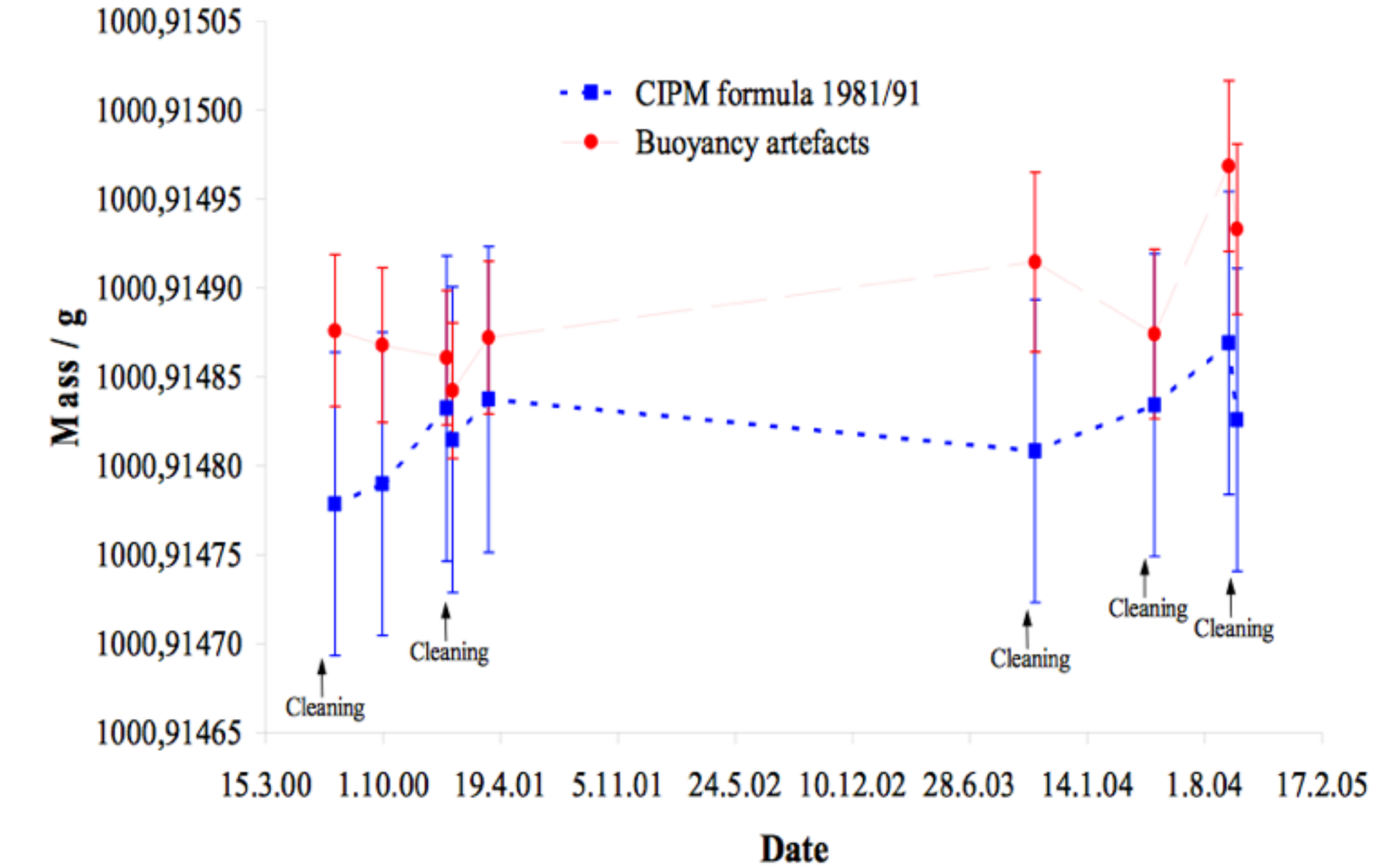
Brahe's Declination Data Converted to Numbers
(not adjusted to current dates)

Year	Day	Time	Quote	Volume	Page	Year	Month	Day	Day (adj)	Hour	Min	Days since 1 AD	Date
1582	DIE 12 NOUEMBRIS, MANE.		Declinatio										1582.85
1582	DIE 30 DECEMBRIS		Afc. R. [M										1583.02
1582	DIE 27 DECEMBRIS		declinatio										1583.04
1583	DIE 18 JANUARIJ, VESPERI.		Declinatio										1583.07
1584	DIE 13 NOUEMBRIS, A.M.	H.13 26 P.M.	Declinatio										1584.90
1584	DIE 27 NOUEMBRIS	H.2 15'	Declinatio										1584.93
1584	DIE 20 DECEMBRIS AD VESPERAS.		Decl. [MS]										1585.00
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio										1585.00
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio										1585.00
1585	DIE 7 JANUARIJ.		Declin. [M										1585.04
1585	DIE 9 JANUARIJ.	A.M.	Decl. [MS]										1585.05
1585	Die 14 Januarij	H. 16 M. 40 P.M.	Decl. eius										1585.07
1585	Die 22 Jan.	H.14 55 P.M.	Decl. [MS]										1585.09
1585	Die 31 Jan. circa mediam noctem.		Decl. [MS]										1585.13
1585	DIE 3 FEBRUARIJ.	H.9 M.43	Decl. [MS]										1585.12
1585	DIE 3 FEBRUARIJ.	H.9 M.39	Declinatio										1585.12
1585	Die 3 Feb.	H. 6 1/4 P.M.	Declinatio										1585.12
1585	DIE 4 FEBRUARIJ.	H.9 M.14	Decl. [MS]										1585.12
1585	DIE 4 FEBRUARIJ.	H.8 M.16	Decl. [MS]										1585.12
1585	DIE 4 FEBRUARIJ.	H.6.40 P.M.	Decl. [MS]										1585.12
1585	DIE 17 FEBRUARIJ.	H.9.45	Decl. [MS]										1585.16
1585	DIE 17 FEBRUARIJ.	H. 9 1/2	Decl. [MS]										1585.16
1585	DIE 17 FEBRUARIJ.	H. 9 5/6	Decl. [MS]										1585.16
1585	Die 12 Martij	H. 9 1/3 P.M.	Declinatio										1585.22
1585	Die 16 Martij	H. 7 5/6	Declin. [M										1585.23
1585	Die 19 Marij	H. 8 1/4	Declin. [M										1585.24
1585	DIE 26 MARTIJ.	H. 8 1/3 P.M.	Declinatio										1585.26
1585	DIE 15 APRILIS.	H. 9 48'	Decl. [MS]										1585.31
1585	Die 15 Aprils	H. 9 50	Declin. [MS] B. 17 38 3/4	10	399	1585	4	15	25	9	50	579035.91	1585.33
1585	DIE 26 APRILIS.	H. 9 50	Decl. [MS] B. 16 8 1/2 per Armillas Boreales.	10	399	1585	4	26	36	9	50	579046.91	1585.36
1585	DIE 7 MAIJ.	H. 11 24 1/2	Declinatio [MS] 14 22 1/2 per Armillas Auftral	10	401	1585	5	7	17	11	24.5	579057.98	1585.39
1585	DIE 7 MAIJ.	H. 9 1/3	Decl. [MS] 14 22	10	401	1585	5	7	17	9	20	579057.89	1585.39
1585	DIE 7 MAIJ.	H. 11 1/4	Decl [MS] 14 22 1/2 B.	10	401	1585	5	7	17	11	15	579057.97	1585.39
1585	DIE 12 MAIJ.		declinatio [MS] B. 13o 30 1/4' per Auftrales Ar	10	401	1585	5	12	22			579062.50	1585.39
1585	DIE 17 MAIJ.	H.11 30	Decl. [MS]									579067.98	1585.40
1585	DIE 18 MAIJ.	H.10 40	Decl. [MS]									579068.94	1585.40
1586	DIE 23 SEPTEMBRIS.	H.5 M.12 P.M.N.	Declin. [MS									579361.72	1586.75
1586	DIE 24 SEPTEMBRIS A.M.	H.3 M.55	Declin. [MS									579362.66	1586.76
1586	DIE 10 OCTOBRIS.	H.2 M.32	Declin. [MS									579378.61	1586.80
1586	DIE 10 OCTOBRIS.	H.2 M.32	alt. pinnac.									579378.61	1586.80
1586	DIE 10 OCTOBRIS.	H.6 M.14	Declin. [MS									579378.76	1586.80
1586	DIE 10 OCTOBRIS.	H.6 M.14	alt. pinnac.									579378.76	1586.80
1586	DIE 24 OCTOBRIS.	H.6 M.35	Declin. [MS									579392.77	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.11	Declinatio									579393.72	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.16	Repetita De									579393.72	1586.84
1586	DIE 25 OCTOBRIS A.M.	H.5 M.32	Declin. [MS									579393.73	1586.84
1586	DIE 1 NOUEMBRIS A.M.	H.5 M.6	Declin. [MS									579400.71	1586.86
1586	DIE 2 NOUEMBRIS A.M.	H.4 M.46 1/6	Declin. [MS									579401.70	1586.86
1586	DIE 8 NOUREMBRIS A.M.	H.6 M.34	Declin. [MS									579407.77	1586.88
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.20	Declin. Bor									579409.81	1586.89
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.28 1/2	Repetita De									579409.81	1586.89
1586	DIE 11 NOUEMBRIS A.M.	H.4 M.19 S.50	Declin [MS									579410.68	1586.89
1586	DIE 11 NOUEMBRIS A.M.	H.7 M.6 45"	Decl. ex alt									579410.80	1586.89
1586	DIE 23 NOUEMBRIS A.M.	H.6 M.15	Declin. [MS									579422.76	1586.92
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	Declin. [MS									579422.81	1586.92
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	altero pinac									579422.81	1586.92
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Declin. [MS									579430.82	1586.94
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Alt. pinnac.									579430.82	1586.94
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	Decl. [MS]									579445.75	1586.98
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	alt. pinn. 3									579445.75	1586.98
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	Declin. [MS									579456.67	1587.01
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	alt. pin. 2 40									579456.67	1587.01
1586	DIE 27 DECEMBRIS A.M.	H.7 M.2 S.50	Declin. Martis repet. 2 38 3/4	11	66	1586	12	27	37	7	2.83333	579656.79	1587.04
1586	DIE 27 DECEMBRIS A.M.	H. 3 5/6	Declinatio [MS] tis 2 39 1/2 B.	11	66	1586	12	27	37	3	50	579656.66	1587.04
1586	DIE 27 DECEMBRIS A.M.	H.4 0	Declinatio 2 39 2/3 B.	11	66	1586	12	27	37	4	0	579656.67	1587.04
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	Declin. [MS] per Armill. fubt. 2 11 1/2 Bor.	11	177	1587	1	1	11	7	8	579661.80	1587.05
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	altero pinnacidio 2 12 1/2	11	177	1587	1	1	11	7	8	579661.80	1587.05
1587	DIE 9 JANUARIJ A.M.	H.6 M.35 S.56	Declin. [MS] vno 1 39 1/2	11	178	1587	1	9	19	6	35.9	579669.77	1587.05








1000,91505
1000,91500
1000,91495
1000,91490
1000,91485
1000,91480
1000,91475
1000,91470
1000,91465
Mass / g
CIPM formula 1981/91
Buoyancy artefacts
Cleaning
Cleaning
Cleaning
Cleaning
Cleaning
15.3.00
1.10.00
19.4.01
5.11.01
24.5.02
10.12.02
28.6.03
14.1.04
1.8.04
17.2.05
Date

fine-structure constant

$\alpha = 1/137.035999139(31)$

$$\alpha = \frac{e^2/\hbar c}{4\pi\epsilon_\circ} = \frac{\mu_\circ c e^2}{2h}$$

e : elementary charge

h : Planck constant

$\epsilon_\circ$: permittivity of vacuum

μ_0 : magnetic constant

$\epsilon_\circ = 1/\mu_0 c^2$

Gravity
Electromagnetic Force
Weak Force
Strong Force

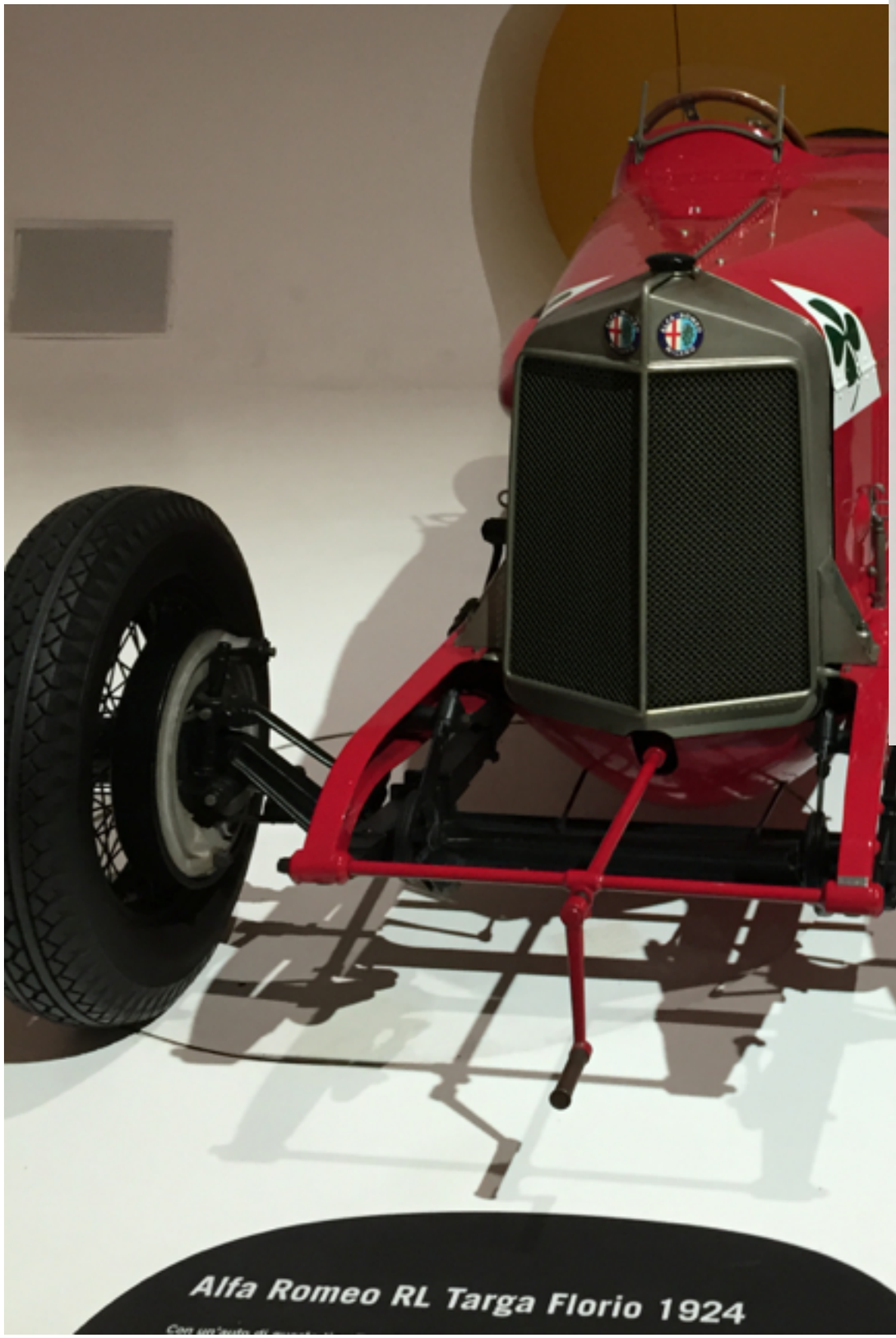
CODATA

SLL-DLL & Unlearning

Beauty of Logical Coherence

OS, ES, TS, CS

Engineering Rationality through Many Experiences


Alfa Romeo RL Targa Florio 1924

********** Data **********

This element declares the content model for Data, which contains property data and has one required attribute, format, for indicating the format of the data ("float," "integer," "string," or "exponential") found in Data.

```
        </xsd:documentation>
    </xsd:annotation>
    <xsd:complexType>
        <xsd:simpleContent>
            <xsd:extension base="xsd:string">
                <xsd:attribute name="format" use="required">
                    <xsd:simpleType>
                        <xsd:restriction base="xsd:string">
                            <xsd:enumeration value="float"/>
                            <xsd:enumeration value="integer"/>
                            <xsd:enumeration value="string"/>
                            <xsd:enumeration value="exponential"/>
                        </xsd:restriction>
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                </xsd:attribute>
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<xsd:element ref="Qualifier" minOccurs="0"/>
<xsd:element name="Uncertainty" minOccurs="0">
    <xsd:annotation>
        <xsd:documentation>
```

********** Uncertainty **********

This element declares the content model for Uncertainty, which contains a description of the measurement uncertainty of the data. Uncertainty is composed of the following elements.

Value contains the value of the uncertainty and has one required attribute, format, for indicating the format of the value ("float," "integer," "string," or "exponential") found in Value. Value must occur once and only once within the Uncertainty element.

Units contains the units for the value of the uncertainty and must occur once and only once within the Uncertainty element. For additional information, see the documentation for the Units element.

