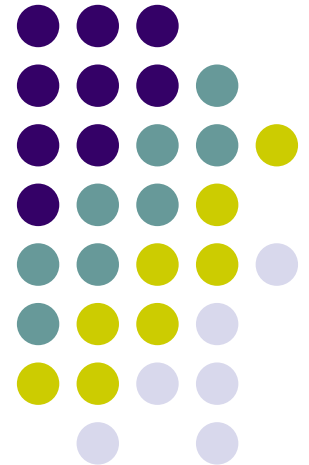


General Introduction of Scientific Data Activities from CODATA International

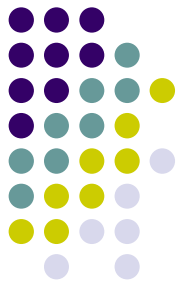
Shuichi Iwata



Focus of Presentation



- **Brief history and objectives**
- **Biggest impact in the last 5 years**
- **CODATA's mandate in the 21st Century**
- **Challenges facing CODATA**



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Established 40 years ago
Today our members include:



- **23 National Members**
- **15 International Unions**
- **4 Co-opted Organizations**
- **20 Supporting Organizations**

What are our objectives?



- The improvement of the quality and accessibility of data, as well as the methods by which data are acquired, managed, analyzed and evaluated, with particular emphasis on digital divide.
- The facilitation of international co-operation among those collecting, organizing and using data.
- The promotion of an increased awareness in the scientific and technical community of the importance of these activities.
- The consideration of data access and intellectual property issues.

Our Tools



- **Task Groups**
- **National Member Activities**
- **International Conferences**
- **Peer Reviewed Electronic Science Journal**
- **Publications**
- **Workshops**
- **Studies and Reports**
- **Co-operation and liaison with other Interest Groups**



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Briefly



- ICSU/CODATA UNESCO Symposium 2003 March
- J.Lubchenko and S. Iwata: "Science and Information Society", Science 301, 12 September 2003, 1443.
- WSIS Geneva 2003 December
- CODATA 2004
- CODATA UNESCO Symposium 2005 September
- S. Iwata and R. Chen : "Science and the Digital Divide" , Science 310, 21 October 2005, 405.
- WSIS Tunis
- CODATA 2006



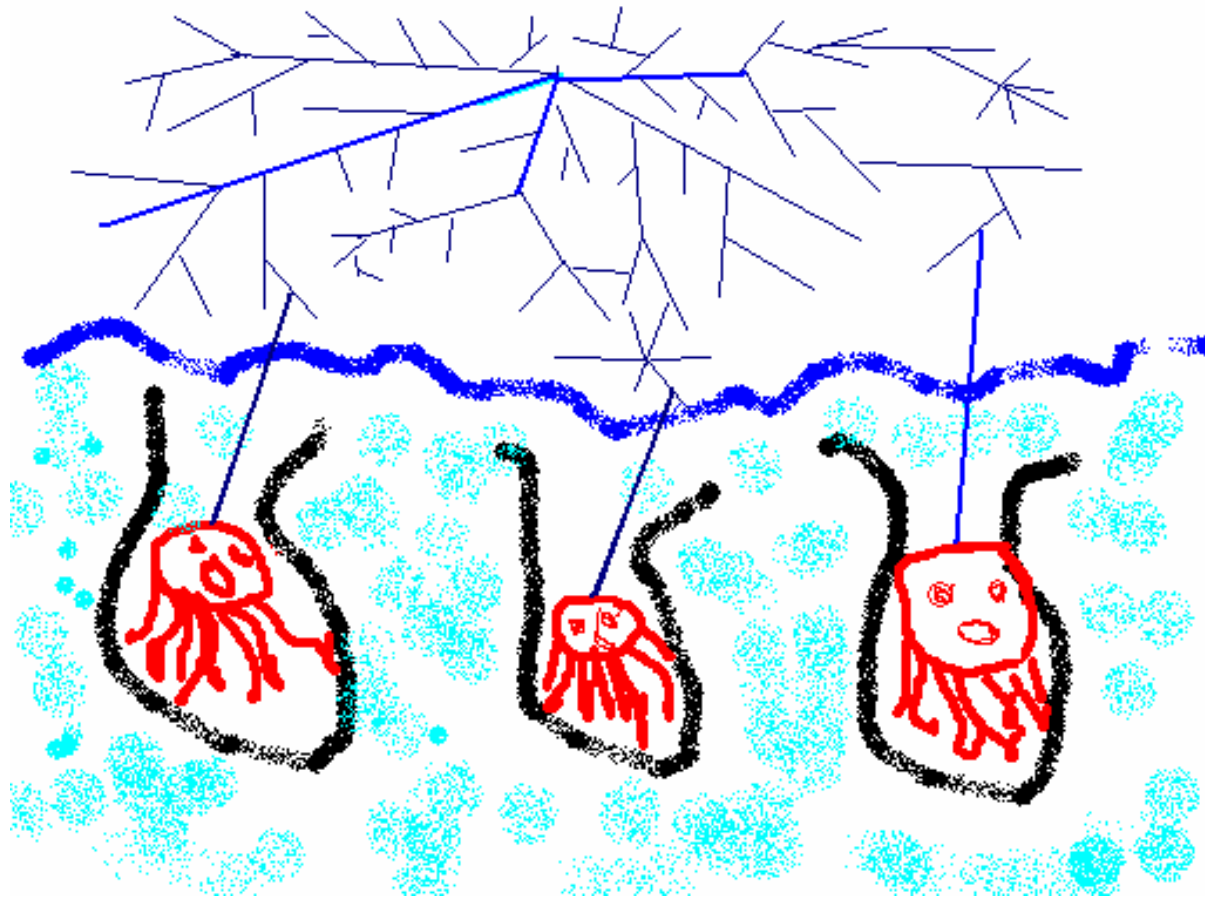
Our Understanding

- The speed to get and transfer data
- The emergence of new quantities and qualities of data
- The growing diversity and richness of data

We now require the creation of innovative mechanisms for handling and sharing data as “public goods” of/for/by human beings

These magnificent changes are the target of a converging CODATA experience, including success stories and mistakes, since its start in 1966

