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That one step will shift the future.

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INTERNATIONAL SYMPOSIUM

Days on Safety, Health & Well-being for All

Expo & Intex - Osaka, Kansai, Japan

16 to 19 July 2025

Global Crises, Youth and Education: Innovative Approaches to Risk, Resilience and Resonance

THE GLOBAL INITIATIVE FOR SAFETY, HEALTH & WELL-BEING
Safety Health Well-being For All
OSAKA KANSAI 2025

The Science of Societal Safety – its Principle and Education

Mamoru Ozawa, Prof. Emeri., Kansai University

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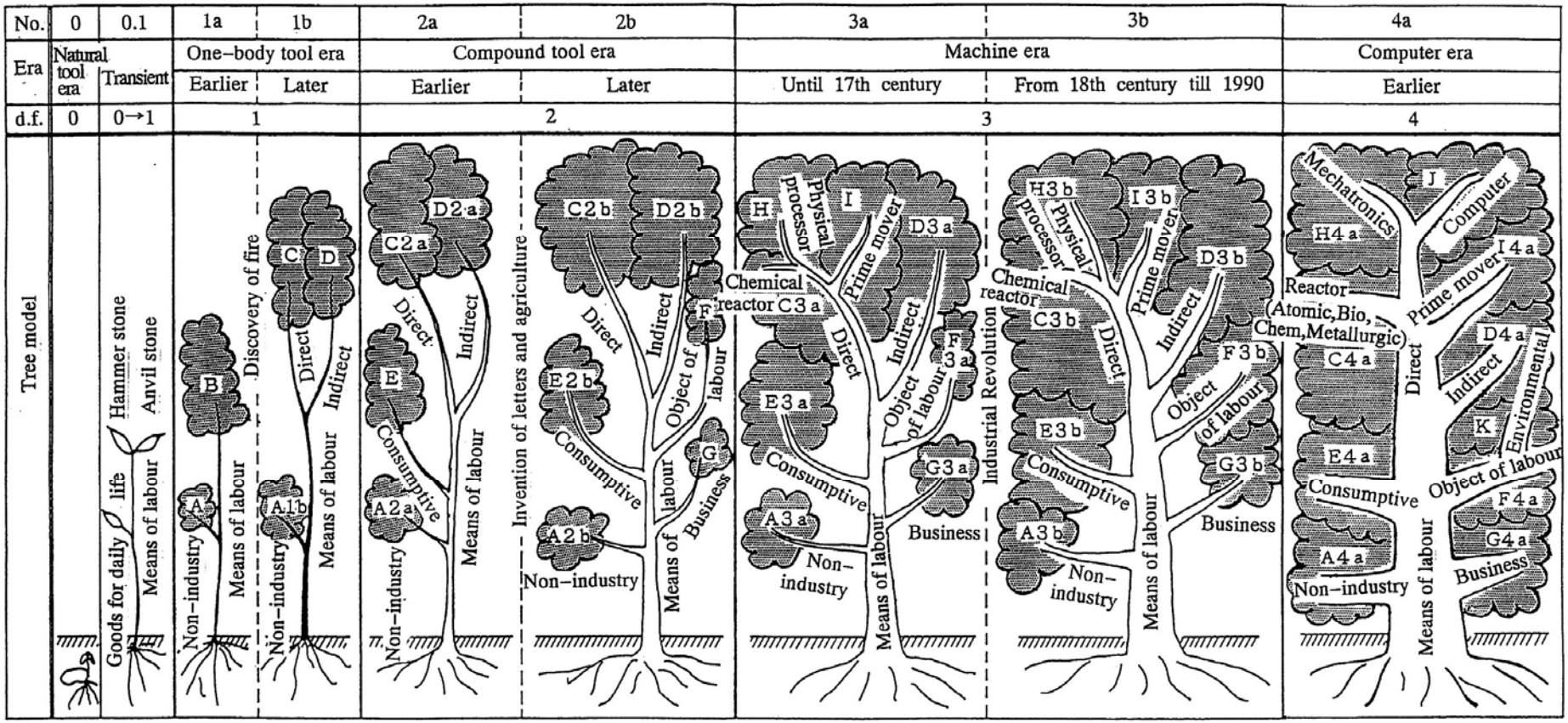
With the advancement of human civilization, complexity has progressively increased across a wide range of fields, including society, industry, and culture.