Notes contains any additional information concerning the uncertainty, such as a description of the evaluation of the uncertainty, and may occur once or not at all within the Uncertainty element.

```
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    </xsd:annotation>
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element ref="Value"/>
            <xsd:choice>
                <xsd:element ref="Units"/>
                <xsd:element ref="Unitless"/>
            </xsd:choice>
            <xsd:element ref="Notes" minOccurs="0"/>
```

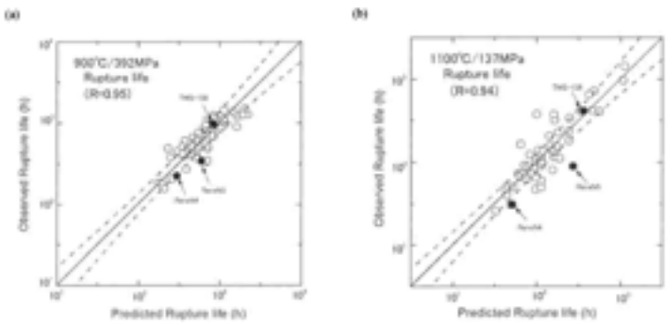
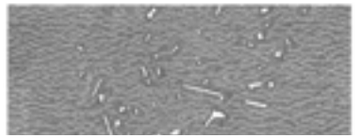
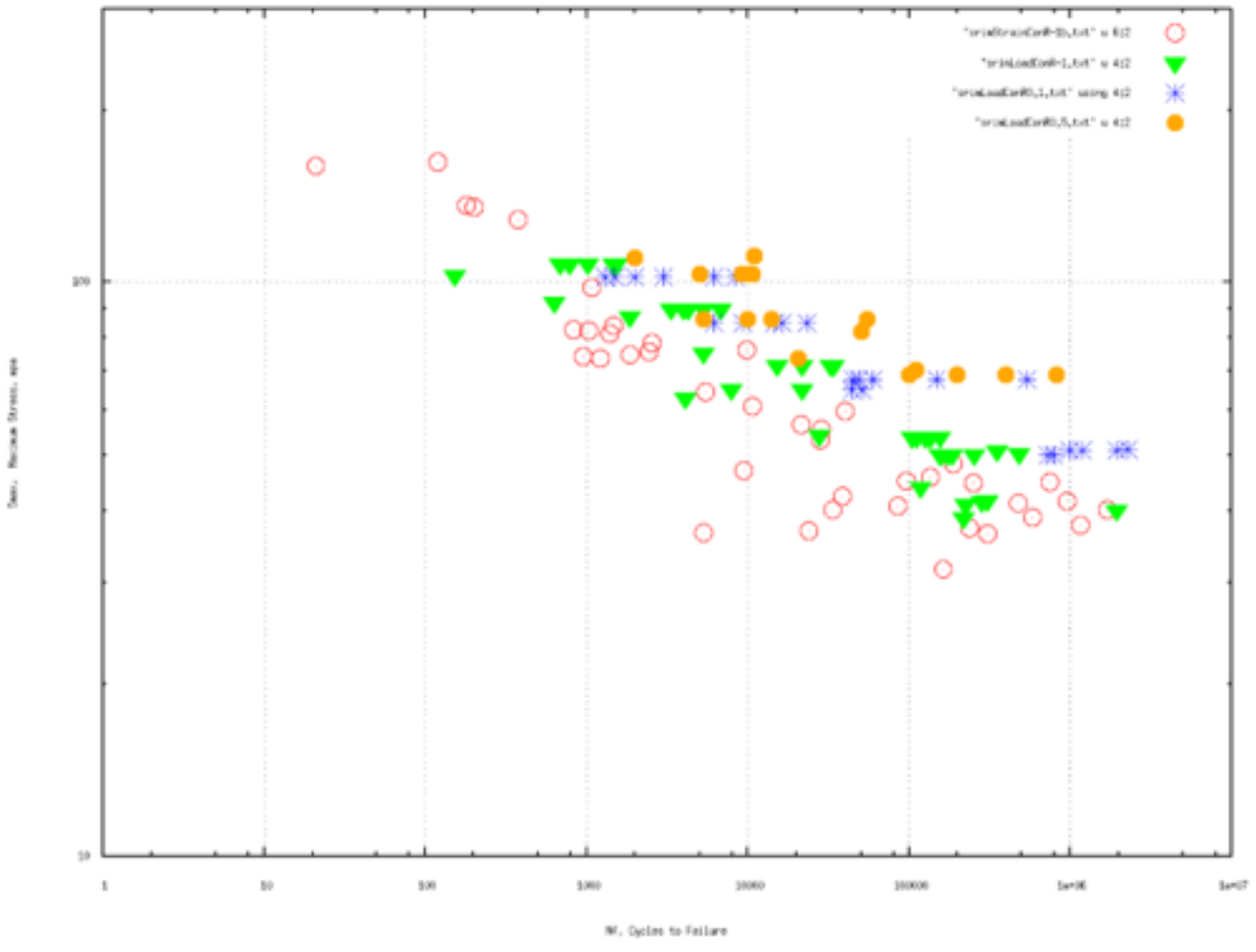


Fig.7 Relationship between experimental and predicted creep-rupture lives at (a) 900 °C/392 MPa and (b) 1100 °C/137 MPa. Open circles show predicted values of alloys used for regression analysis, solid circles show predicted values of ReneN4, ReneN5, and TMS-138 that were not used for regression analysis.



1. Three equations to predict creep-rupture lives at 900 °C/392 MPa, 1000 °C/245 MPa, and 1100 °C/137 MPa were obtained with excellent multi-correlation coefficients from 0.94 to 0.98. From analysis of the coefficients of these prediction equations, we were able to quantitatively understand creep-strengthening factors at 900–1100 °C/137–392 MPa.
2. From the values of the regression coefficients, it was shown that solution strengthening is affected by the addition of Re, W, and Ta at 900 °C/392 MPa.

SR30 Stretched Specimens



http://fde.uwaterloo.ca/Fde/Materials/ShortFiberComposites/Srim/srimSmax-Nf.png
http://xml.coverpages.org/MatMLv30-NISTIR6939-200301.pdf

Technology : Development by Failures

Forward/Inverse Problems

Welcome to Boeing - Everett

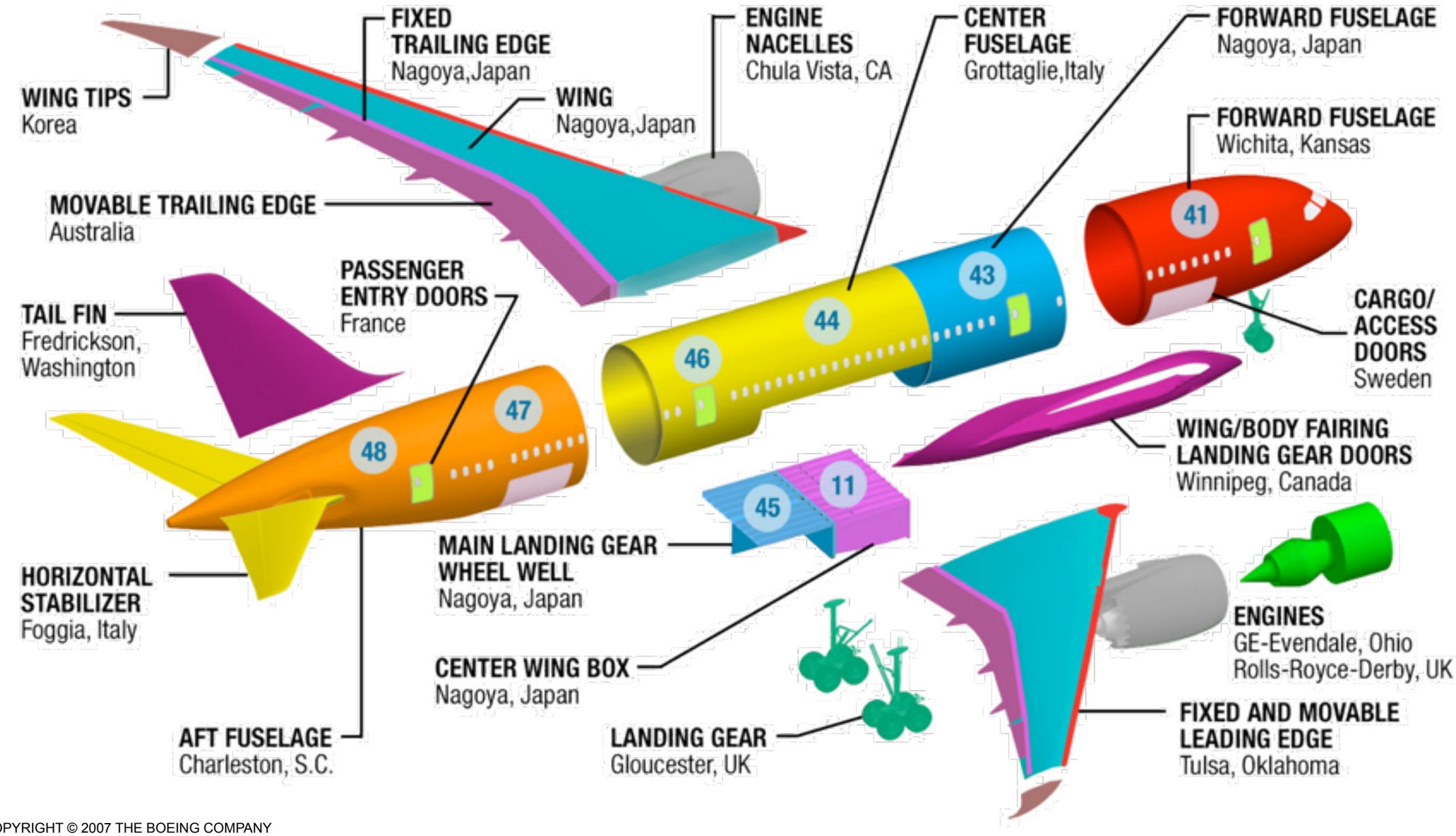
787 DREAMLINER

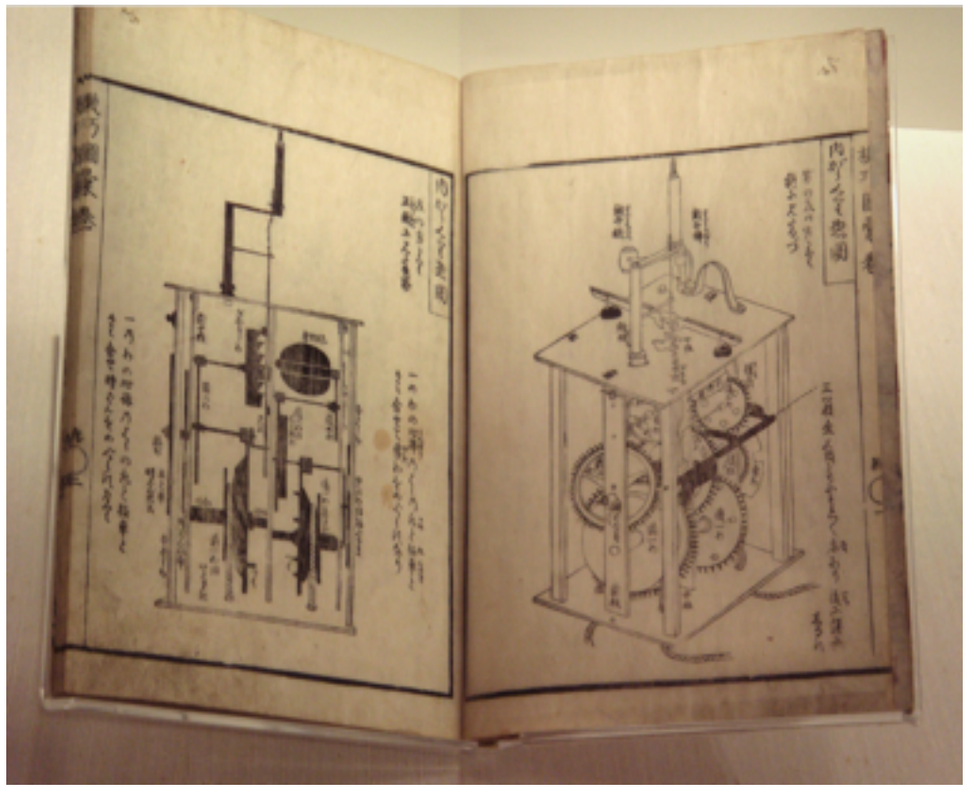
Partners Across The Globe Are Bringing The 787 Together

787 DREAMLINER

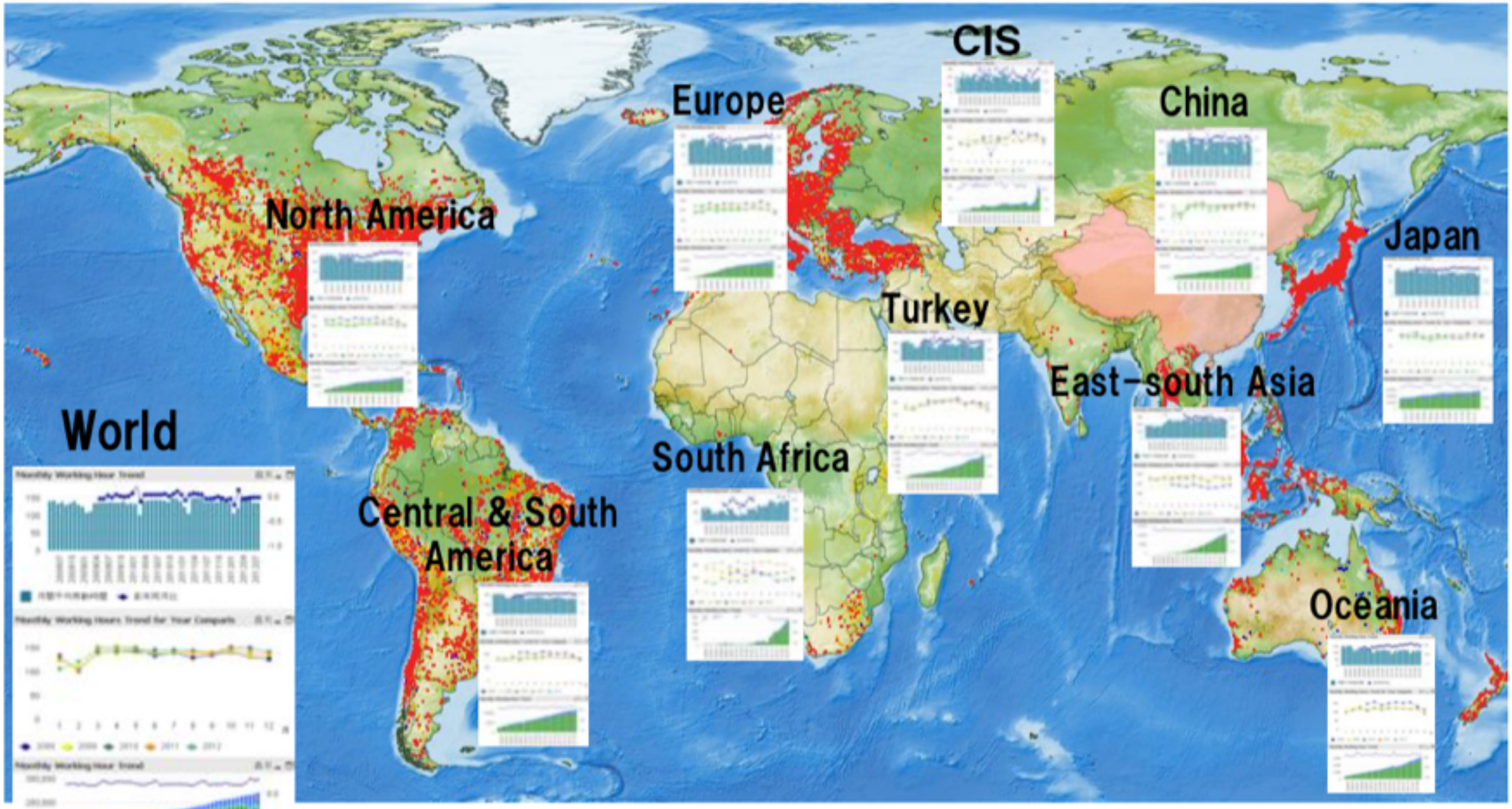
THE COMPANIES

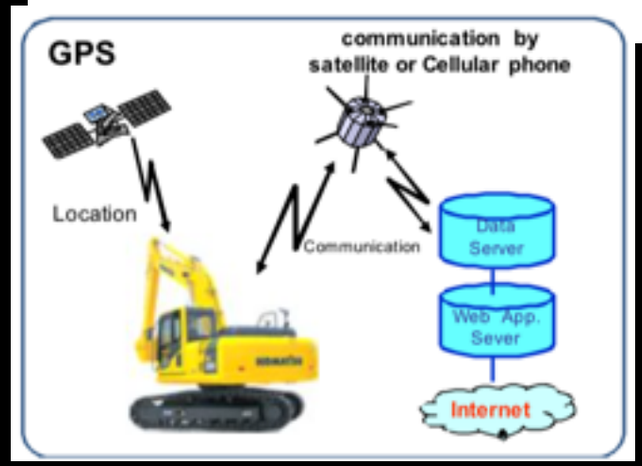
U.S.	CANADA	AUSTRALIA	JAPAN	KOREA	EUROPE
Boeing	Boeing	Boeing	Kawasaki	KAL-ASD	Messier-Dowty
Spirit	Messier-Dowty		Mitsubishi		Rolls-Royce
Vought			Fuji		Latecoere
GE					Alenia
Goodrich					Saab





～Working status all over the world～





[Collected data]

Economic indicator

Sales information (Sales forecast etc.)

Actual Sales

After support info.

Product usage info.

Production control info.

Accounts and finance info.

Etc.

Data correction and linkage

[Data utilization]

Marketing

After support

Production planning

Business admin.

Disclosure to stakeholders (IR etc.)

Etc.