Linkages of specialized domains through data and IT



Differences-Mass Production of Data



Regularity in Binaries

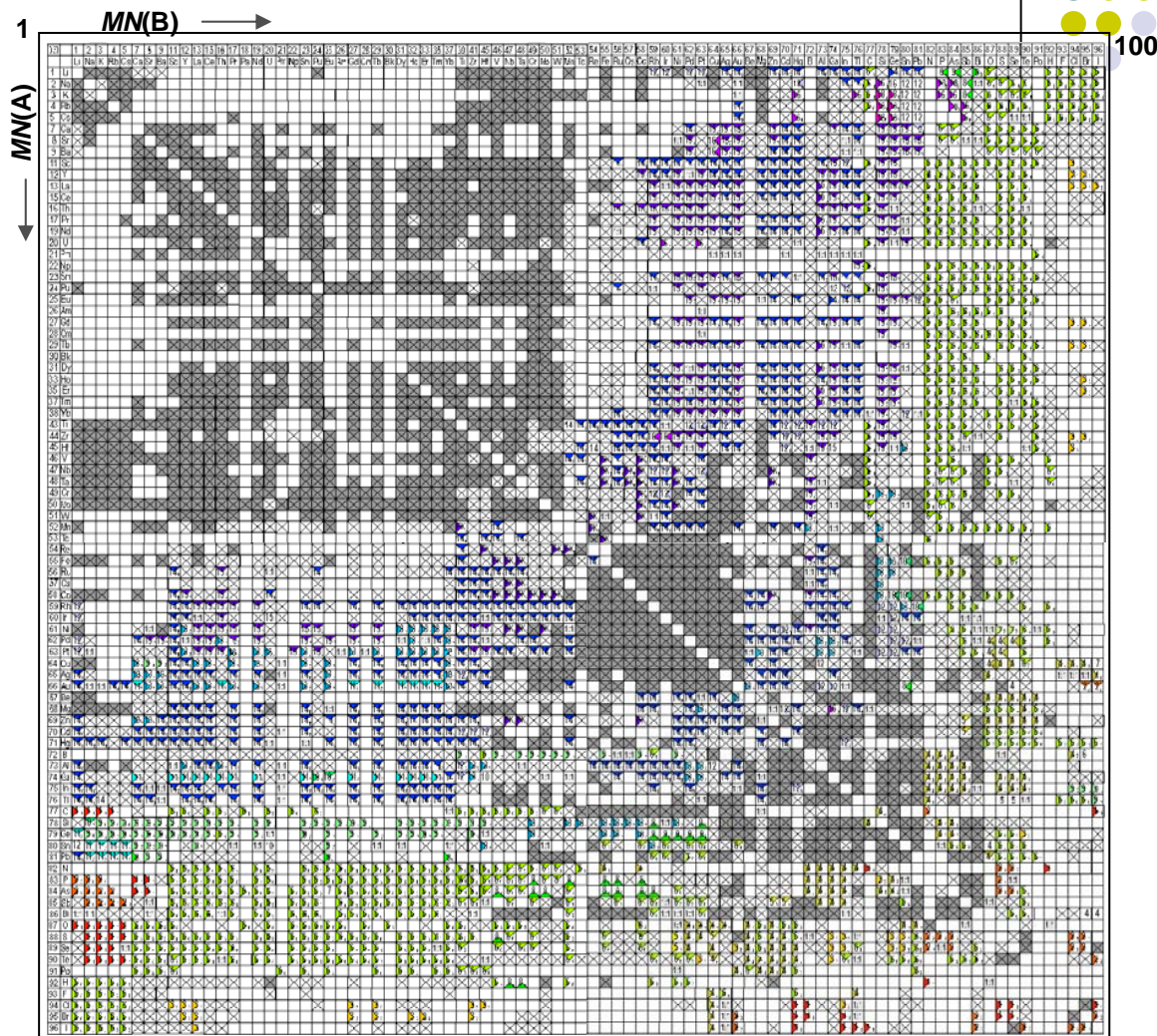
AETs of Compounds



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

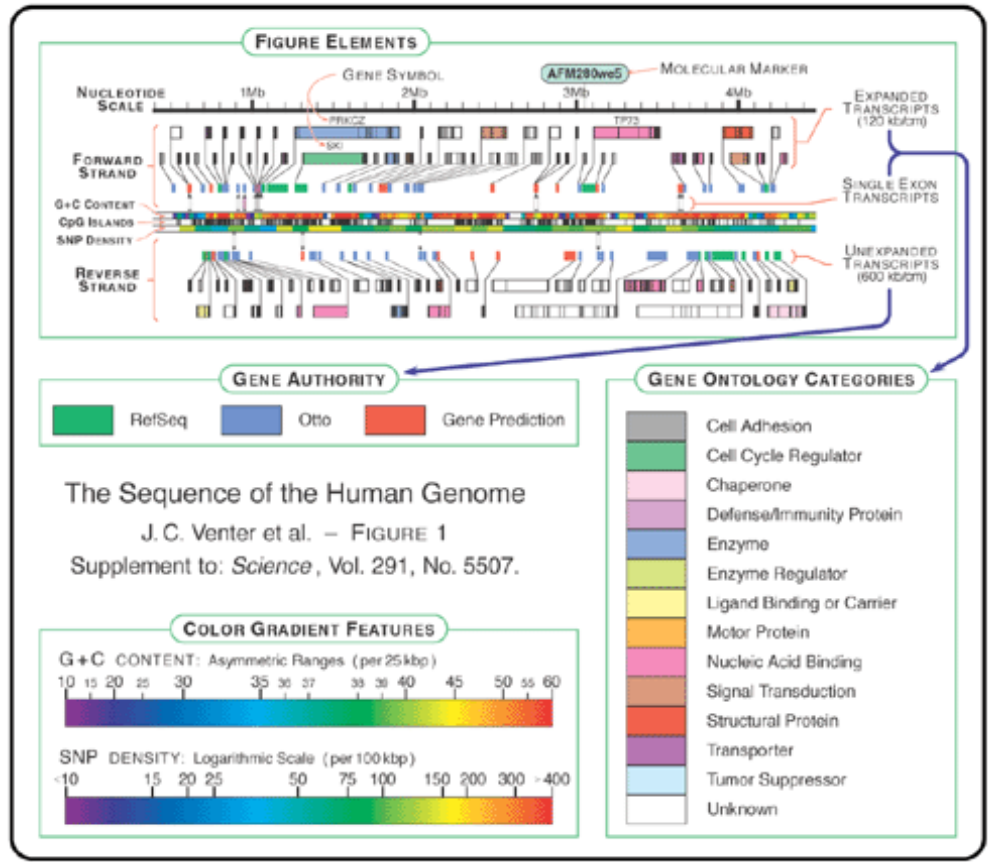
- CN 1-3
- CN 4
- CN 6 (-11)
- CN 12 (-13)
- CN 14(-18)
- ⊗ Non-former
- ⊗ Former (no 1:1)