How to deal with complexity- Human Dimensions

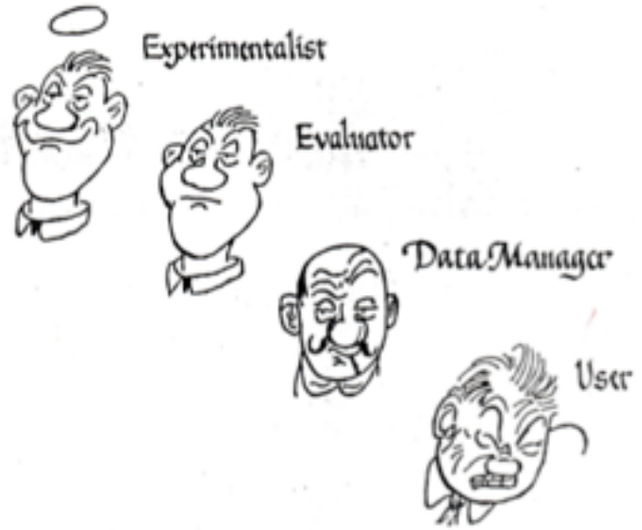
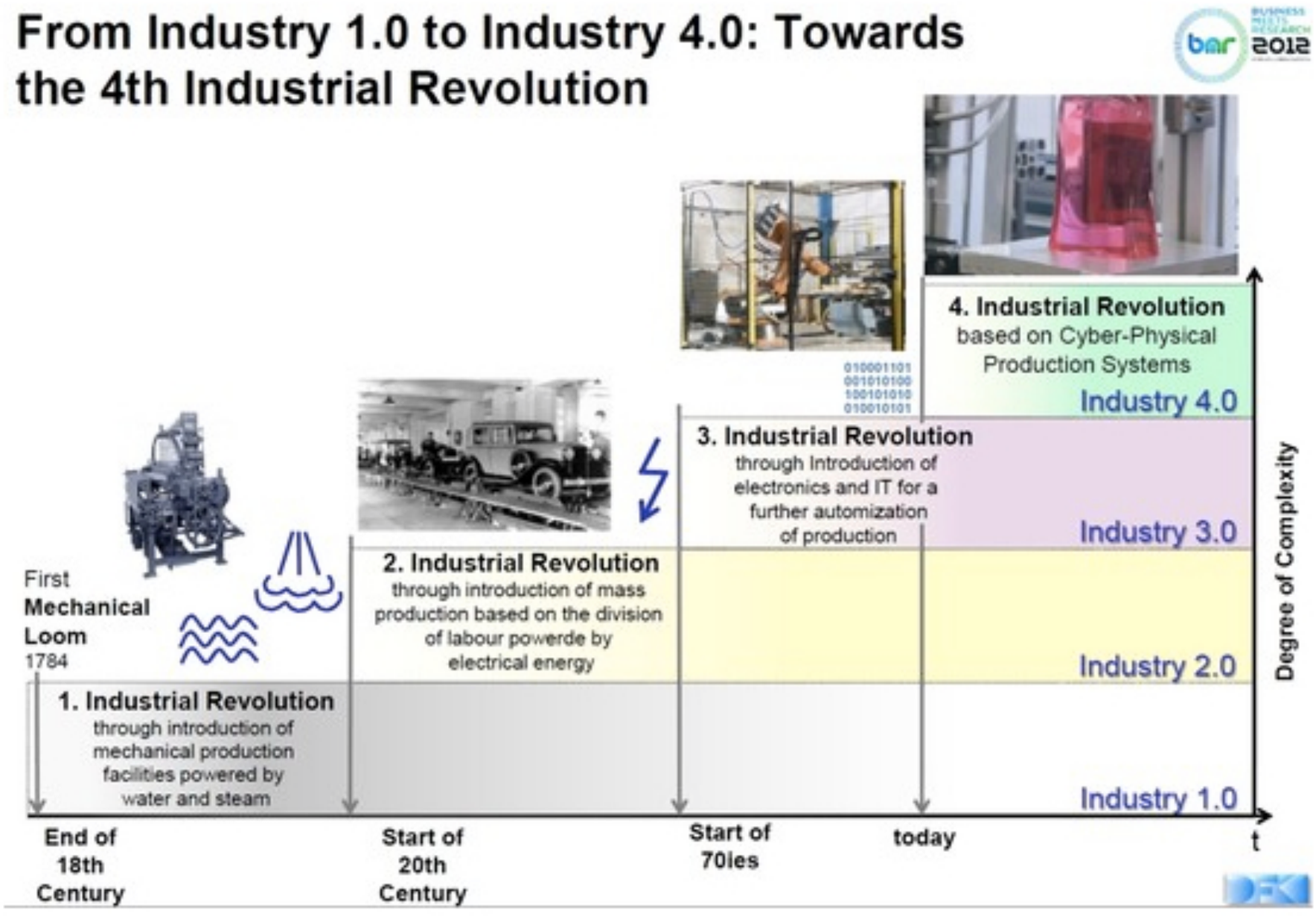


TABLE II Complexity of artifacts

Subject	*People*	*Rules*	*Basics*	*Solutions/Results*	*Information structure*
chemistry/materials	1–10 K	1–1 K → non-linear	about 100 elements	over 17 M substances	homogeneous, one criterion
genetics/biotechnology	1–10 K	1–1 K → non-linear	DNA	5–30 M species	homogeneous, one criterion
damage studies	10 K	1 K, non-linear	defects, about 100 elements	better materials models	homogeneous, many criteria methods for fusion of knowledge
car	1–10 K	1–10 K → "linear"	fuel, over 100 K parts	about 0.7 G cars + wastes	heterogeneous, many criteria
airplane	1–100 K	1–50 K → "linear"	fuel, over 1 M parts	about 0.1 M airplanes + wastes	heterogeneous, many criteria
nuclear reactors	1–100 K	1–100 K → "linear"	nuclear fuel, over 1 M parts	about 500 reactors + wastes	heterogeneous, many criteria
environment	6 G	many, non-linear	people, artifacts and nature atmosphere (5.3×10^{18} Kg) sea (1.41×10^{21} Kg) soil (0.20×10^{18} Kg) the earth (5.98×10^{24} Kg)	one comfortable earth	heterogeneous, many criteria, non deterministic, robust as one physical object but with sensitive lives, methods for fusion of knowledge

Shuichi Iwata, "Toward Proactive Engineering : Lessons from Damage Studies", *Radiation Effects & Defects in Solids*, Vol.144, pp.1-25(1998).

Where we are


From Industry 1.0 to Industry 4.0: Towards the 4th Industrial Revolution
bmr 2012
4. Industrial Revolution
based on Cyber-Physical Production Systems
Industry 4.0
3. Industrial Revolution
through Introduction of electronics and IT for a further automization of production
Industry 3.0
2. Industrial Revolution
through introduction of mass production based on the division of labour powerde by electrical energy
Industry 2.0
1. Industrial Revolution
through introduction of mechanical production facilities powered by water and steam
Industry 1.0
First Mechanical Loom
1784
Degree of Complexity
End of 18th Century
Start of 20th Century
Start of 70ies
today
t

Inclusive Wealth

Heuristic/Evolutional/Dynamic

Data-Driven Design

Harmonized Stories

Innovation Driven

Competitive

Symbiotic

Pre 3.11

Structured Society

Winners Take All

Deterministic/Conservative/Stable

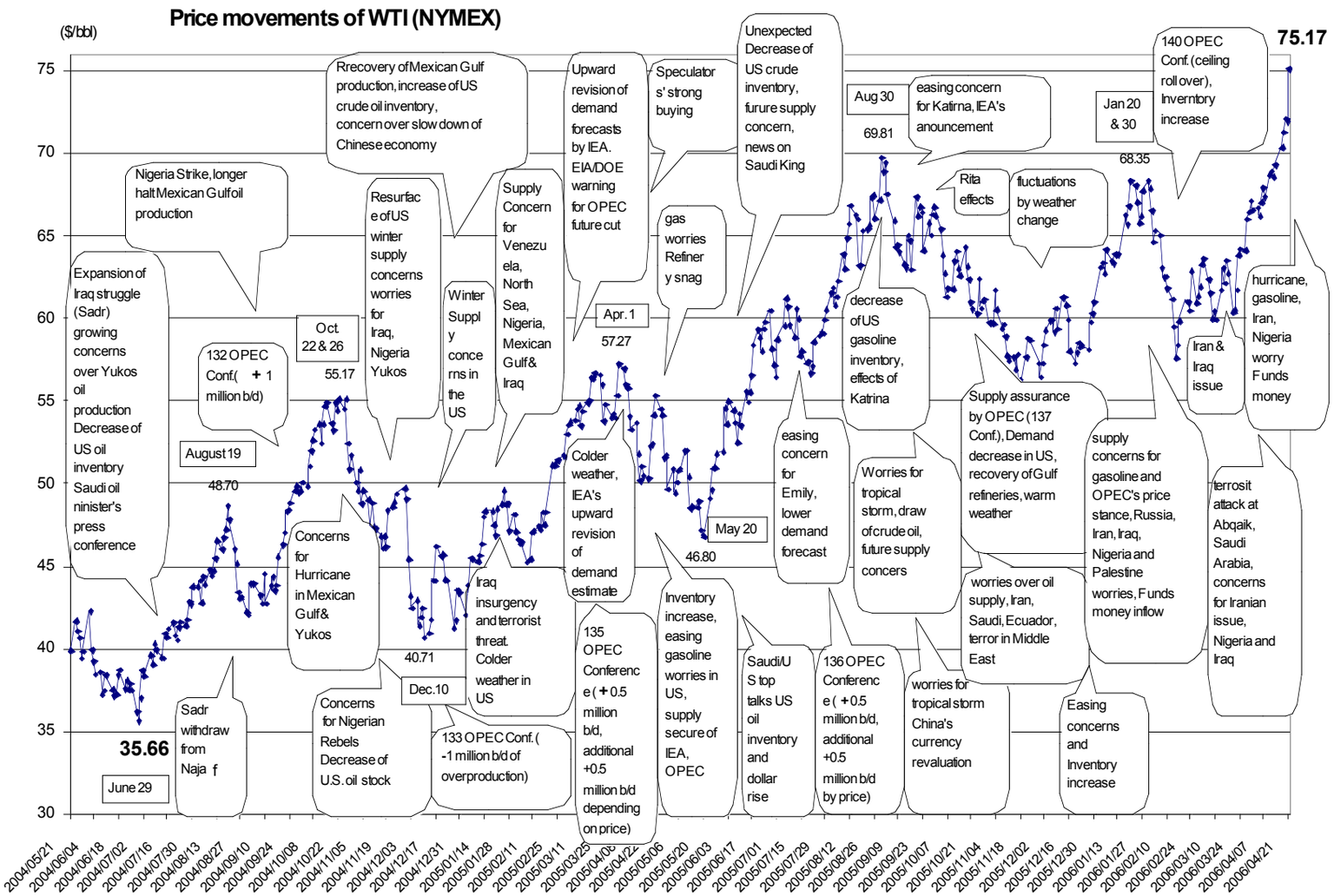
SLL-DLL-TLL-Unlearning

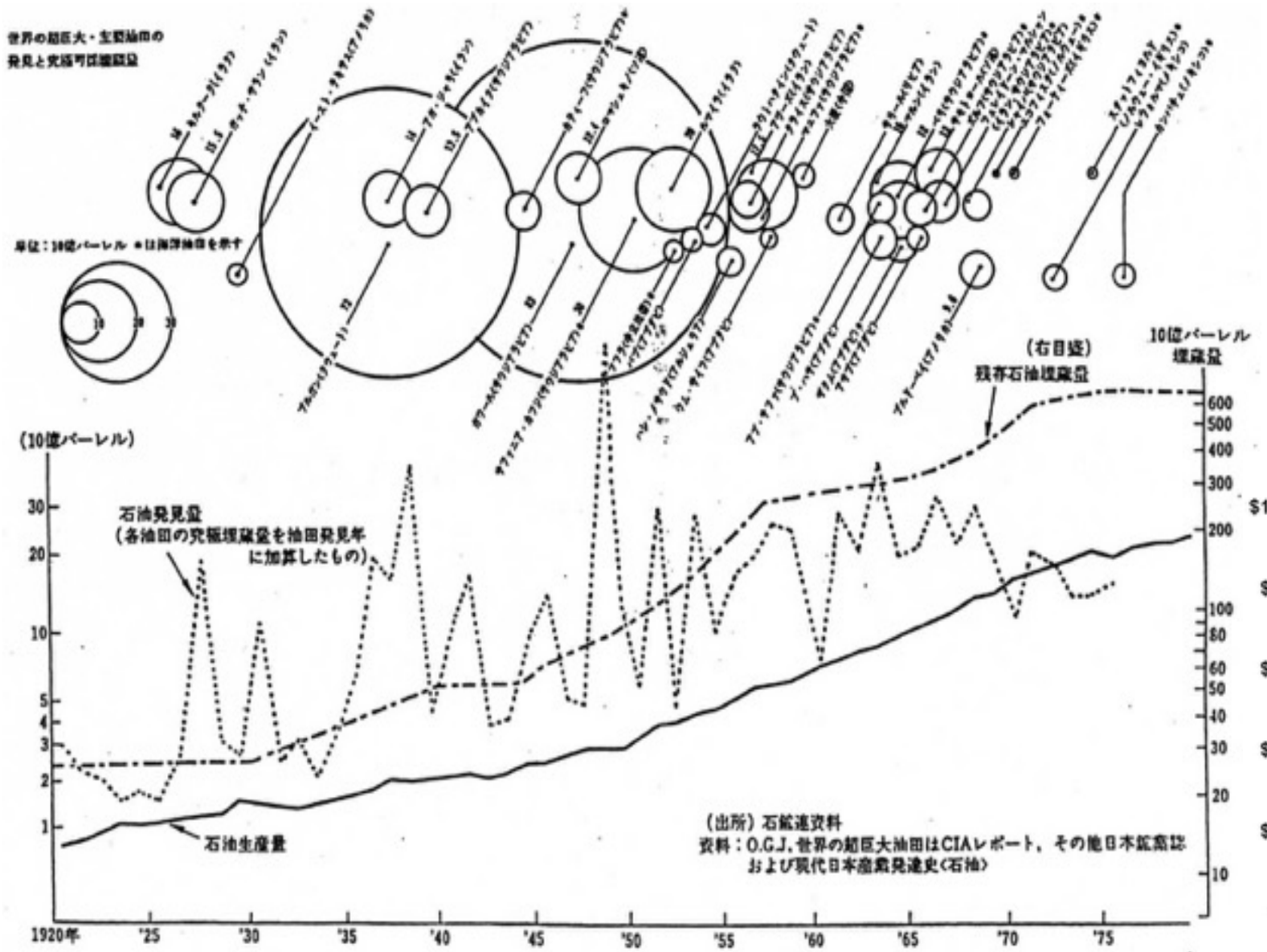
Experience-Redesign-Intelligent Design

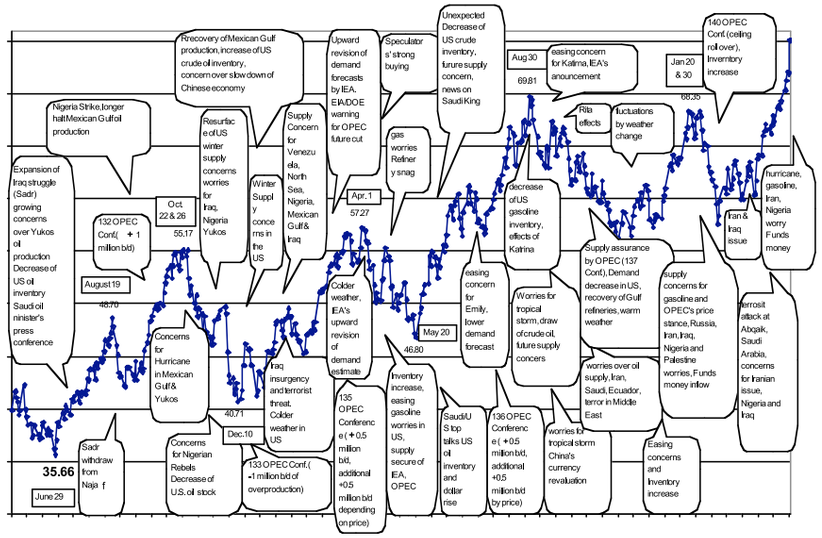
?

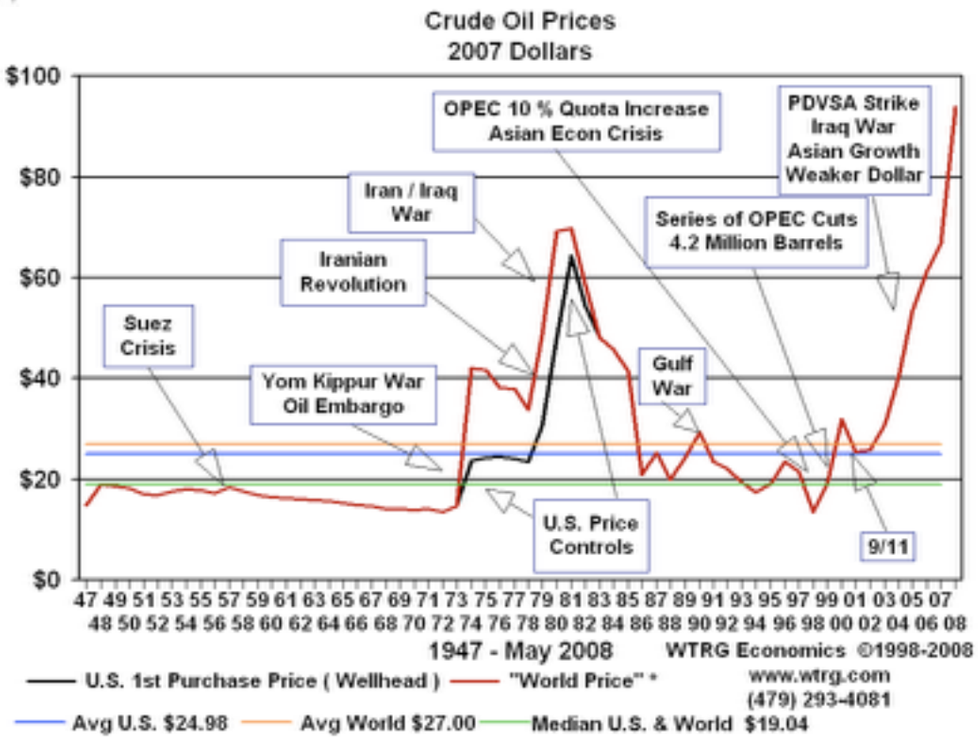
Economical Rationality after Incentives of Each Person

EneEnvEcEntEthE...