non compound formation 724	no AB compound formed 544	1:1 AB without structure data 70
single atom 43	dipole 31	linear or dumb-bell 2
triangle, center outside 44	tetrahedron 101	square, center inside 8
square pyramid 2	tetragonal bi-pyramid 2	octahedron 615
octahedron + trigonal prism 8	trigonal prism 76	equatorially mono-capped trigonal prism 2
cube or square prism 3	distorted square anti-prism 6	double anti-bigonal prism 22
equatorially bi-capped trigonal prism 74	equatorially bi-capped square prism 2	polarity bi-capped square anti-prism 4
full-capped trigonal prism 15	pseudo Frank-Kasper (13) 12	Frank-Kasper (12) 12
cuboctahedron 30	anti-cuboctahedron 7	pseudo Frank-Kasper (13) 88
rhombic dodecahedron 540	Frank-Kasper (15) 8	equatorially five-capped pentagonal prism 209
Frank-Kasper (16) 211	defective eight equatorially capped pentagonal prism 4	pseudo Frank-Kasper (16) 8
Frank-Kasper structures 41		



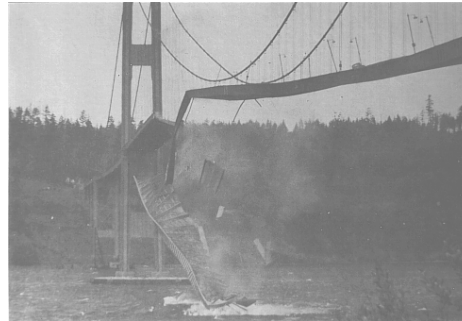
100

Human-beings : Homo sapiens, -faber, -ludens, loquens, oeconomicus



The Sequence of the Human Genome
 J.C. Venter et al. – FIGURE 1
 Supplement to: *Science*, Vol. 291, No. 5507.

Lessons from Failures





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21st Century CODATA Mandate -Data Science for Society-



- **Data archiving and preservation**
- **Data access issues, including intellectual property rights ensuring data accessibility balancing public needs and economic growth**
- **Data and society (including policy and decision making)**
- **Data in e-science environment**
- **Data management in science and technology and data quality**
- **Data publications**

Task Group



- ANTHROPOMETRIC DATA AND ENGINEERING
- LOW DIMENSIONAL (INCLUDING NANO SCALE) MATERIALS AND TECHNOLOGIES DATA NETWORK
- DATA INFORMATION AND VISUALISATION
- DATA SOURCES IN ASIAN-OCEANIC COUNTRIES
- ACCESS TO BIOLOGICAL COLLECTION DATA (ABCD)
- GLOBAL SPECIES DATA NETWORKS
- PRESERVATION OF AND ACCESS TO SCIENTIFIC AND TECHNICAL DATA IN DEVELOPING COUNTRIES
- VIRTUAL LABORATORIES IN EARTH PHYSICS AND ENVIRONMENTAL SCIENCES
- DATA ON NATURAL GAS HYDRATES
- FUNDAMENTAL PHYSICAL CONSTANTS

Data and Society



- **Medical Health Data-SARS, AIDS, Birds Flu and Future unidentified dangers which will require on time remedy based on available data.**
- **Natural Disasters/Seismic Data/Big Accidents**
- **Environmental Data for Decision Making for Sustainable Development**

Success Stories of CODATA over the last five years



- CODATA Fundamental Physical Constants
 - Major revision; processes put in place to make future reassessments easier
- Biodiversity
 - CODATA Task Groups and interactions with other international groups facilitated establishment of GBIF
- Data archiving
 - Work has led to concrete cooperative projects to establish archiving principles
- Data access
 - CODATA leadership has brought together many fragmented efforts leading to a focus on what is best for science
- Involvement of developing nations
 - By workshops, free internet journal, new country members, new task groups, CODATA helped make modern data work accessible

Focus of Presentation

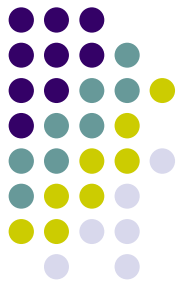


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Issues on the digital divide



- How to bridge the gaps among different disciplines, generations, principles, languages, nations, cultures, religions,?
- Something beyond Traditional Science & Engineering
 - Starting with data



CODATA Direction

- Better collaboration through data
- Requires better articulation of issues of mission, importance and feasibility through data
- And consequently,
New Projects + Finance = Implementation

Data and Models



- Uncertainties in data and models
- Fusion of data and models
 - Beyond dichotomy
 - Theory/experiments→modeling
 - Ad hoc modeling
 - High performance computing
 - Peta flops challenge
- Data on demand
- Virtual Experiment/Laboratory/Reality
 - Research/education→e-Science/e-Learning

Differences-Society



- **We should not be divided into developed countries and developing countries, but we are developing our common futures together with the gifts from friends, i.e., data & knowledge.**
- **We need to work together.**

Essential changes are



- Actors and actresses in S/T are not only experts but people in general in the information era.
- *Techno-democracy by IT may emerge as a new relation between people and S & T and experts are the people who can show exemplars for the people and help people to do it by themselves.*