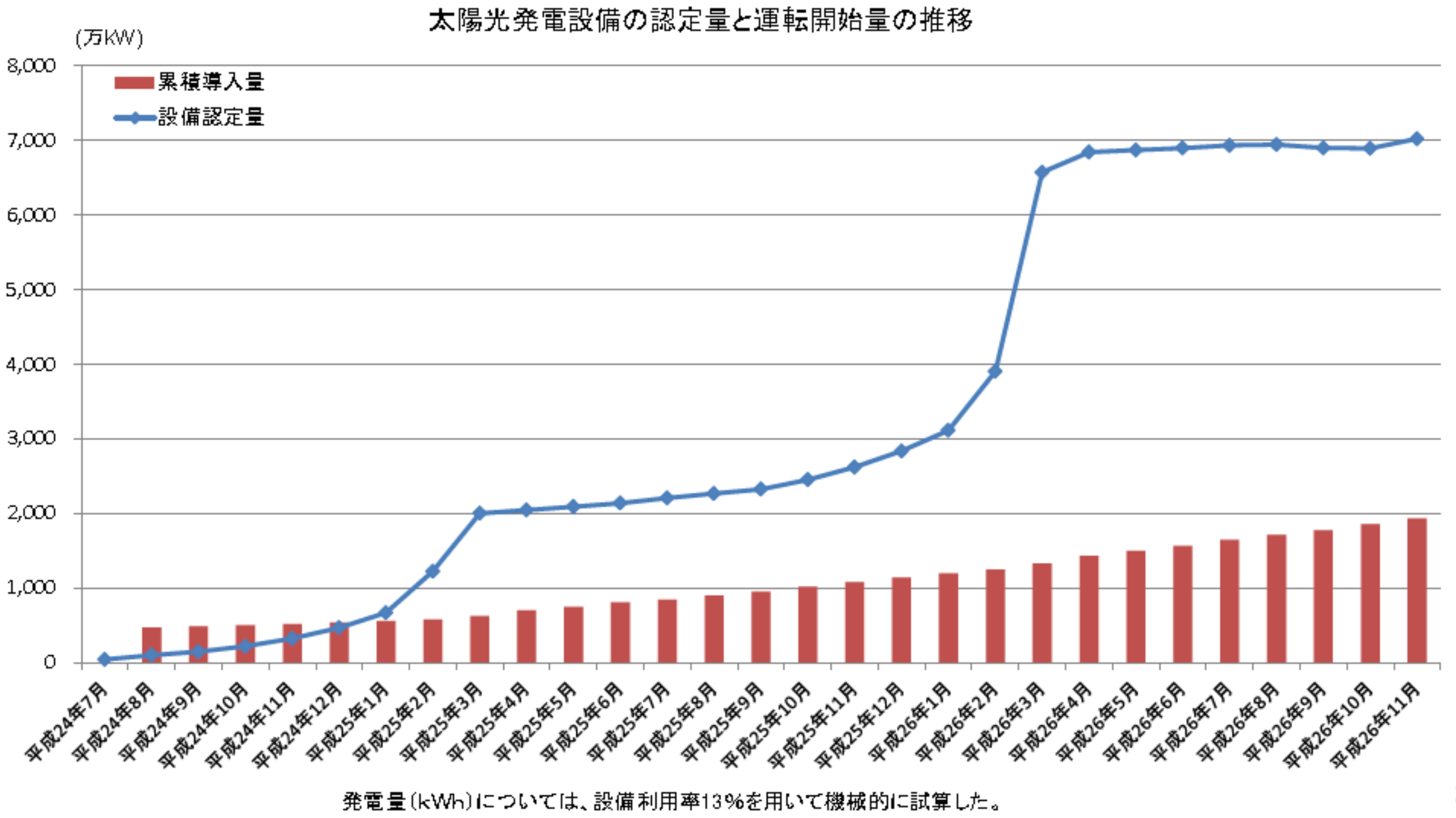


How long can we use oils?

No nuclear weapon!

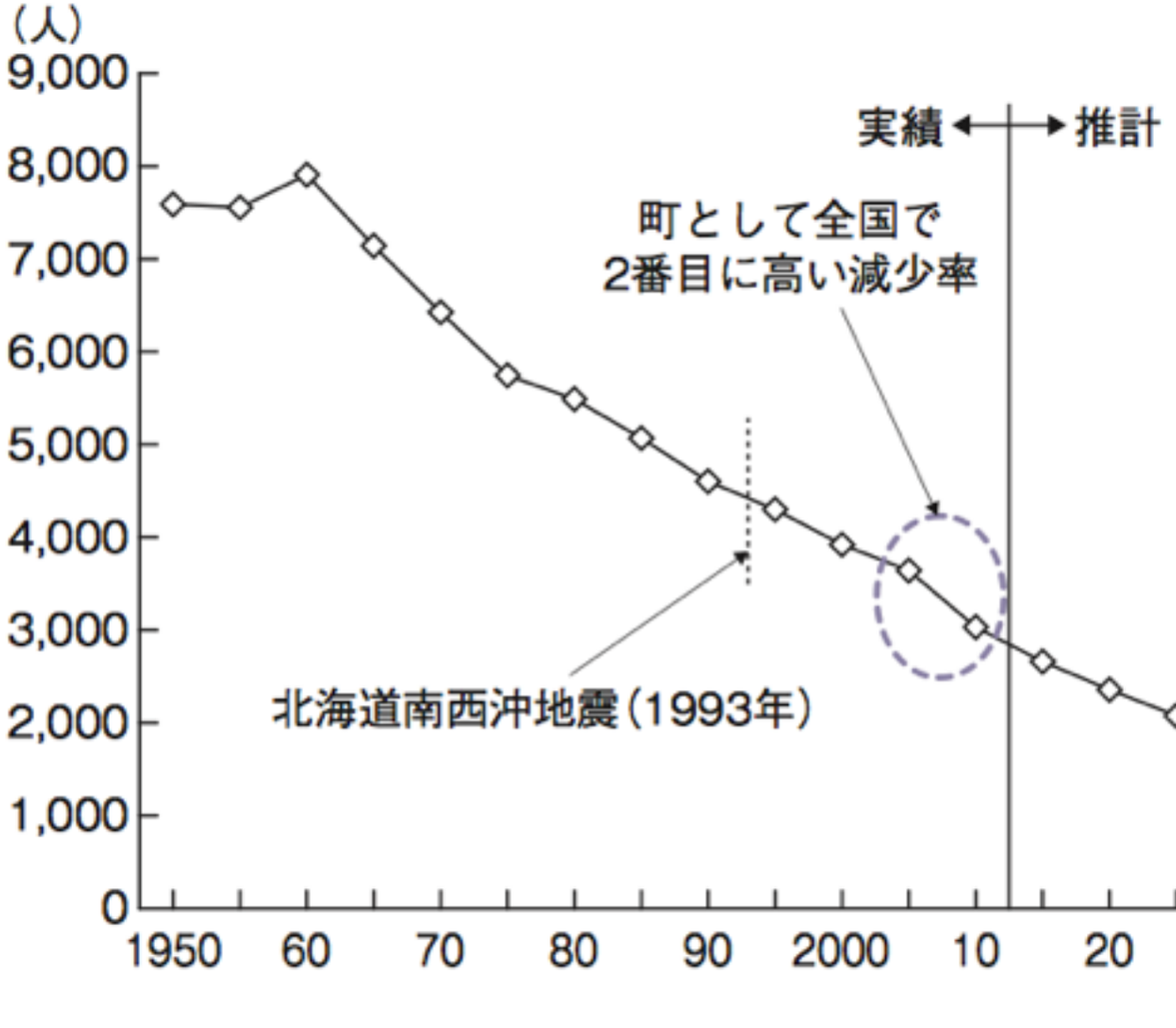
Shale Gas

After K.Hoashi



After K.Hoashi


津波の爪痕



（資料）「国勢調査報告」（各年版）、国立社会保障・人口問題研究所「日本の地域別将来推計人口（平成25年3月推計）」

http://www.boeing.jp/ヒシネス部門-紹介/ホーインク民間航空機部門/787型機の概要.page

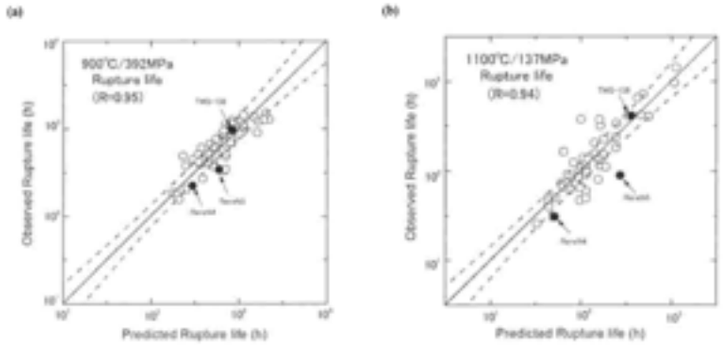


Fig.7 Relationship between experimental and predicted creep-rupture lives at (a) 900 °C/392 MPa and (b) 1100 °C/137 MPa. Open circles show predicted values of alloys used for regression analysis, solid circles show predicted values of ReneN4, ReneN5, and TMS-138 that were not used for regression analysis.

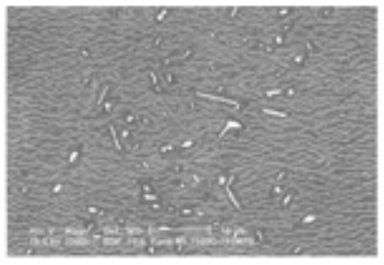


Fig.8 Microstructure showing ReneN5 crept at 1100 °C/137 MPa.

Conclusions

By multi-regression analysis using the creep data for 75 Ni-base SC superalloys, the creep-strengthening factors from 900 °C/392 MPa to 1100 °C/137 MPa were investigated. The following results were obtained.

1. Three equations to predict creep-rupture lives at 900 °C/392 MPa, 1000 °C/245 MPa, and 1100 °C/137 MPa were obtained with excellent multi-correlation coefficients from 0.94 to 0.98. From analysis of the coefficients of these prediction equations, we were able to quantitatively understand creep-strengthening factors at 900–1100 °C/137–392 MPa.
2. From the values of the regression coefficients, it was shown that solution strengthening is affected by the addition of Re, W, and Ta at 900 °C/392 MPa.
3. The regression coefficients suggests that the formation of a rafted structure of the γ/γ′ phases with a finer interfacial dislocation network stimulated by a larger negative lattice misfit ($a_\gamma > a_{\gamma'}$) enhances creep resistance at 1100 °C/137 MPa.
4. The addition of Ru to alloys is effective in suppressing TCP formation, and shifts the lattice misfit toward slightly negative values. This lattice misfit shift is not very effective in enhancing the creep strength at 900–1100 °C/137–392 MPa.
5. Creep life can be predicted with sufficient accuracy using the prediction equations obtained in this study, except for cases when harmful TCP phases are formed during high-temperature exposure.

Acknowledgment

The authors express their thanks to Mr. Shizuo Nakazawa of the National Institute for Materials Science (NIMS) for generating the creep data.

Hiroshi Harada et al.

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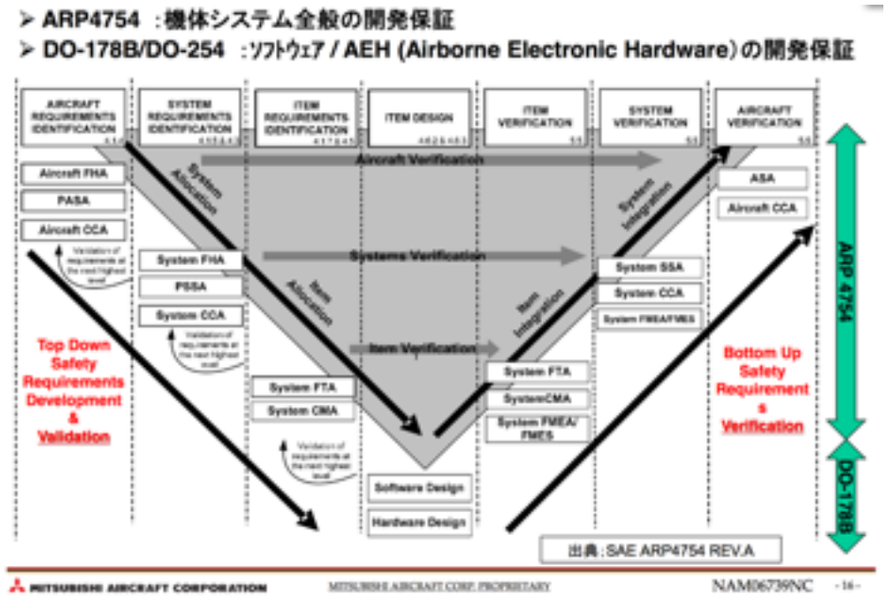
Figure 2: Aluminum Alloy Data in MatML

http://www.matml.org

BUSINESS CONTINUITY PLAN by Many Eyes

- SAFETY REGULATION
- BRAND
- CO REGULATION



http://www.ipa.go.jp/files/000036469.pdf

- TQC(HARD, SOFT, HUMAN)
  - CALS/STEP--100%, 200%,... , 400%digital
  - Total Life Cycle-- From Design to Maintenance, Waste Management
  - Mental Health

Social Rationality gained through Ageing

Data Issues

- real time monitoring
- design
- data mining
- knowledge discovery
- simulation
- data driven
- human-centered

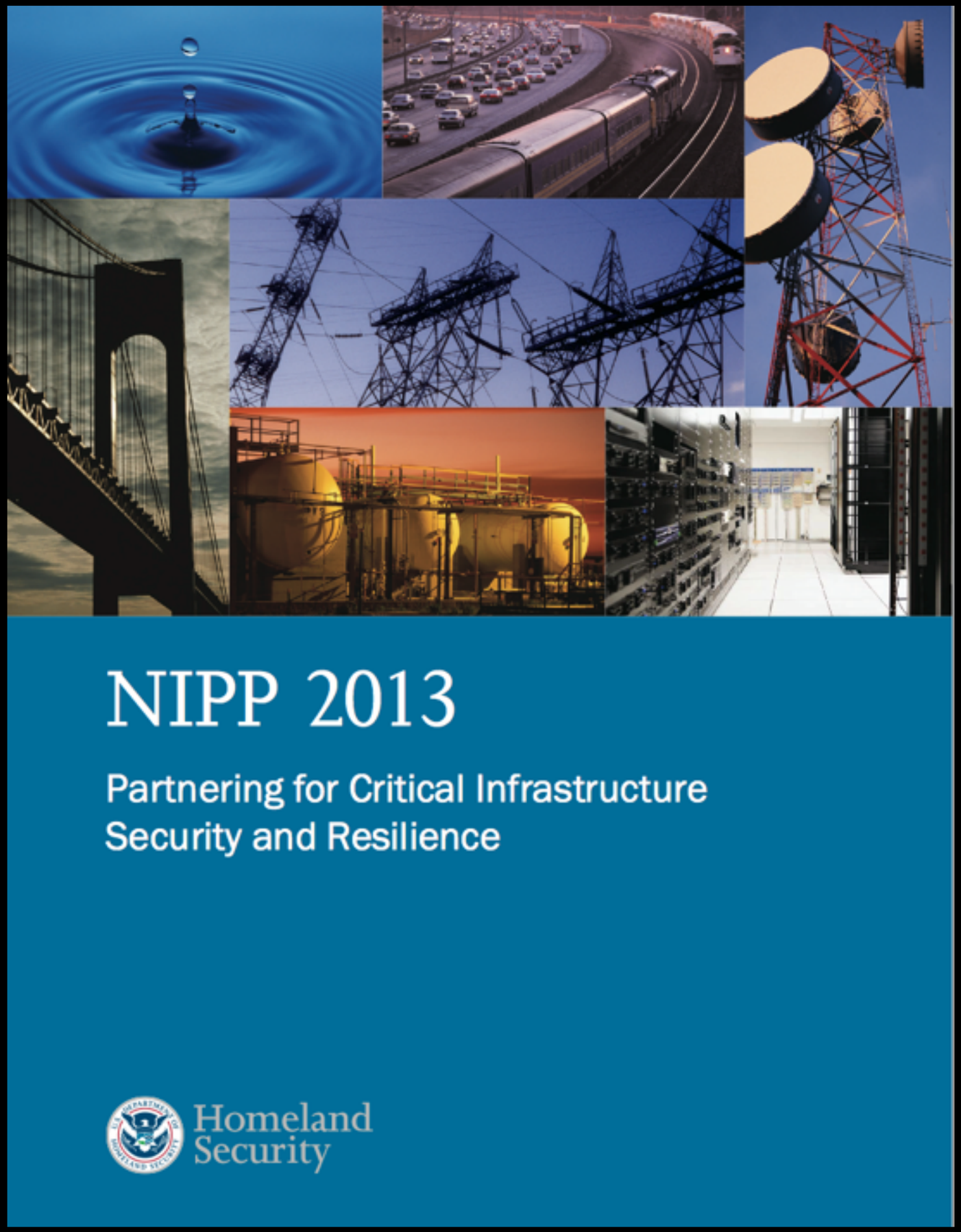
新たな挑戦課題

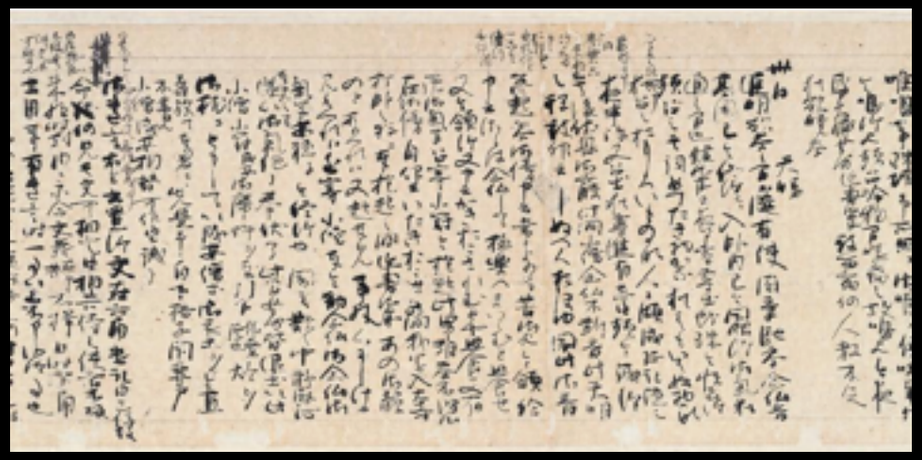
- 空気
- 気配
- 間合
- 阿吽
- ・・・

Transformation

- BCP(Business Continuity Plan)
- CCP(Community Continuity Plan)
- Sustainable Development
- Planet under Stress