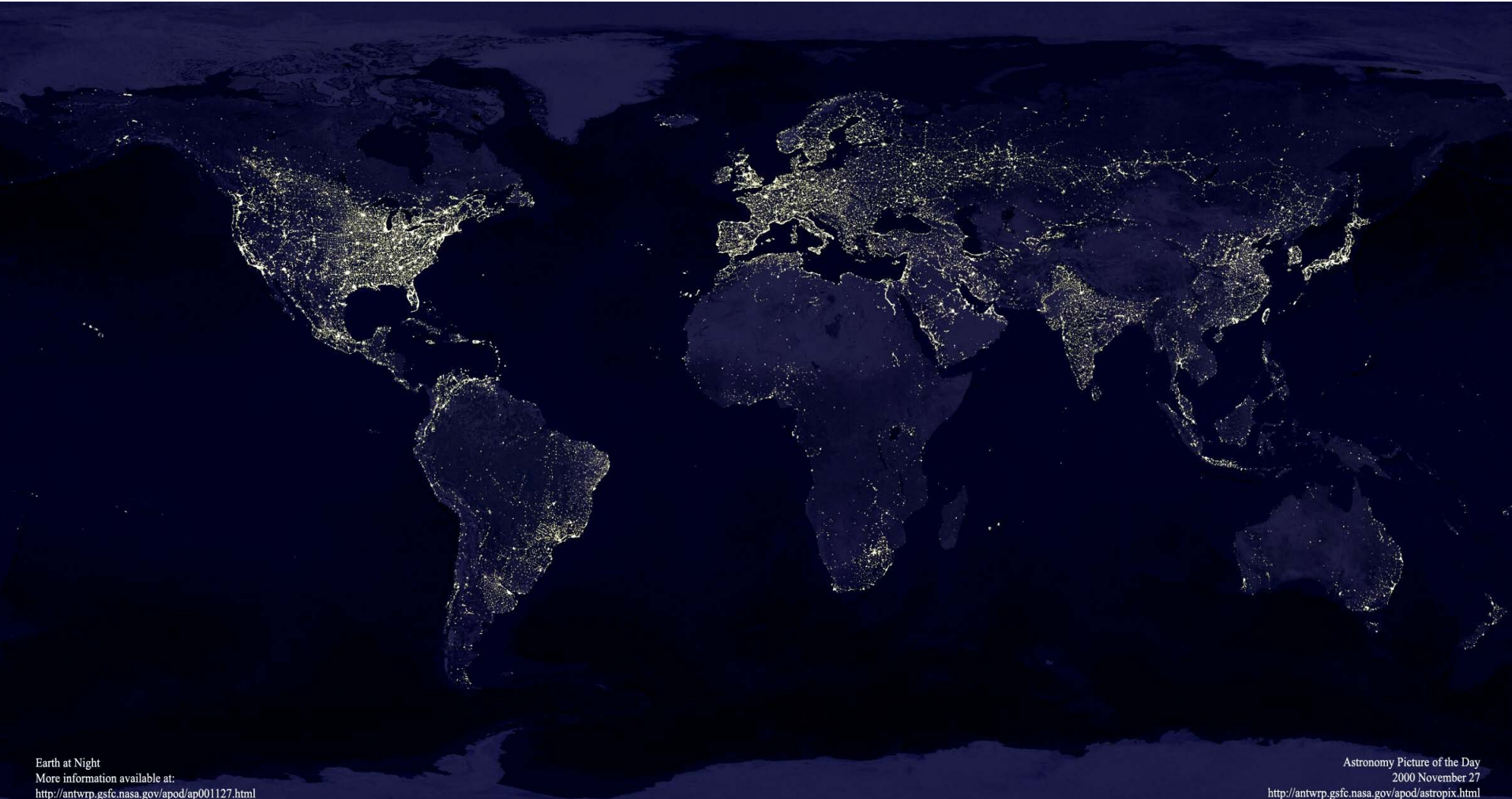
FAIR COMPETITION!

Explicit Data and Tacit Knowledge

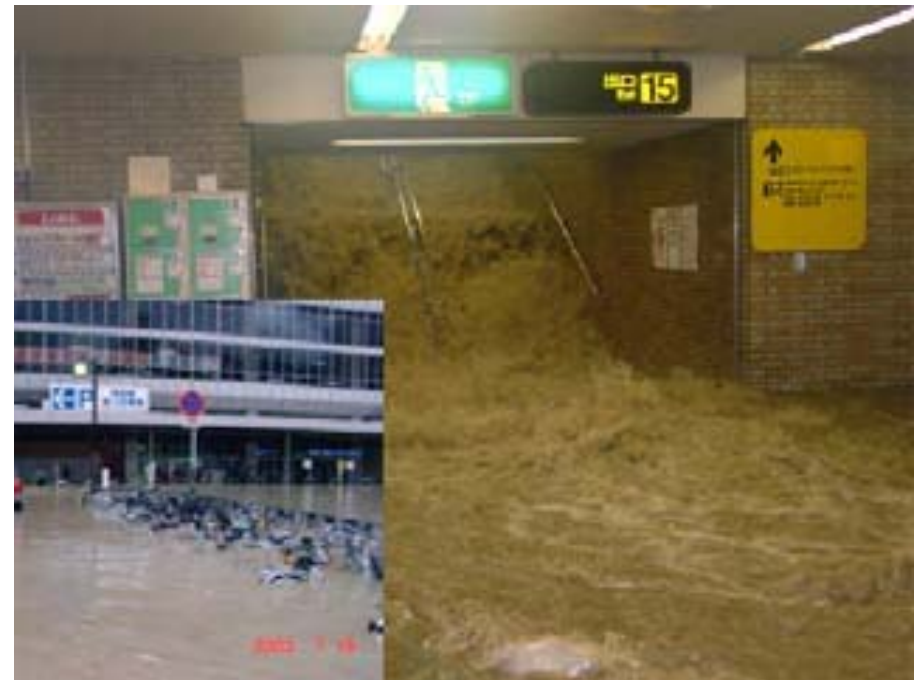


- Fundamental Constants,
- Interatomic Potential,, Free Energy, ...
- Protein Structure,
- Climate Change,
-
- Knowledge with different expressions
- Knowhow(Data+Model+Evaluation+Procedure+...)
- Complementary Set

We have been emerging with mistakes and successes,
and we need to make our experiences into public goods.
It starts from our collaboration fighting against public bads!



Floods





August 15, 2002 Oregon (AP)



(AP PHOTO)

August 10, 2002



(AP PHOTO)



(AP PHOTO)

August 11, 2002

Starvation



(CNN)

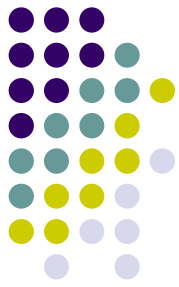


Starvation

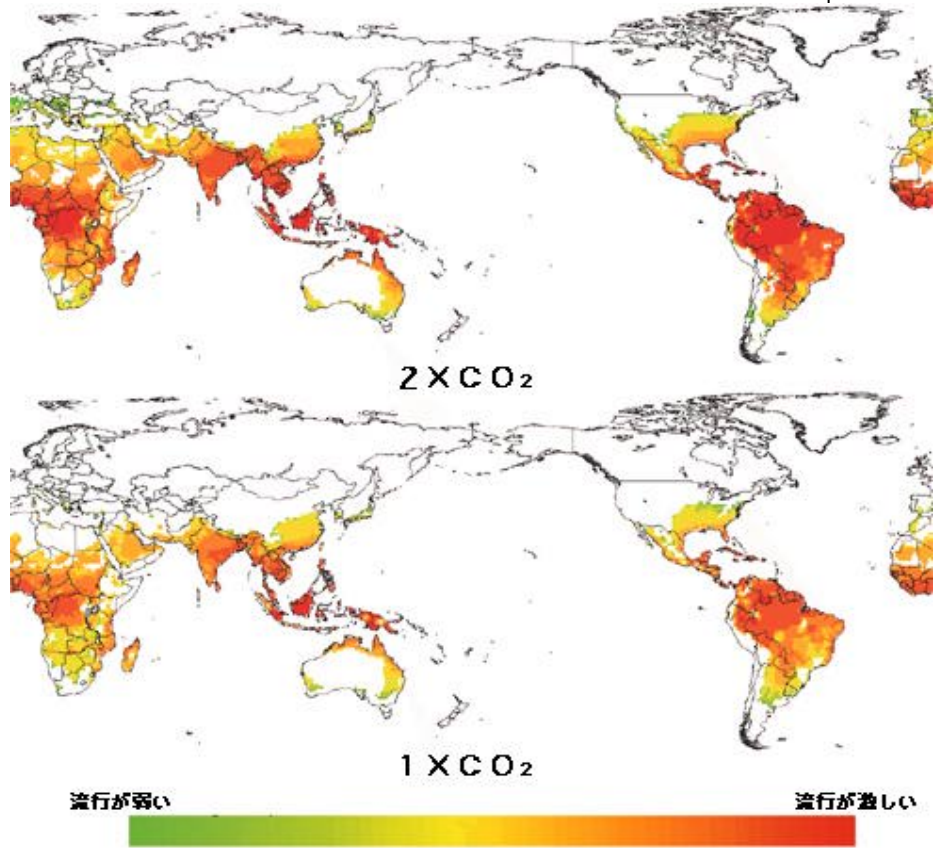


Water Shortage



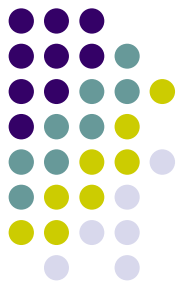


Desertification and Refugee

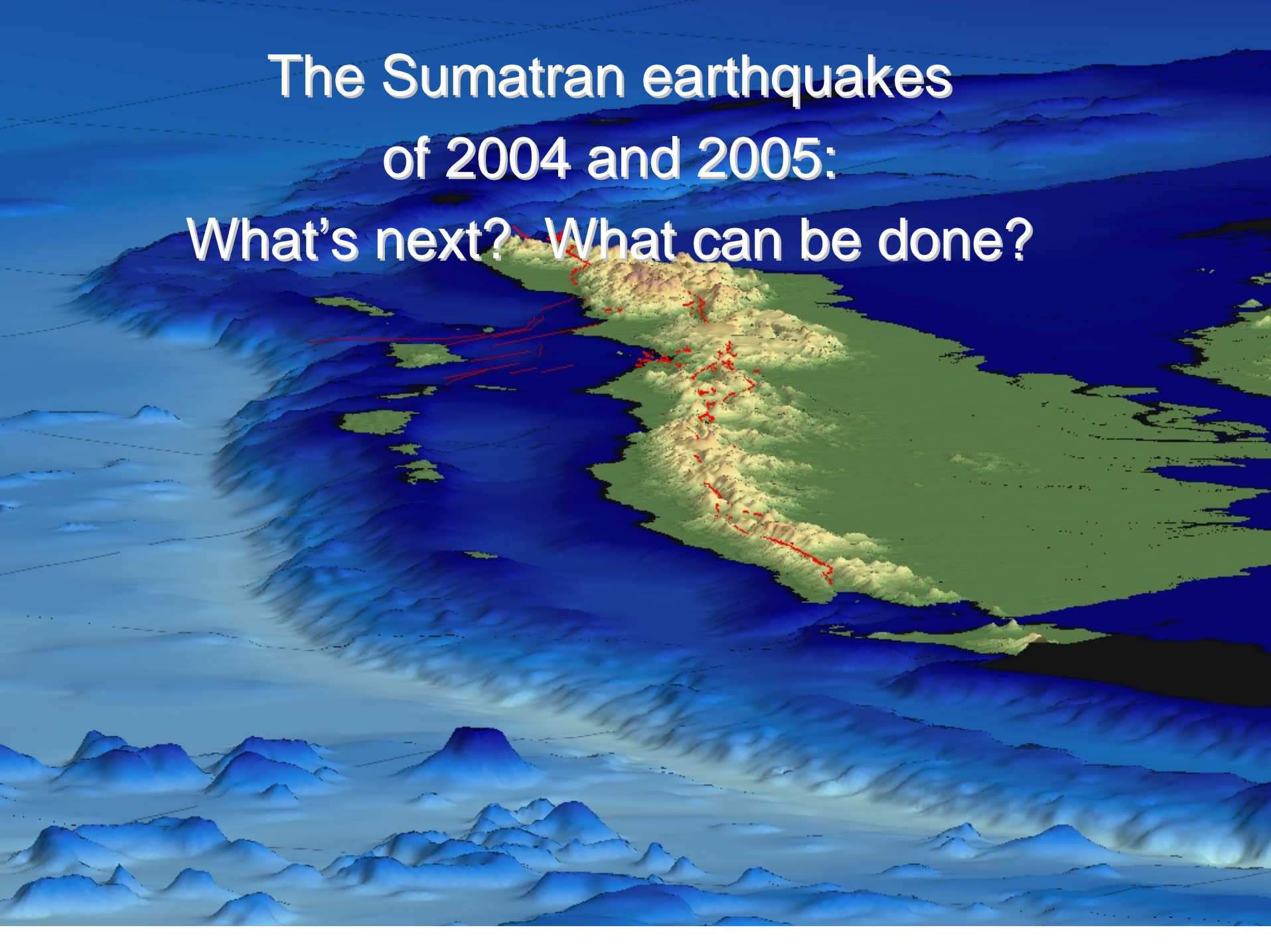


Malaria and Climate Change

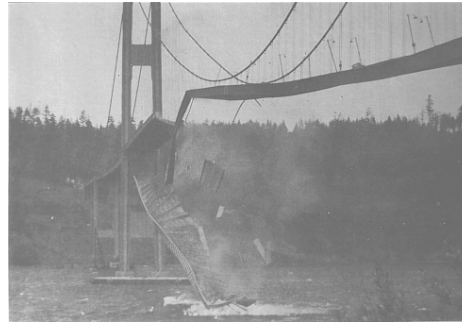
Refugee



The Sumatran earthquakes
of 2004 and 2005:
What's next? What can be done?