- 縮小社会
- 固有の文化
- 「ご縁」の社会
- 「もったいない」
- 「おかげさま」
- 「まるい」
- 「やわらかい」
-


NIPP 2013
Partnering for Critical Infrastructure
Security and Resilience
Homeland
Security




Heibonsha Library
逝きし世の面影
渡辺京二
読書人垂涎の名著,
ペーパーバック版ていよいよ刊行!!
和辻哲郎文化賞[1999年度]受賞　解説―平川祐弘
平凡社ライブラリー　今月の新刊
日本近代史
日本人論

Civilizational, Cultural Rationality by Learning

家族

地球家族

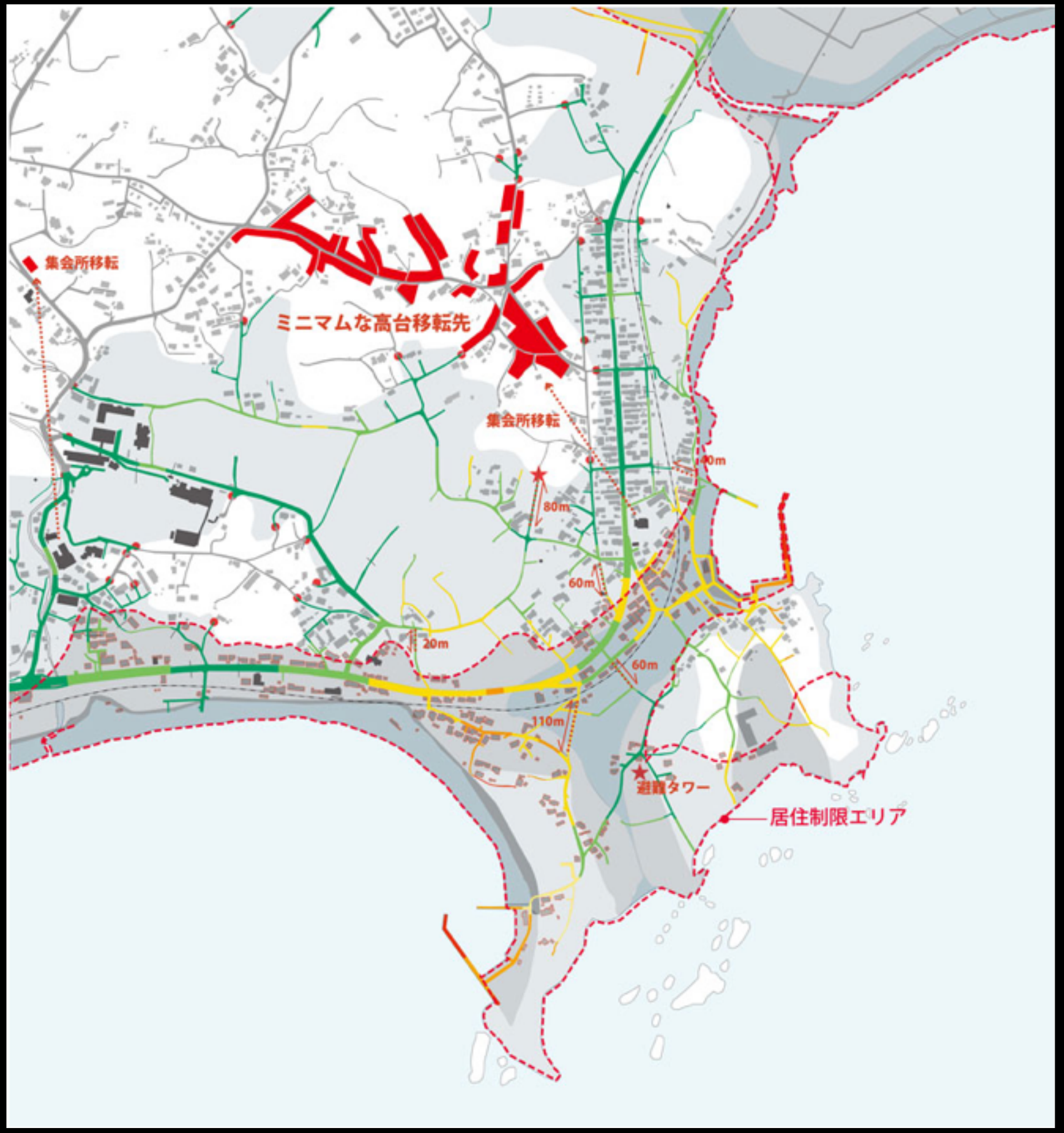
コミュニティ

個人

国家


BEFORE


最大浸水ライン
避難ポイント
近道
★追加避難ポイント
80m
40m
20m
50m
100m
避難タワーを配置した
地図を塗ってみる


集会所移転
ミニマムな高台移転先
集会所移転
80m
60m
20m
60m
110m
40m
避難タワー
居住制限エリア

Many reports have been published as “narrative based stories”.


「著作権保護コンテンツ」
門田隆将
RYUSHO KADOTA
死の淵を見た男
吉田昌郎と福島第一原発の五〇〇日
「著作権保護コンテンツ」
PHP


東日本大震災対応記録
それぞれの3.11
自衛隊機でおにぎりを運ぶ
はじめに
「記憶」を「記録」として留める
プロローグ 激震襲来
第1章 命をつなぐ
第2章 再起する


政府事故調
中間・最終報告書
（２分冊セット）
東京電力福島原子力発電所における
事故調査・検証委員会

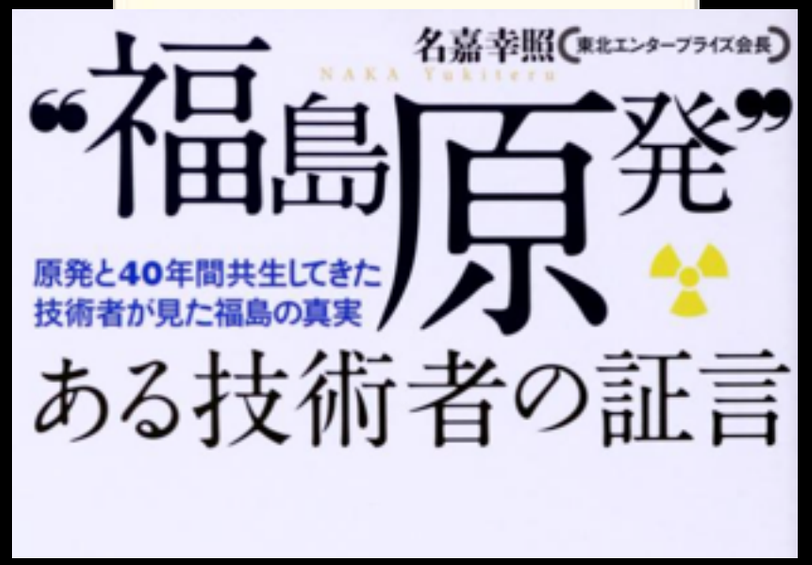

西條剛央
「ふんばろう東日本支援プロジェクト」代表
早稲田大学大学院（MBA）専任講師
人を助けるすんごい仕組み
ボランティア経験のない僕が、
日本最大級の支援組織をどうつくったのか
岩をも動かす理屈はある。
「そこに方法がないなら、つくればいい」西條さんの学問は、実戦的で痛快だ。震災の状況だけでなく、あらゆる仕事の場で役に立ってしまう本になったと思う。
糸井重里
ダイヤモンド社


道部 伸 著
プロメテウスの罠
明かされなかった福島原発事故の真実


東日本大震災
語られなかった
国交省の記録
―ミッションは「NOと言わない」
道下弘子
JDC


国会事故調
東京電力福島原子力発電所
事故調査委員会
報告書
国会事故調
NAIIC

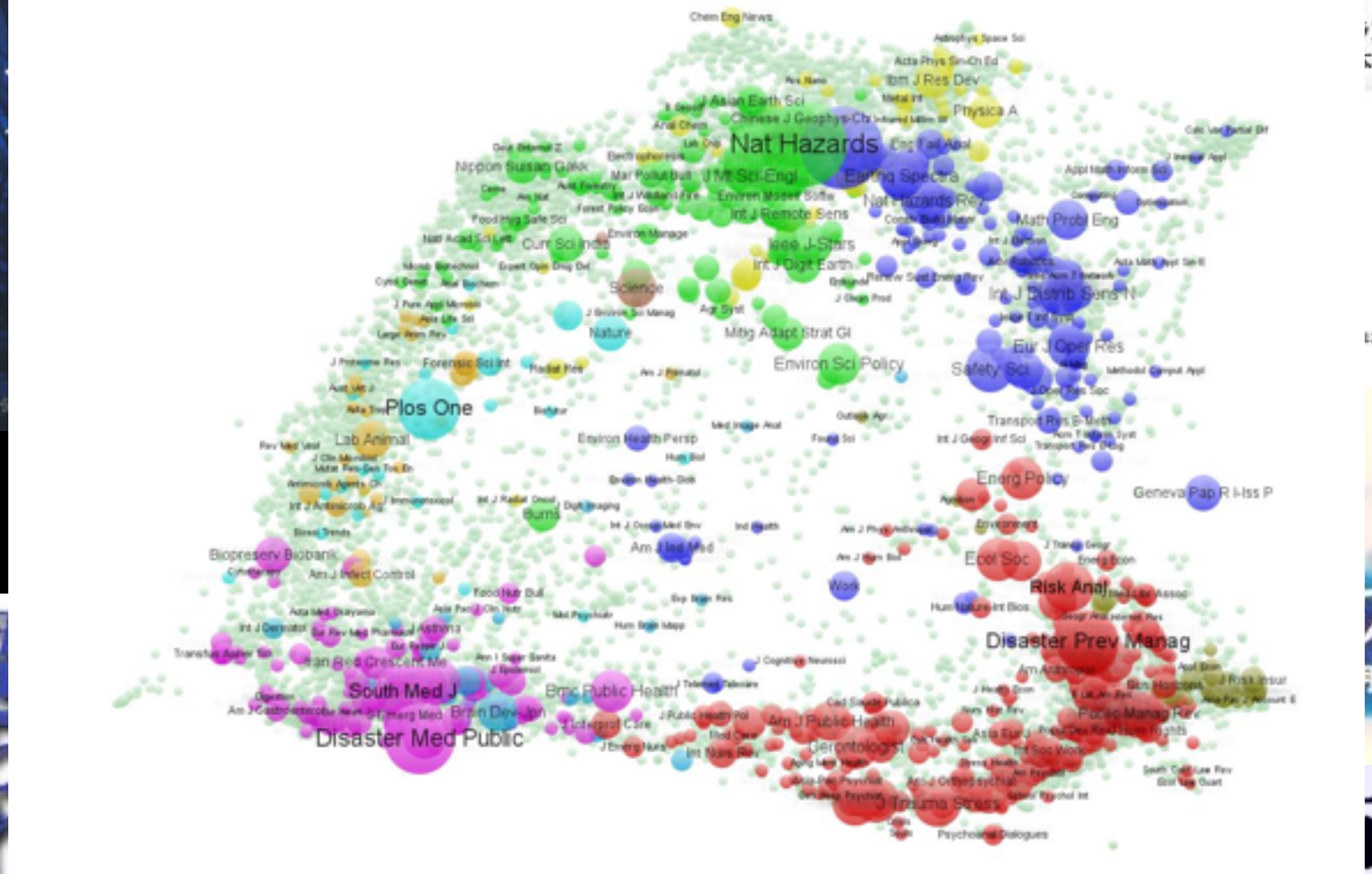

福島原発事故
独立検証委員会
調査・検証報告書
日本再建イニシアティブ


名嘉幸照（東北エンタープライズ会長）
NAKA Yukiteru
“福島原発”
原発と40年間共生してきた
技術者が見た福島の真実
ある技術者の証言


門田隆将
RYUSHO KADOTA
死の見た
吉田昌郎と福島第一原発の五〇〇日


東日本大震災対応記録
それぞれの
3.11


西條剛央
「ふんばろう東日本支援プロジェクト」代表
人を助ける
んごい仕組み
ンティア経験のない僕が、
に最大級の支援組織をどうつくったのか
岩をも動かす理屈はある。
「そこに方法がないなら、つくればいい」西條さんの学問は、実戦的で痛快だ。震災の状況だけでなく、あらゆる仕事の場で役に立ってしまう本になったと思う。
糸井重里
日新聞
別報道部
プロメテウスの罠
かされなかった福島原発事故の真実


Nat Hazards
Physica A
Int J Remote Sens
Int J Digit Earth
Science
Nature
Mitig Adapt Strat Gl
Environ Sci Policy
Plos One
Lab Animal
Environ Health Persp
Burns
Ann J Ind Med
Ecol Soc
Risk Anal
Energ Policy
Disaster Prev Manag
South Med J
Bmc Public Health
Am J Public Health
Gerontologist
Disaster Med Public
J Trauma Stress

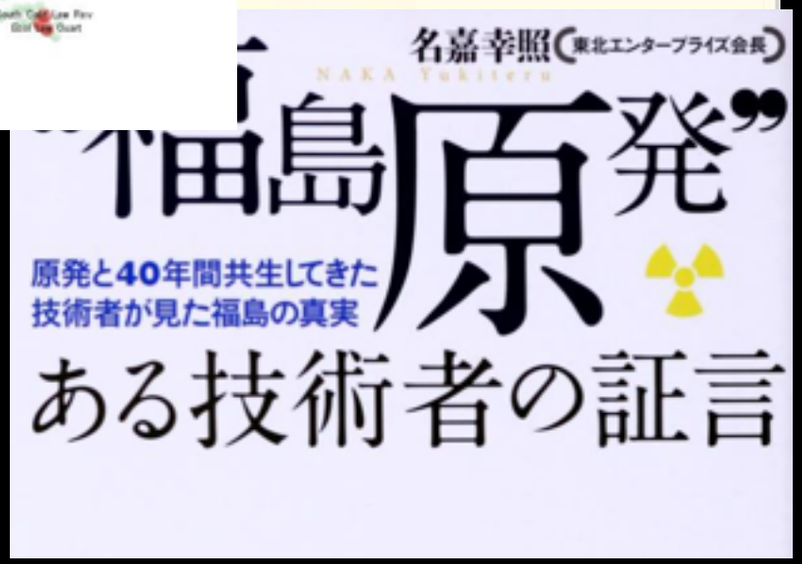

国交省の記録
ミッションは「NOと言わない」
道下弘子

大震災
なかった


国会事故調
東京電力福島原子力発電所
事故調査委員会
報告書

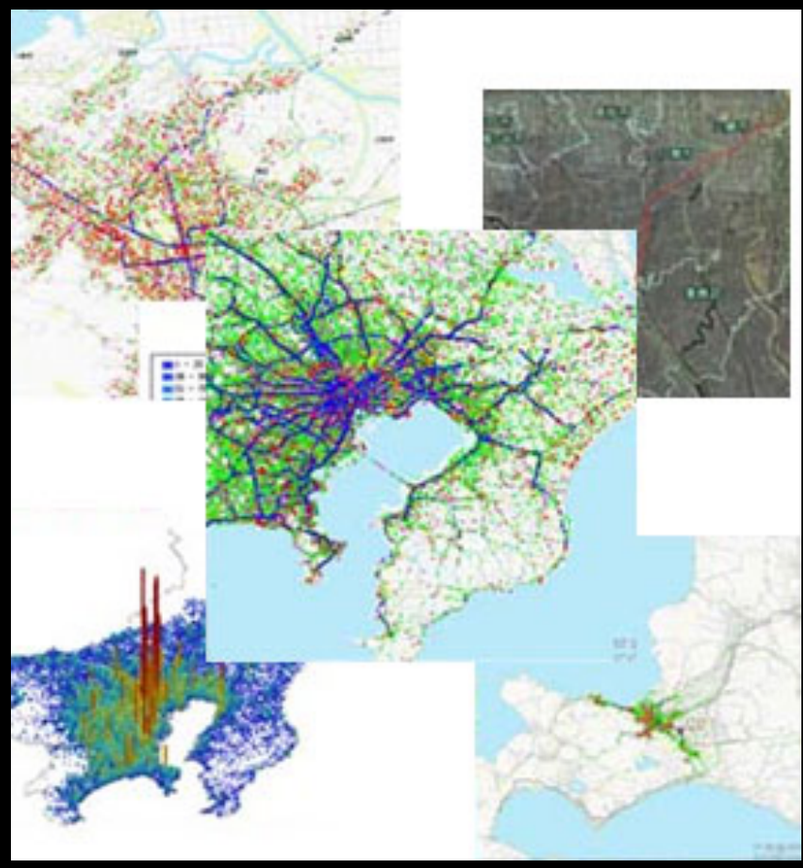

福島原発事故
独立検証委員会
調査・検証報告書


政府事故調
中間・最終報告書
（２分冊セット）
東京電力福島原子力発電所における
事故調査・検証委員会


名嘉幸照（東北エンタープライズ会長）
NAKA Yukiteru
福島原発”
原発と40年間共生してきた
技術者が見た福島の真実
ある技術者の証言

Dynamics of ~7B Intelligent Agents

- Your Life, Uploaded: The Digital Way to Better Memory, Health, and Productivity by Gordon Bell

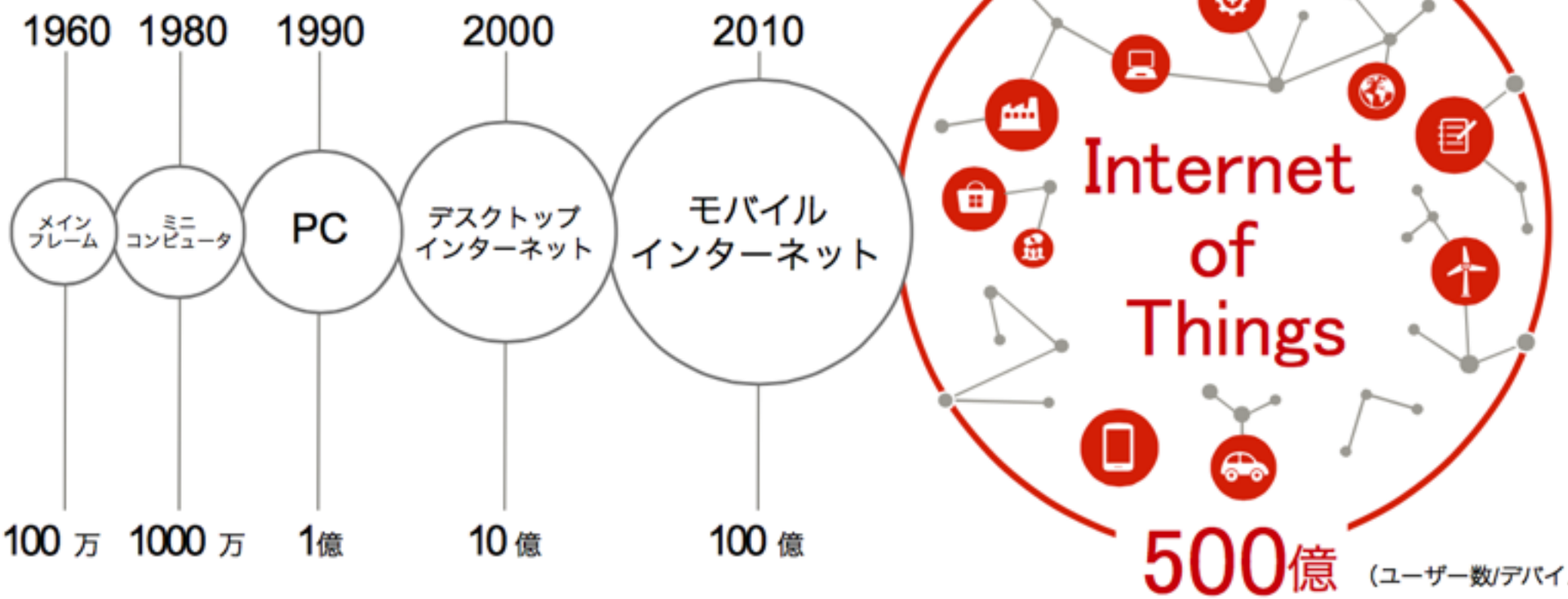


http://pflow.csis.u-tokyo.ac.jp/?page_id=943

「つながり」の拡大

FUJITSU

IoT（Internet of Things）とビッグデータが、
世界経済に大きな成長をもたらす



INTERNATIONAL & GLOBAL

REGIONAL

GEOPOLITICAL

NATIONAL

COMMUNITY DYNAMICS

MIND SET

ECONOMY

POLITICS

PLANT SITE

PLANT

REACTOR

CORE

MATERIAL

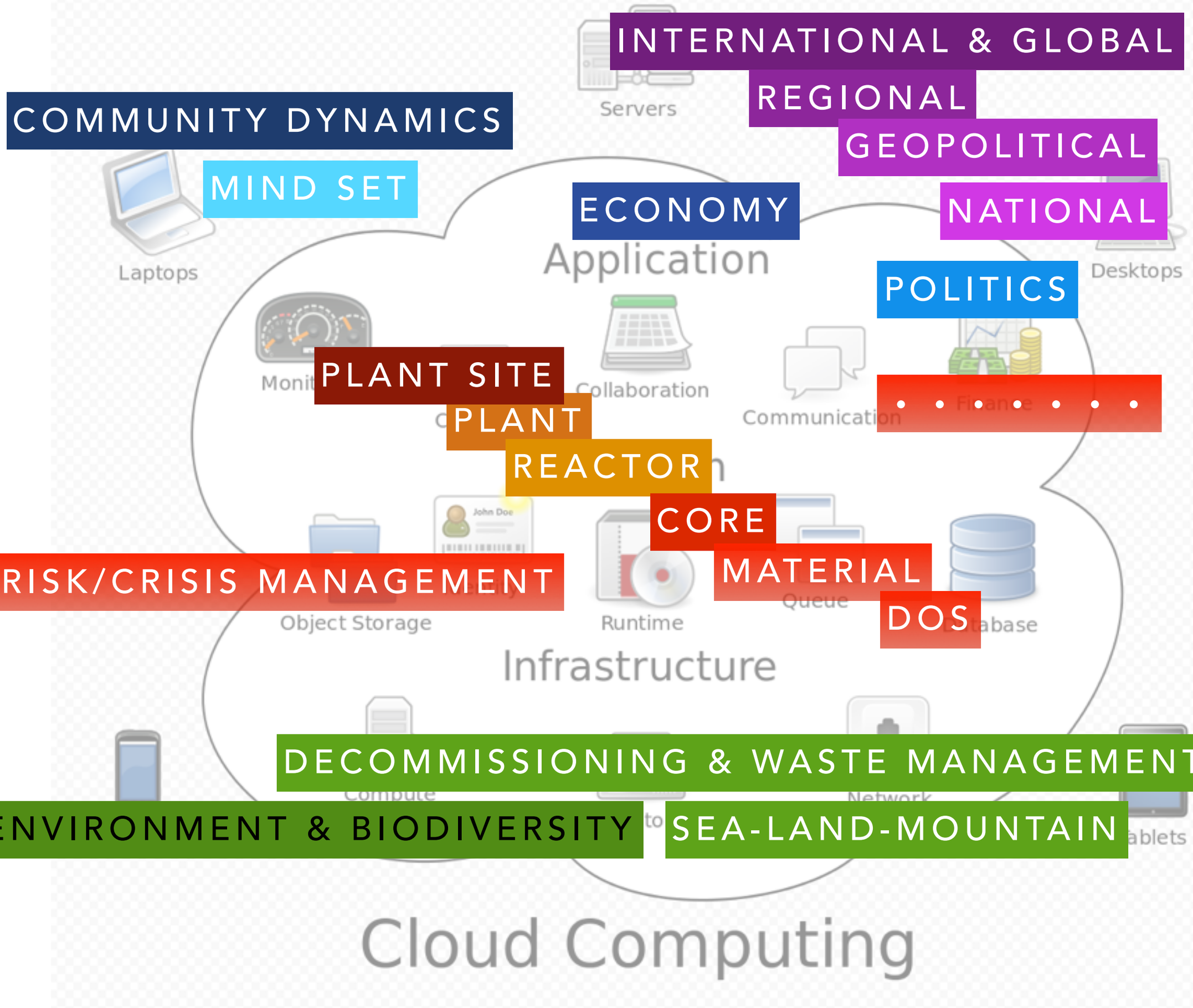
DOS

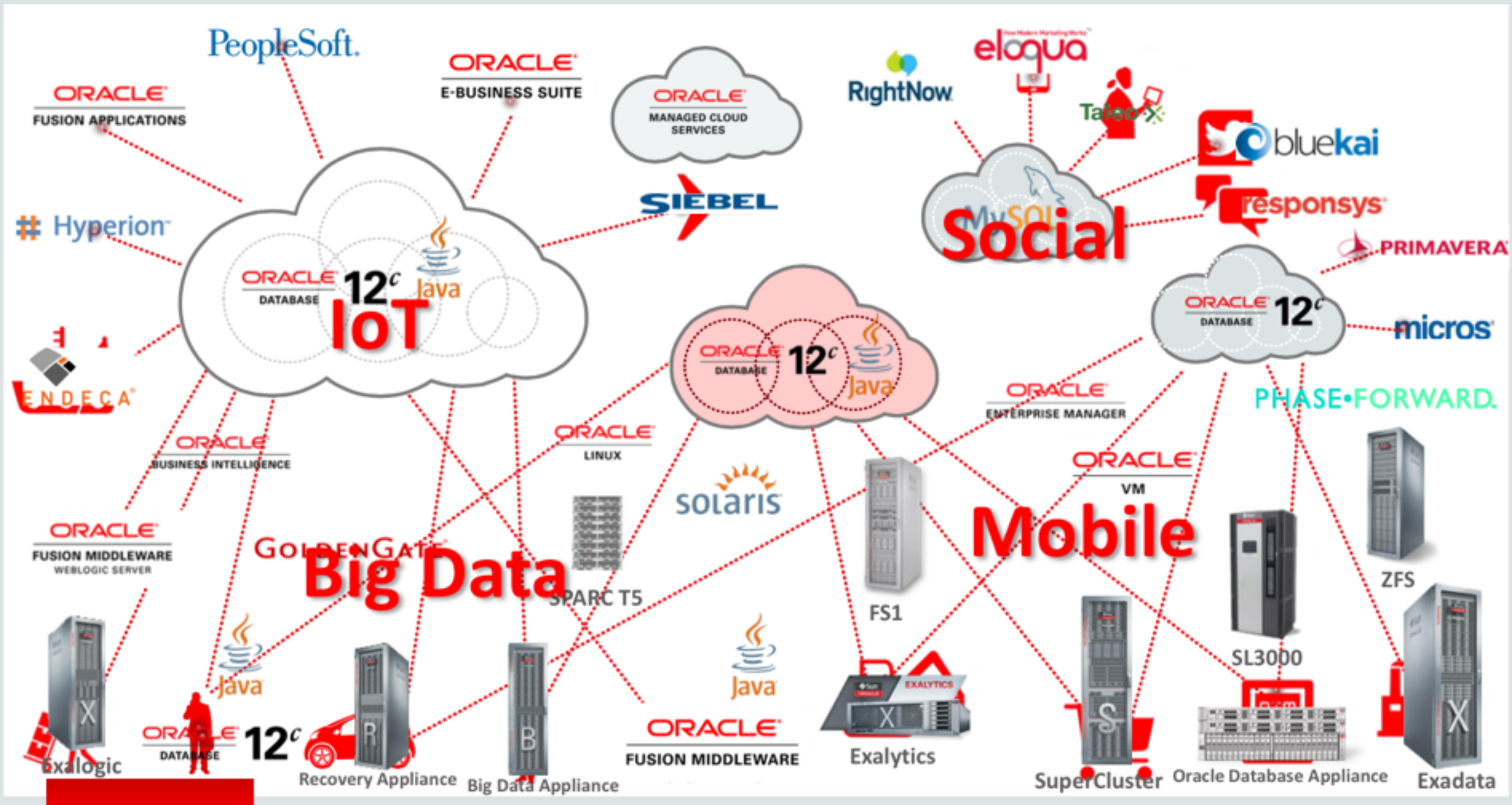
RISK/CRISIS MANAGEMENT

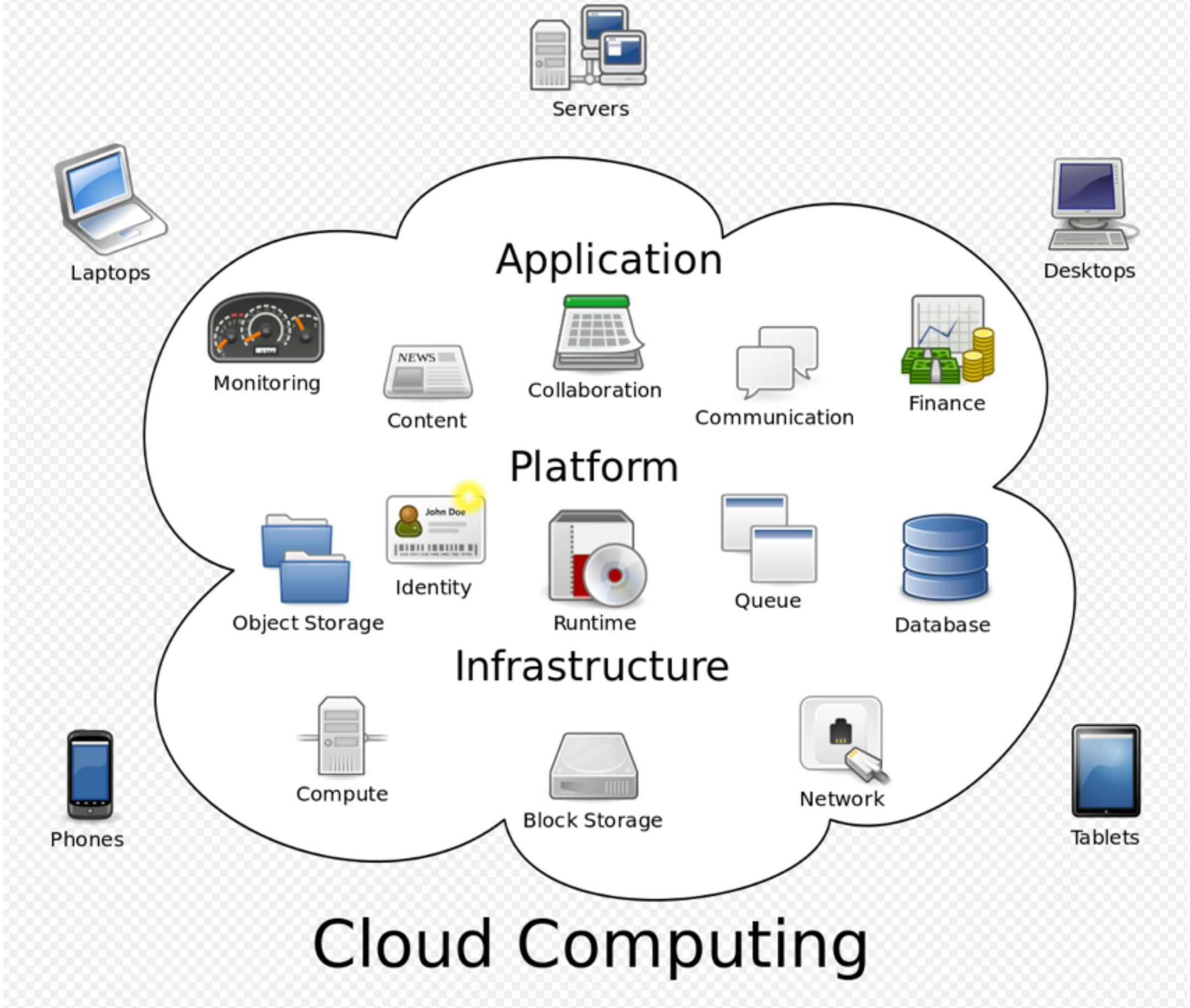
DECOMMISSIONING & WASTE MANAGEMENT

ENVIRONMENT & BIODIVERSITY

SEA-LAND-MOUNTAIN






Servers
Laptops
Desktops
Application
Monitoring
Content
Collaboration
Communication
Finance
Platform
Identity
Object Storage
Runtime
Queue
Database
Infrastructure
Compute
Block Storage
Network
Phones
Tablets
Cloud Computing