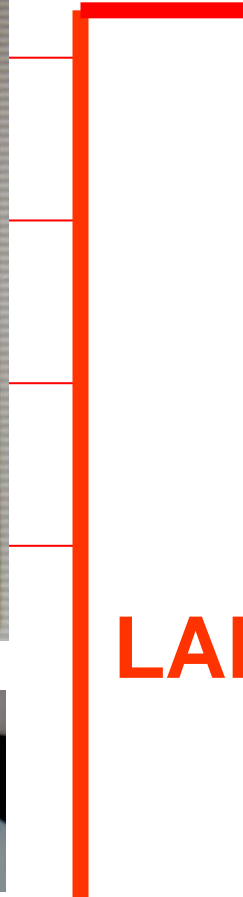
Lessons from Failures



System of collected surgical events



Strategic desk

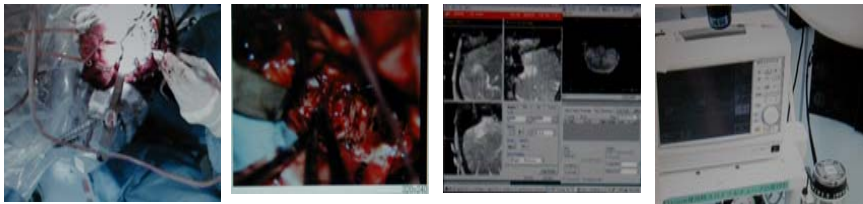


LAN

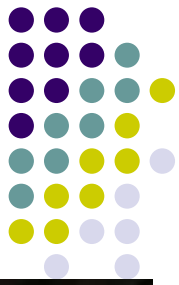


VPN-LAN

Surgical events recording server



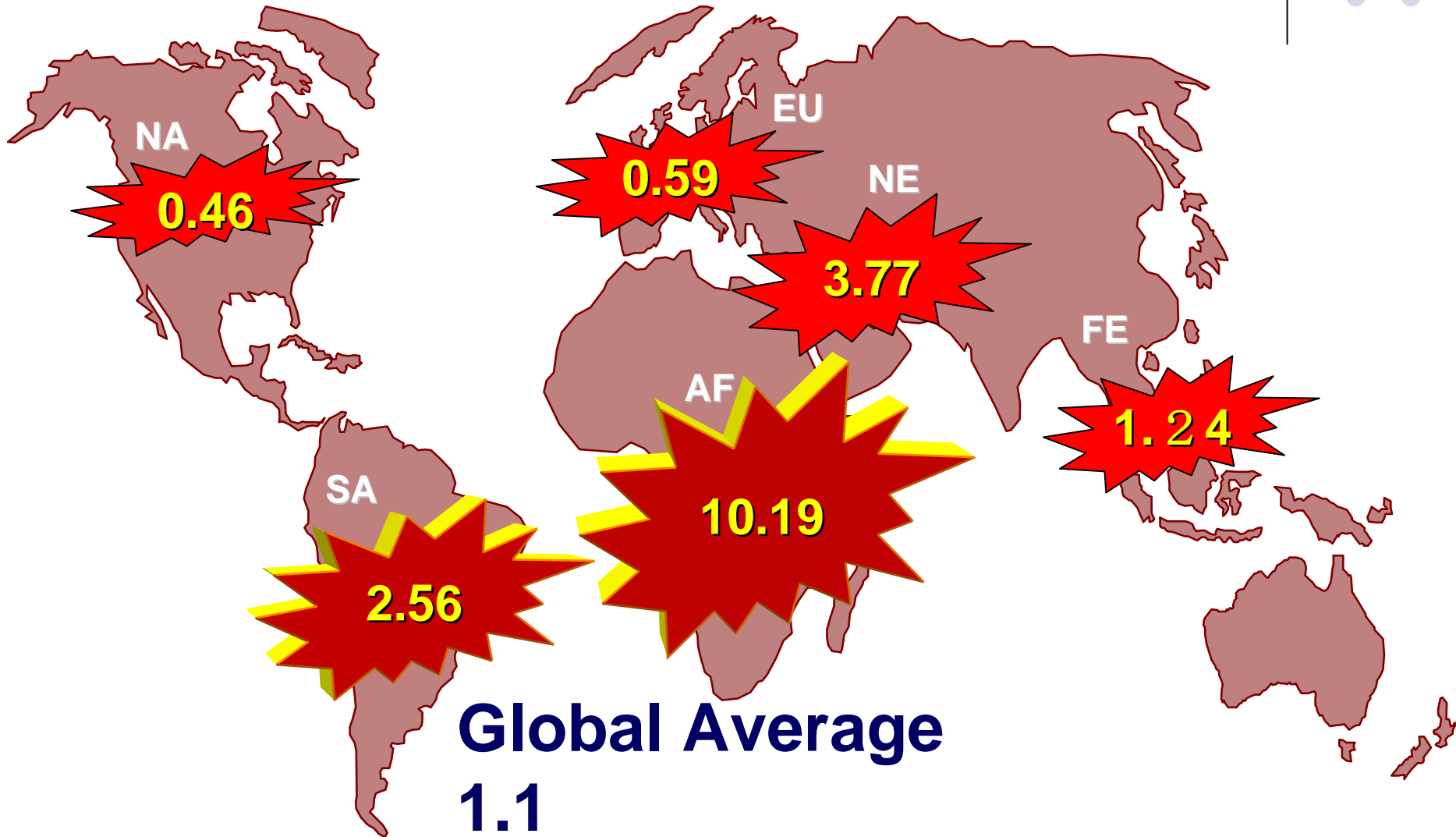
Human Dimensions

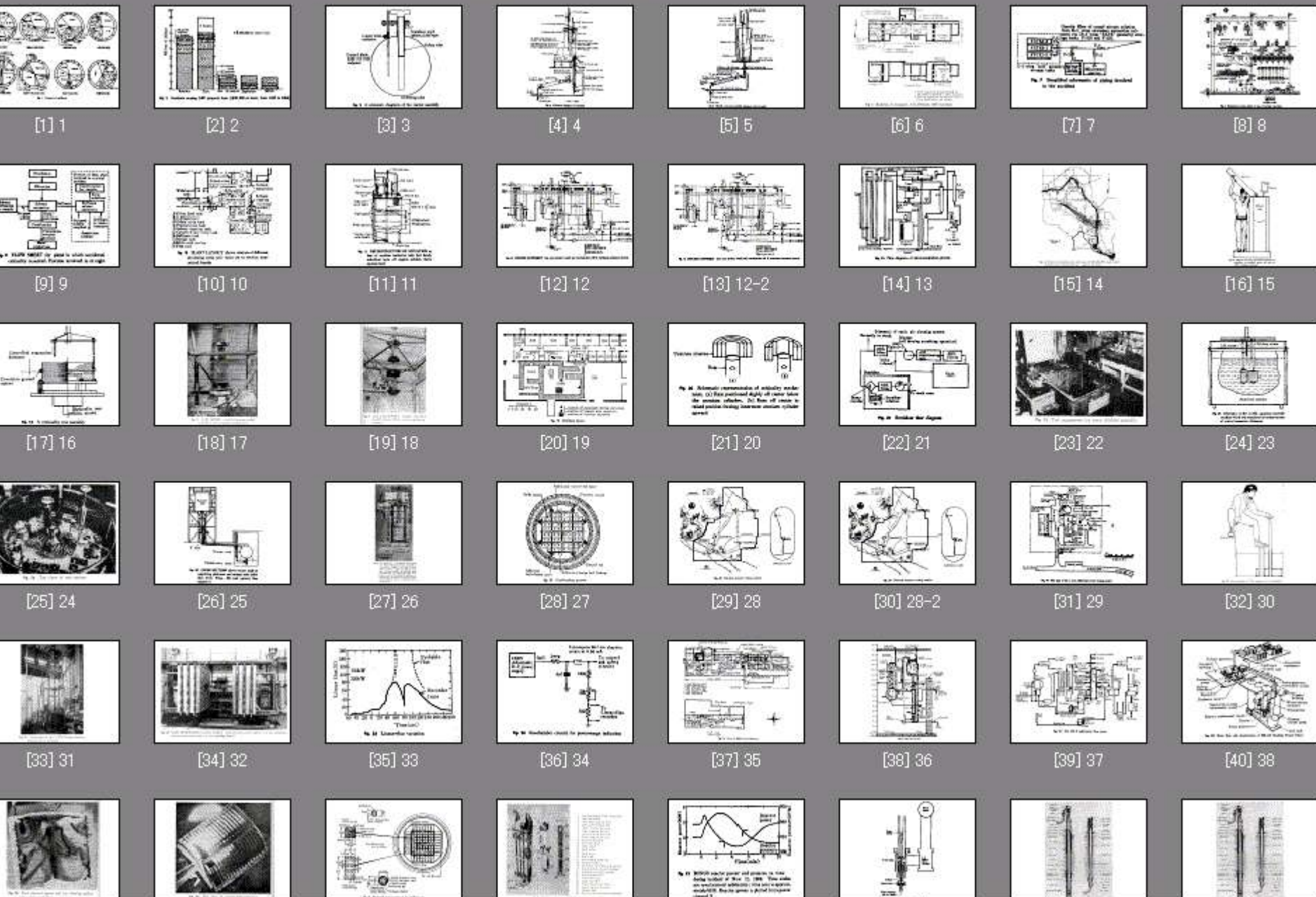


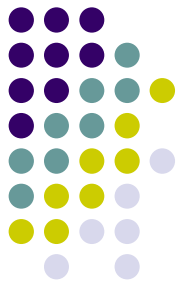


(1994-2003)

Hull Losses per Million Sectors by IATA Region