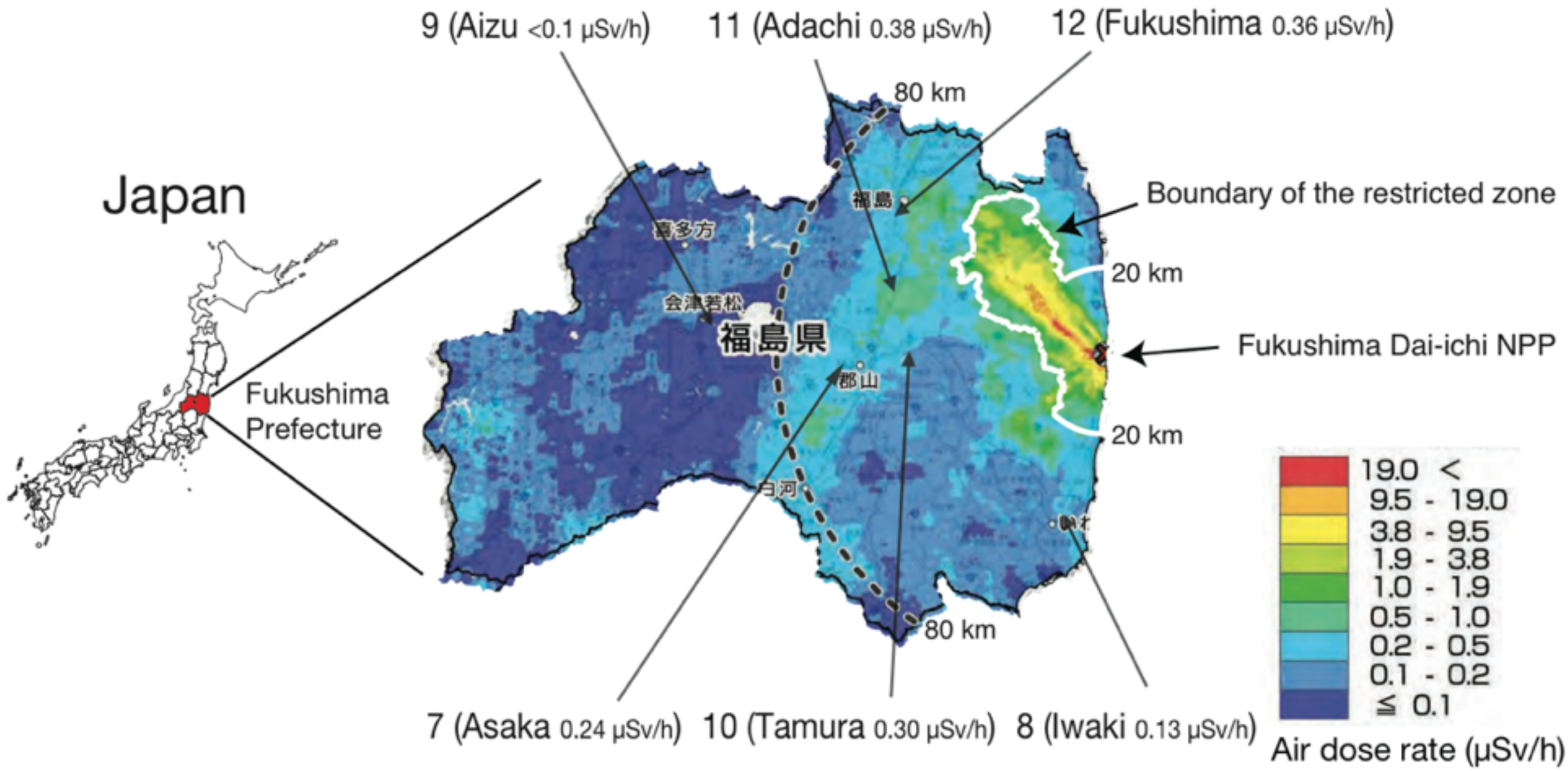


FIG. 1. (left) The location of Fukushima prefecture within Japan. (right) A map showing the air-dose rate (μSv/h) at 1m above the ground estimated from the 9th airborne survey (as of November 7, 2014) [8]. The boundary of the evacuation zone is shown in white. The locations of the six high schools participated in the study are also shown together with the air-dose rates estimated from the 9th airborne survey.

R.Hayano et al. : http://arxiv.org/pdf/1506.06364v2.pdf

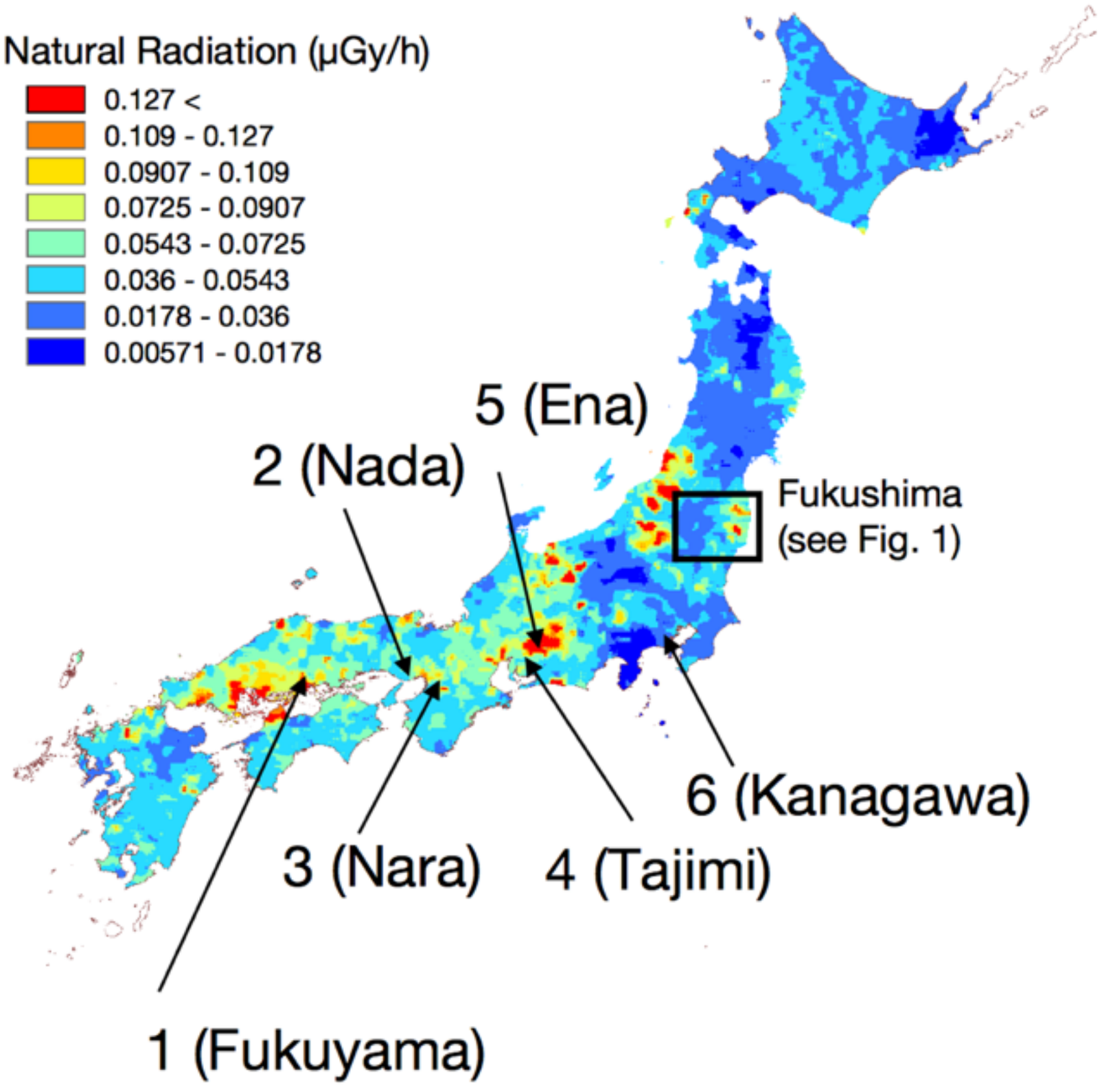


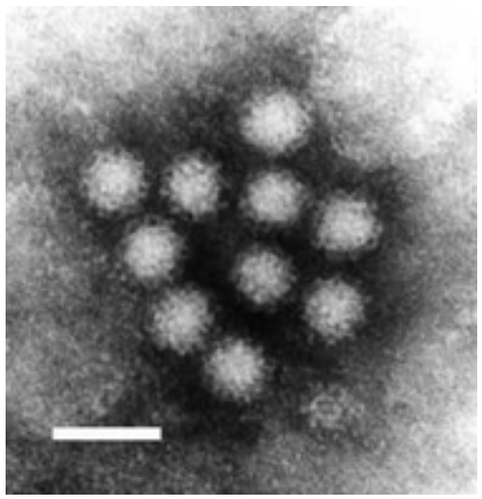
FIG. 2. The natural radiation level map of Japan (in nGy/h) calculated from the chemical analyses of the soil samples by adding contributions from uranium, thorium and potassium-40 [10]. The map was adopted from Ref. [9]. Note that the colour coding schemes are different between this figure and that in Fig 1.

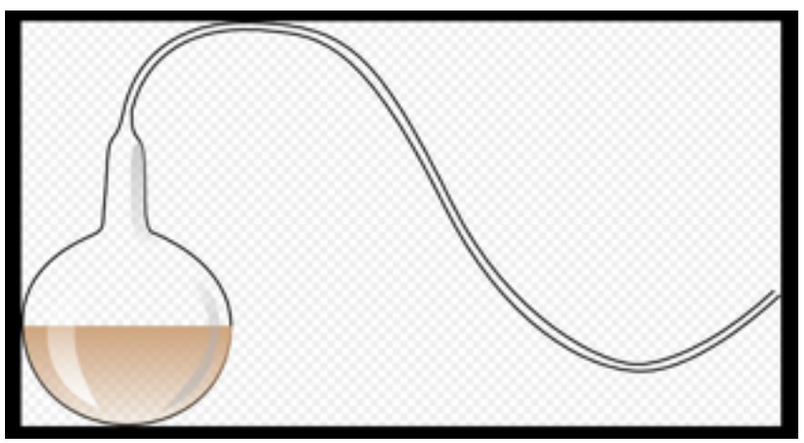
R.Hayano et al.:http://arxiv.org/pdf/1506.06364v2.pdf

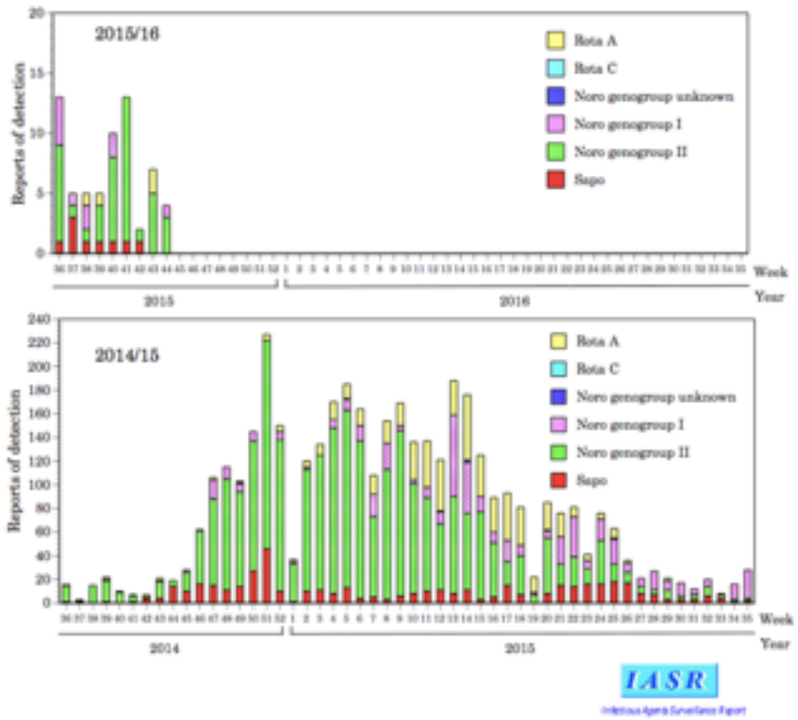
FIG. 6. A semiconductor-type personal dosimeter "D-shuttle", developed jointly by AIST and Chiyoda Technol Corporation. Each participant was instructed to wear the dosimeter on their chest, using the provided strap.

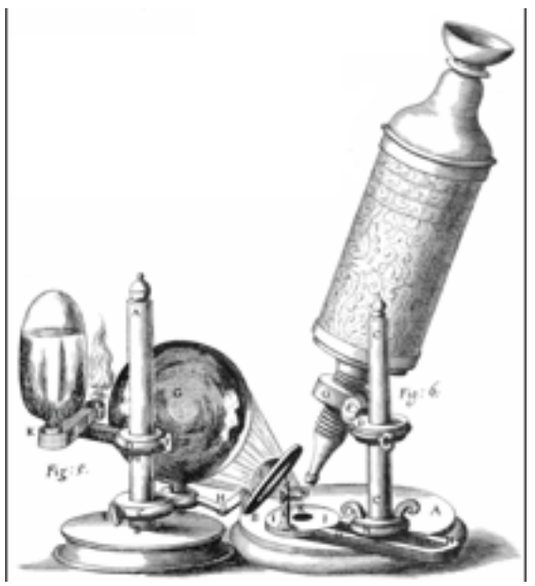
R.Hayano et al.:http://arxiv.org/pdf/1506.06364v2.pdf

Data for Causality and Correlation









https://fr.wikipedia.org/wiki/Louis_Pasteur

https://en.wikipedia.org/wiki/Robert_Hooke

http://www.nih.go.jp/niid/en/2013-03-15-04-55-59/2100-disease-based/na/norovirus/idsc/iasr-noro-e/5700-iasr-noro-e-150529.htm

metadata of health issues

- not established and fragmented due to the complexity of life in general
    - stress, age, nutrition, life style etc. individual differences sensitive
- screening effects
- bad statistics for rare cases
- nervous for unknowns and uncertainties
- .....

Between Data and Emotion

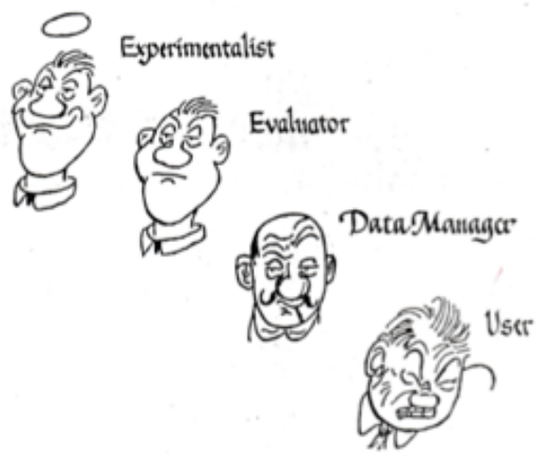
From Collective Care by Epidemiology to Individual Care Personal Data

From Government to Citizen

Open Data, Data Sharing and Use

Selection Criteria under Uncertainties

- Voting Paradox(M. Condorcet, ...), ...
- Sympathy(Adam Smith), Justice(John Rawls), ..
- Iijima Theorem, Theorem of the Ugly Duckling
- Arrow's Impossibility Theorem
- The Liberal Paradox(A.K. Sen)
- Prisoner's Dilemma
- .....



Not common ruin but coexistence!

Big Data

Data

Intelligence

AI

Manufactured Capital

IoT ~ ioe_mc

Smart Grid/Smart City/Smart Village/Smart House/HEMS, NEMS

Inclusive Wealth

Sustainability

Value

Fundamental Human Right

Human security

Individual Lifelong Care

EHR_medical service

Well being

Health

Green Product

Resource & Environment

GPS

GIS

Human Capital

ioe_hc

Natural Capital

ioe_nc

Value

Information

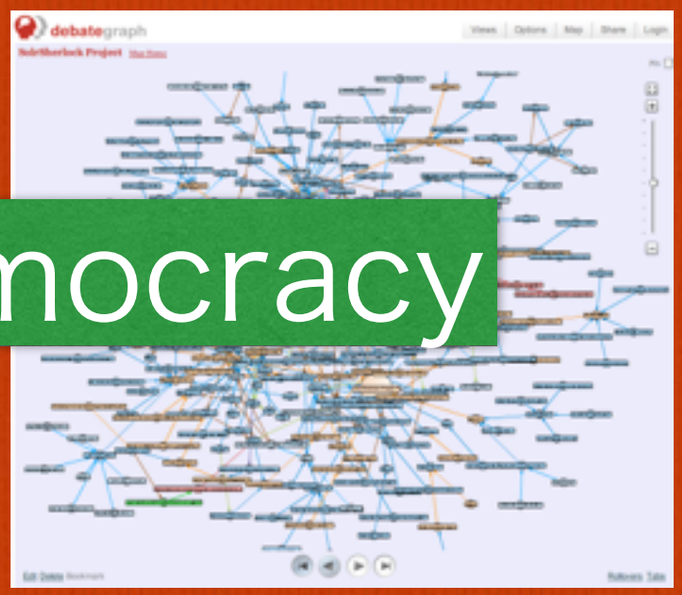
Knowledge

Service

Wisdom

SLL-DLL-TLL-Unlearning

How to co-create a harmonized community by Data-driven Design



Data Commons Democracy

How to overcome the ill-structured society
by reliable scientific data,
and becoming more proactive and
productive, creative, innovative.....

Show case for society to change?

How to get a holistic view?

How to become inclusive?