We are repeating mistakes.
Is it our intrinsic feature?

To be brave enough for
making challenges
(=mistakes and/or
challenges) .

Successes by total quality
control let people stop
thinking together and
differently.

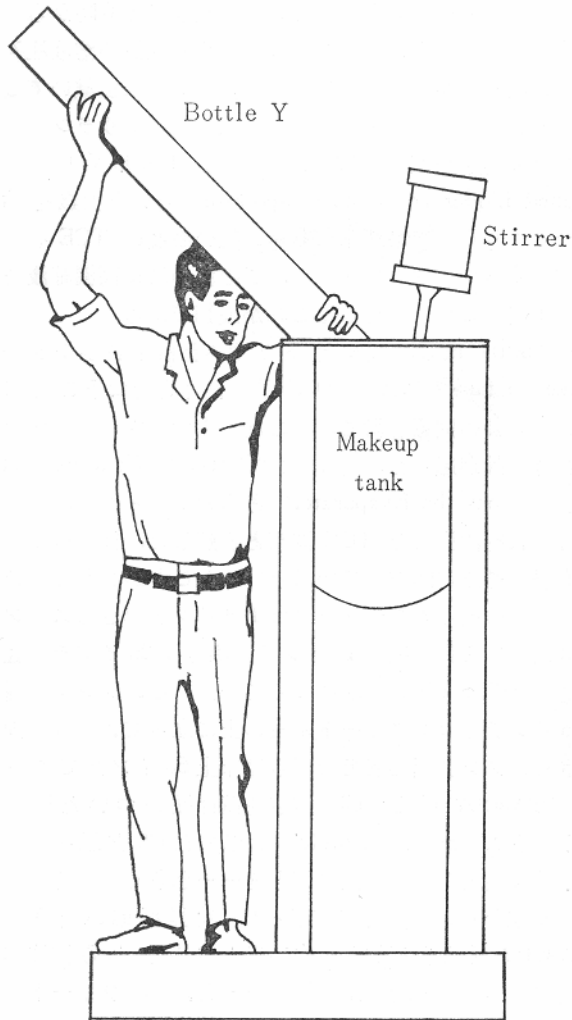


Fig. 15 Diagram showing approximate location and orientation of exposed person and tank in which excursion occurred

How to go beyond a domain differentiated discipline
ensuring universal access to scientific knowledge ?



The Goals

Eradicate extreme poverty and hunger

- Reduce by half the proportion of people living on less than a dollar a day
- Reduce by half the proportion of people who suffer from hunger

Achieve universal primary education

- Ensure that all boys and girls complete a full course of primary schooling

Promote gender equality and empower women

- Eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

Reduce child mortality

- Reduce by two thirds the mortality rate among children under five

Improve maternal health

- Reduce by three quarters the maternal mortality ratio

Combat HIV/AIDS, malaria and other diseases

- Halt and begin to reverse the spread of HIV/AIDS
- Halt and begin to reverse the incidence of malaria and other major diseases

Ensure environmental sustainability

- Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources
- Reduce by half the proportion of people without sustainable access to safe drinking water
- Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020

Develop a global partnership for development

- Develop further an open trading and financial system that is rule-based, predictable and non-discriminatory. Includes a commitment to good governance, development and poverty reduction—nationally and internationally
- Address the least developed countries' special needs. This includes tariff- and quota-free access for their exports; enhanced debt relief for heavily indebted poor countries; cancellation of official bilateral debt; and more generous official development assistance for countries committed to poverty reduction
- Address the special needs of landlocked and small island developing States
- Deal comprehensively with developing countries' debt problems through national and international measures to make debt sustainable in the long term
- In cooperation with the developing countries, develop decent and productive work for youth
- In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries
- In cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies

One step forward



- Domain Differentiations
 - Semantic Web
 - Ontology
 - Transfer Model
- Knowledge and Knowing
 - Interface/Affordance
- GICSI
 - Case Studies & Exemplars
- Mission(important issues for us all) vs. Incentive
 - Big Science vs. Small/Besides Science
 - How to deal with long tails for individual cares-exemplars and paradigm shifts

Digital Divides



- Haves vs. Not-haves
- Connection and Solution
- Universal access with equal opportunities for all to scientific knowledge and the creation and dissemination of scientific and technical information—fair competition.
- Leading and catching up
- Restructuring to keep activities
- Dynamics and Diversities in solutions



Village of 100 persons

52 women/48 men

30 children/70 adults/7 elderly persons

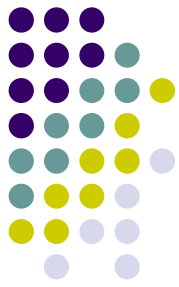
**61 Asian/13 African/13 Americans(NS)/12 European
Others Oceania**

20 inanition/1 dying/15 too fat

6 Americans have 59% of wealth

74 others share 39% of wealth

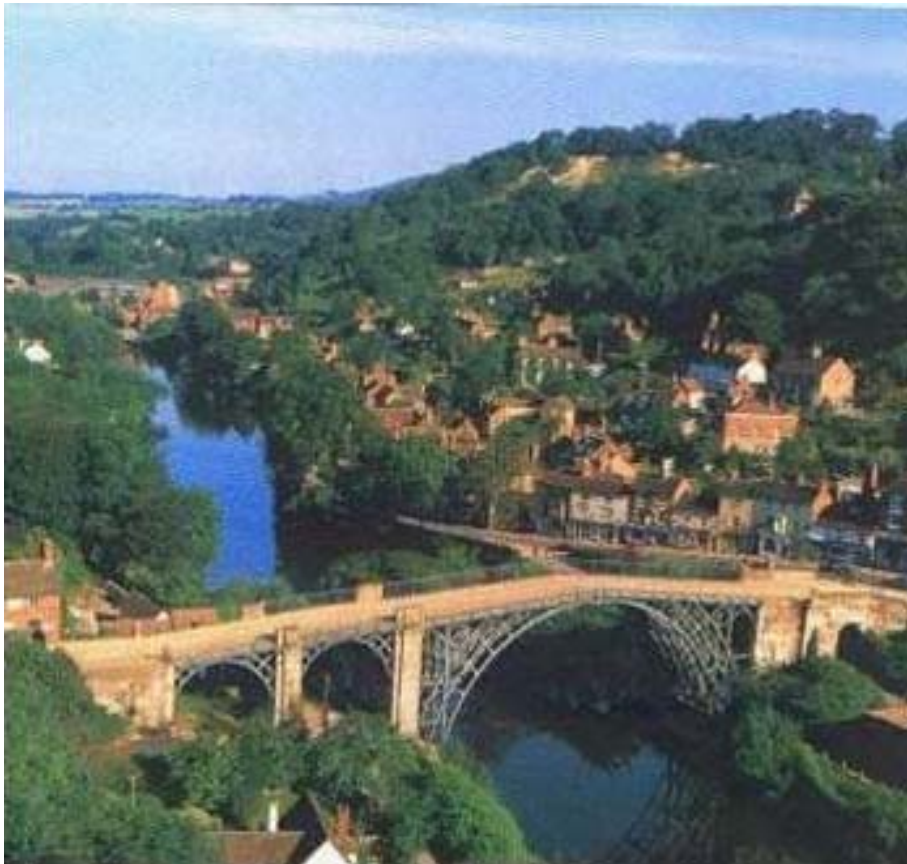
20 share 2% of wealth



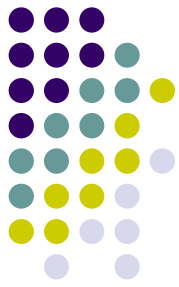
Data Activities in General

- Databases everywhere, but not well organized.
 - Many databases, but too many duplications
 - Less interoperability
 - Necessity to make practically useful interface
 - Piecewise
 - How to integrate for ad hoc application
 - Positive incentives to go beyond “collection”
- **Next : Long Tail Possibilities Individual Cares**

Revolutions and evolutions



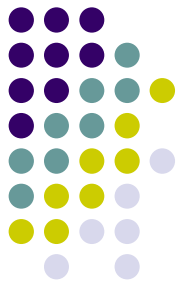
Ken Tomabechi



Working Hypothesis

- Data Science
 - Friendly interface for many sciences!
- Design Science
 - Value extraction/design/creation from data
- Management Science
 - Knowledge(Physics, Chemistry, Mathematics, Technology)
 - Environment(Nature, Artifact, Human beings)
 - Society(Politics, Economy, Sociology)

Components : Mind Sets in E-Science



Data Science

- **Universality**
 - Data for everyone
 - Sharing, standards, metadata, interoperability,
 - Data of no one
 - Equitable, universal, open, ...access
- **Individual Care-establishing service channels**
 - Data services for each person and each context with appropriate expression, timing and contents.
 - Differences of individuals are the key for evolutions.

Let's work together from now!

- Complementary Set

Data Science is not pursued as an end in itself, but as a means to the attainment of wisdom as human.