Critical thinking

- in being responsive to variable subject matter, issues, and purposes - is incorporated in a family of interwoven modes of thinking, among them:

- scientific thinking
- mathematical thinking
- historical thinking
- anthropological thinking
- economic thinking
- moral thinking
- philosophical thinking

Collective Knowledge
Collective Choice
and Social Welfare
based on data

マルチレンマ問題ー文明的合理性

- 医療・トリアージ
- 原発・資源
- 航空機事故
- 食品安全・飢餓
- 気候変動・格差
- 内戦・ストレス
- ・・・

- 倫理・命「よくいきる」
- バランス・バイアス
- 事前評価・選択・事後の潔さ
- 希望・夢「ワクワクする」
- コミュニティー

- 最適解
- デザイン
- 物語

PROPOSALS

- DEVELOPMENT OF PROACTIVE AND POSITIVE DIGITAL STORY TELLERS BASED ON SCIENCE AND TECHNOLOGY(human capital with capacity building +produced capital described by knowledge network connected dynamically with real/cyber space objects(data/information/knowledge/wisdom)+natural capital with monitoring/evaluation technologies +high performance simulators with qualitative/quantitative/adaptive intelligent reasoning+….) reflecting all important lessons from Industry 1.0-4.0, SHINKANSEN, “FUKUSHIMA”, PRIUS, TESLA, i-PHONE, B-787 and so on.
- ……

Data democracy to create my story ----

Heuristic/Evolutional/Dynamic

Inclusive Wealth

Data-Driven Design

Harmonized Stories

Innovation Driven

Competitive

Symbiotic

Pre 3.11

Structured Society

Winners Take All

Deterministic/Conservative/Stable

Heuristic/Evolutional/Dynamic

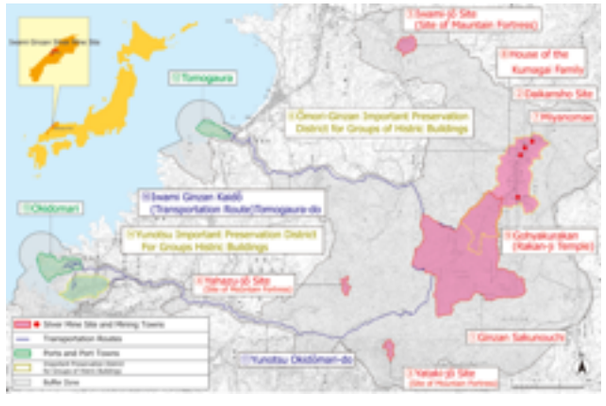
https://www.saesgetters.com/ja/research-innovation/research-innovation

http://www.surari.biz/blog/wp-content/uploads/2014/07/lgf01a201310091600.jpg

Competitive

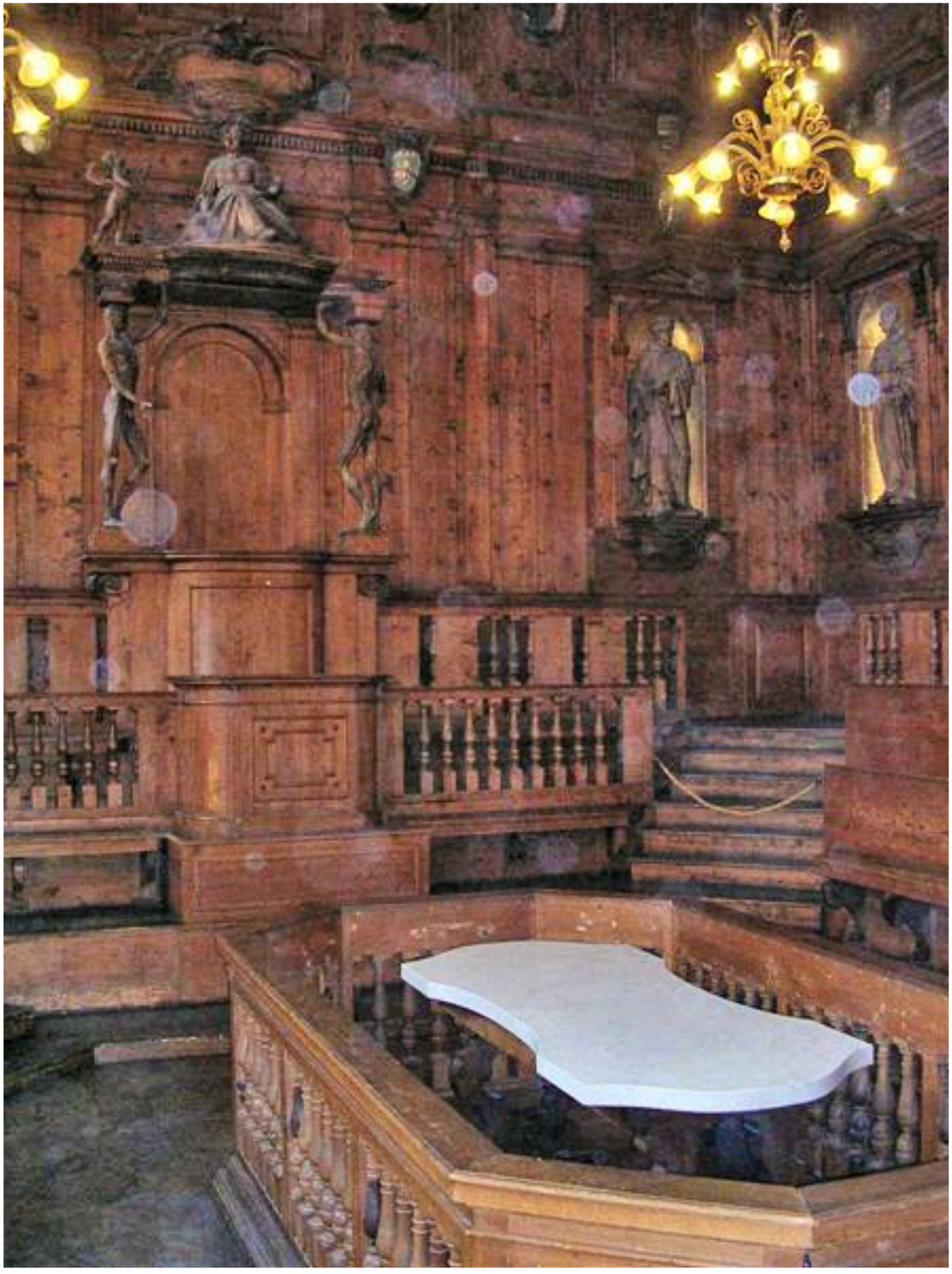
Symbiotic

http://www.tepco.co.jp/index-j.html



http://ginzan.city.ohda.lg.jp/wh/en/culture/index.html

Deterministic/Conservative/Stable



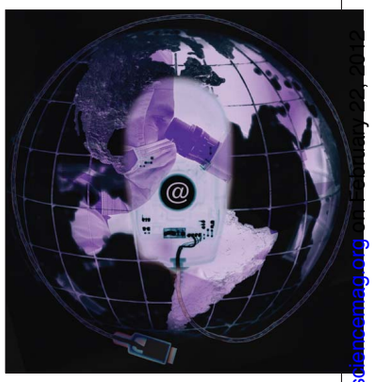
Information Society/Digital Divide

EDITORIAL

Science and the Information Society

In the opening line of his Editorial "A Challenge to the World's Scientists" (*Science,* 7 March 2003, p. 1485), United Nations (UN) Secretary-General Kofi Annan states that "Science has contributed immensely to human progress and to the development of modern society." He acknowledges that "Recent advances in information technology, genetics, and biotechnology hold extraordinary prospects for individual well-being and that of humankind as a whole." But the real challenge he puts to the scientific community is this: "[Y]our advocacy can help bring about a breakthrough in access to scientific knowledge . . ."

As scientists, most of us probably take such views on the value of science for granted, but this is not necessarily the case for our political leaders, nor for society as a whole. Thus, Kofi Annan's challenge is one to which the international science community needs to respond forcefully. The World Summit on the Information Society (WSIS), which will take place in Geneva, Switzerland (December 2003), and Tunis, Tunisia (2005), provides an unprecedented opportunity for the scientific community to promote the importance of open access to scientific knowledge to world leaders and thereby demonstrate that we are indeed "an indispensable partner of the United Nations."



CREDIT: PHOTO COLLAGE BY C. FABER SMITH

The International Council for Science (ICSU) and its Committee on Data for Science and Technology (CODATA) are working with other international science organizations to ensure that the crucial role of science in the development and use of information and communication technologies (ICTs) is clearly recognized in the formal declarations that come out of the WSIS. Scientific knowledge carries enormous potential for helping the world address the UN Millennium Development Goals, and the use of ICTs opens up unprecedented opportunities to accelerate this process. At the same time, scientists and governments must work together to eliminate, not widen, the "digital divide": the division between rich and poor, North and South.

After an international workshop hosted by UNESCO (Paris, March 2003), ICSU and CODATA developed a joint position paper and agenda for action entitled "Science in the Information Society," which can be found at www.icsu.org. This agenda for action emphasizes the importance of strengthening the public domain for scientific data and information, and ensuring that the necessary policies and infrastructure are in place to enable universal and equitable access to this invaluable resource. The agenda for action has now been formally endorsed by many national science academies and international science organizations around the world.

A special intergovernmental intersessional meeting for WSIS took place in early July 2003 in Paris to refine the draft declaration of principles and plan of action that heads of state will be asked to endorse at the summit in Geneva in December. Several governments, in particular Switzerland, France, and Romania, have embraced the messages from the science community, and science now features in the revised draft declaration. However, there were strong pleas from both the commercial sector and sympathetic governments to strengthen intellectual property rights and copyright regimes even further. Although no one appears to be strongly opposed to the principle of open and equitable access to scientific data and knowledge, that value can easily be relegated to a secondary position relative to short-term commercial interests. Hence, it is crucial that the science community continue to promote the societal benefit of widely shared scientific knowledge. The next preparatory meeting for the WSIS is in Geneva from 16 to 26 September. Our goal is to ensure that science continues to feature strongly in the final drafts of the formal summit documents expected to emerge from that meeting.

The "Science in the Information Society" agenda for action was a starting point. Getting science into the draft governmental documents in July was a significant step forward. What is now needed is for scientists around the world to take up this agenda for action, discuss it, and adapt it where necessary—but most of all, present it to the national government delegations who will be making major decisions on the future of the information society this December. Kofi Annan will be in Geneva. We invite the scientific community to demonstrate its readiness to take up his challenge by championing universal and equitable access to scientific knowledge.

Jane Lubchenco and Shuichi Iwata

Jane Lubchenco (Oregon State University) is president of ICSU; Shuichi Iwata (University of Tokyo) is president of ICSU's CODATA. ICSU and CODATA are based in Paris, France.

EDITORIAL

Science and the Digital Divide

At the launch of the World Summit on the Information Society (WSIS) in Geneva in December 2003, the world community strongly affirmed the central role of science in developing an information society and affirmed the principle of "universal access with equal opportunities for all scientific knowledge and the creation and dissemination of scientific and technical information." The WSIS Declaration of Principles recognized the essential role of the public domain and public institutions such as libraries, archives, and museums in supporting the growth of the Information Society and providing free and equitable access to information.* The WSIS Plan of Action suggested numerous approaches to implement these principles, including "e-science" as a key application of information and communication technologies in support of sustainable development.†

The international scientific community succeeded in raising these issues at WSIS and securing widespread support from participating governments. Now, with the second phase of WSIS taking place in Tunis in November 2005, the scientific community needs to take the lead in demonstrating how science—and universal access to scientific data, information, and knowledge—can make a critical difference in sustainable development and overcoming the "digital divide."

CREDIT: STEVEN HUNT/GETTY IMAGES

The deadly South Asian tsunami in December 2004 and what many have called the "silent tsunamis" of millions of unnecessary deaths and untold suffering from malnutrition, disease, and poverty remind us that science has far to go. Scientists must work not only to predict future hazards and develop new medicines and vaccines, but also to make scientific data and information much more accessible and useful for real-world decision-making. These disasters underscore the need to better understand how societies can best organize themselves to address pressing problems posed by limited resources, conflict, poor infrastructure, and inadequate skills and knowledge. Scientists, the original developers of information and communication technologies, often take for granted their ready access to data and information, software and hardware, and networks of colleagues. But for billions of people, even the most rudimentary access to life-saving scientific expertise and knowledge, such as an early warning or a new cropping method, is a major challenge.

How can the international scientific community help reduce the digital divide? Already, many scientists and scientific institutions are working to improve the reach and effectiveness of science through information and communication technologies. The International Council for Science (ICSU) and its Committee on Data for Science and Technology (CODATA) are collaborating with WSIS to collect and document such efforts (www.wsis-online.net/science/home_EN/). But more needs to be done.

Scientists can support distance education and training; improve the accessibility of information and communication technologies to disadvantaged, marginalized, and vulnerable groups; communicate technical knowledge to the general public; and establish digital libraries, data archives, and other mechanisms to increase access to scientific information. We urge the scientific community to come up with more creative ideas and outcomes. Noteworthy examples on this front include the efforts by the Massachusetts Institute of Technology to provide electronic access to its course materials (http://ocw.mit.edu/index.html) and by the Global Biodiversity Information Facility to make primary scientific biodiversity data openly available (www.gbif.org). The scientific community should also consider new approaches to open electronic access, such as the Science Commons (http://sciencecommons.org), that, among other things, address the complex issue of licensing structures.

Immediately after the South Asian tsunami, critical data on elevation, population location, administrative boundaries, and damage could not be shared because of intellectual property and national security constraints. Even now, the 30-meter-resolution data from the Shuttle Radar Topographic Mission (SRTM) flown by NASA in the year 2000 is not publicly available, although it could potentially provide the best available elevation information regarding most of the world's coasts. The pending decision by the U.S. National Geospatial-Intelligence Agency to prohibit public access to various aeronautical products would be another step in the wrong direction. The scientific community needs to press governments not only to release specific data sets that are vital to disaster management and planning, but also to establish a "good Samaritan" principle for the use of data and information in humanitarian emergencies.

Science helped to create the Information Society—it can now help extend that society to all.

Shuichi Iwata and Robert S. Chen

Shuichi Iwata (University of Tokyo) is president of ICSU's CODATA. Robert S. Chen (Columbia University) is secretary-general of CODATA. CODATA is based in Paris, France.

10.1126/science.1119500

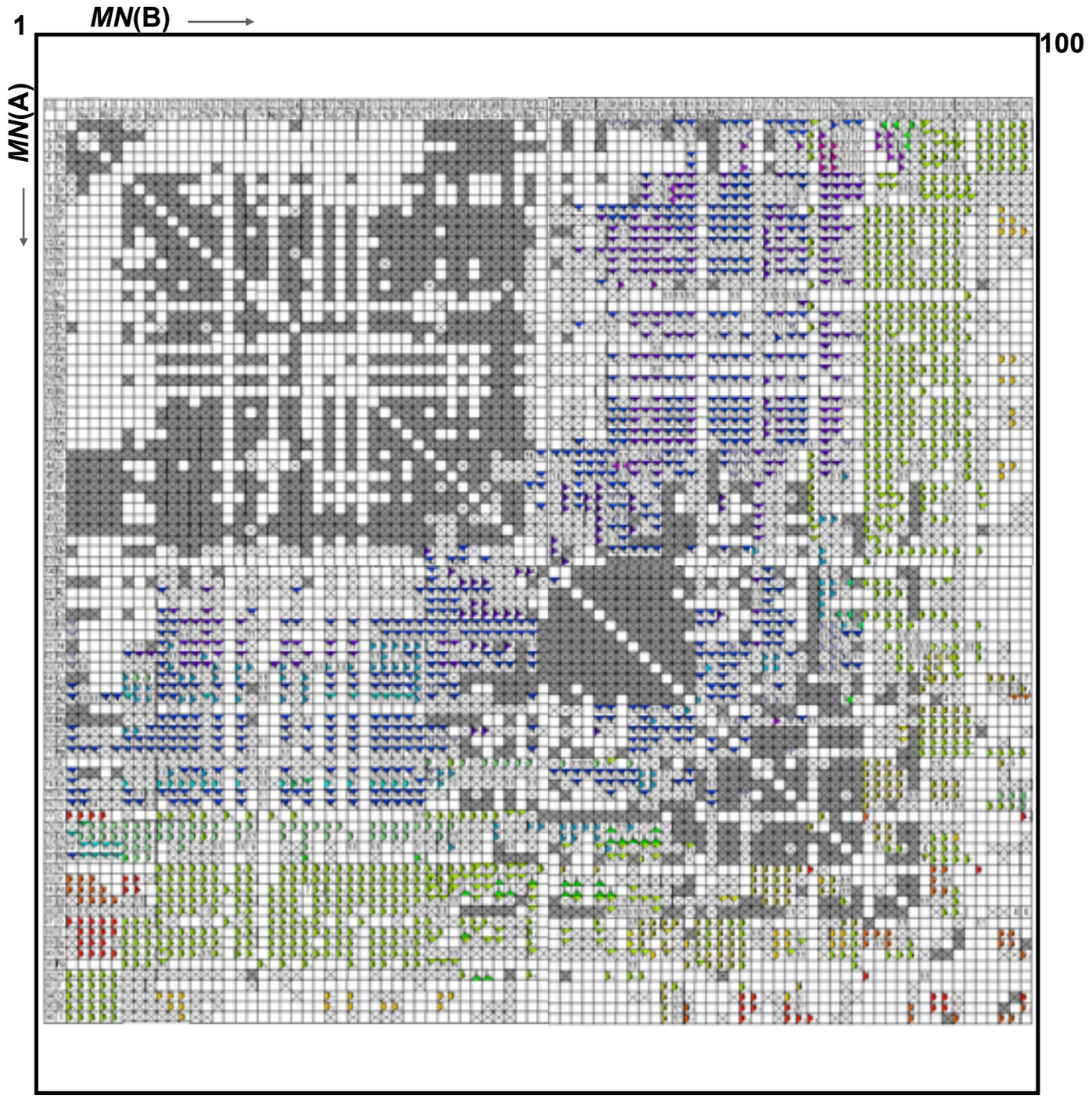
*WSIS, Declaration of Principles (document WSIS-03/GENEVA/DOC/4-E, 12 December 2003). †WSIS, Plan of Action (document WSIS-03/GENEVA/DOC/5-E, 12 December 2003).

Regularity in Binaries

AETs of Compounds

MN(A) *vs. MN*(B) Map for 1:1 Compounds (RT)

- CN 1-3
- CN 4
- CN 6 (-11)
- CN 12 (-13)
- CN 14(-18)
- Non-former
- Former (no 1:1)



http://i.gzn.jp/img/2010/03/02/tribe_war/kw_006.jpg

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語る、作る、使う、そして・・・