S. Ishigai, Steam Power Engineering, Cambridge, New York, 1999

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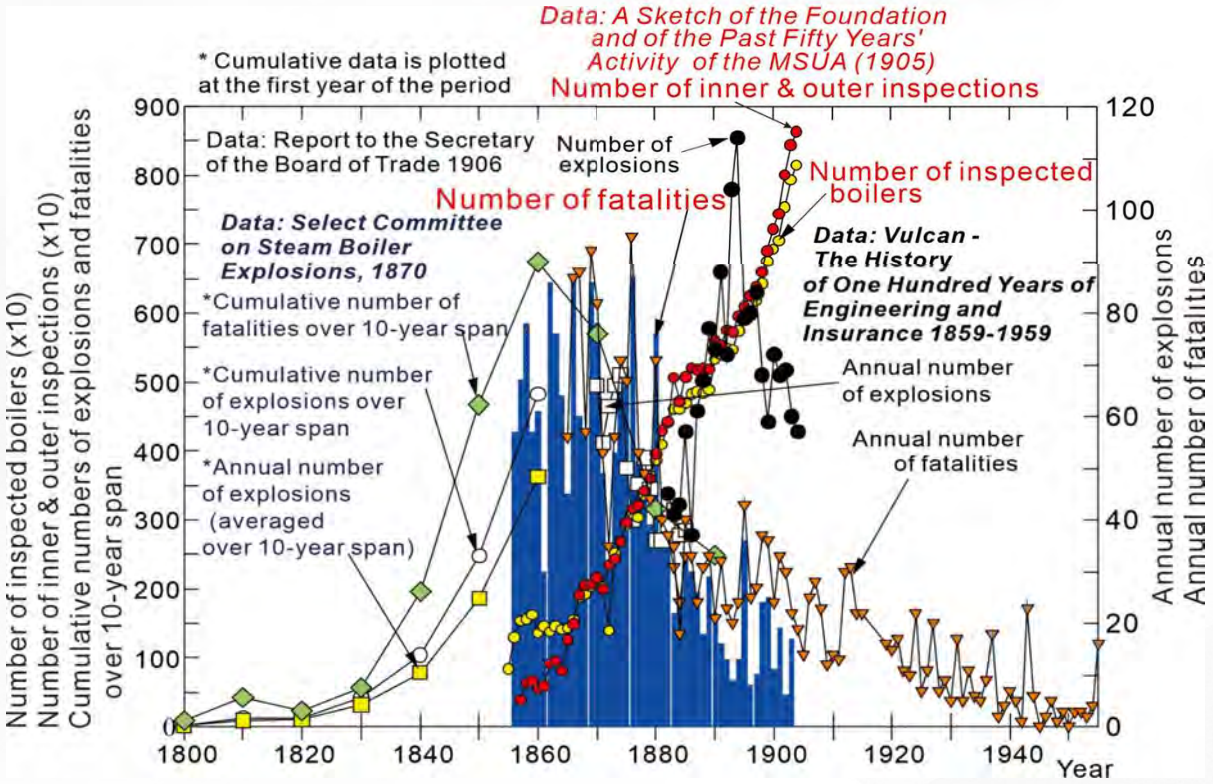
The advent of the Industrial Revolution brought a marked increase in boiler explosions.

Alongside technological advancements, social systems were introduced as countermeasures against boiler explosions.



Number of boiler explosions and fatalities in UK

One representative example is the introduction of third-party inspection systems, complemented by insurance mechanisms to mitigate associated risks

Historical example

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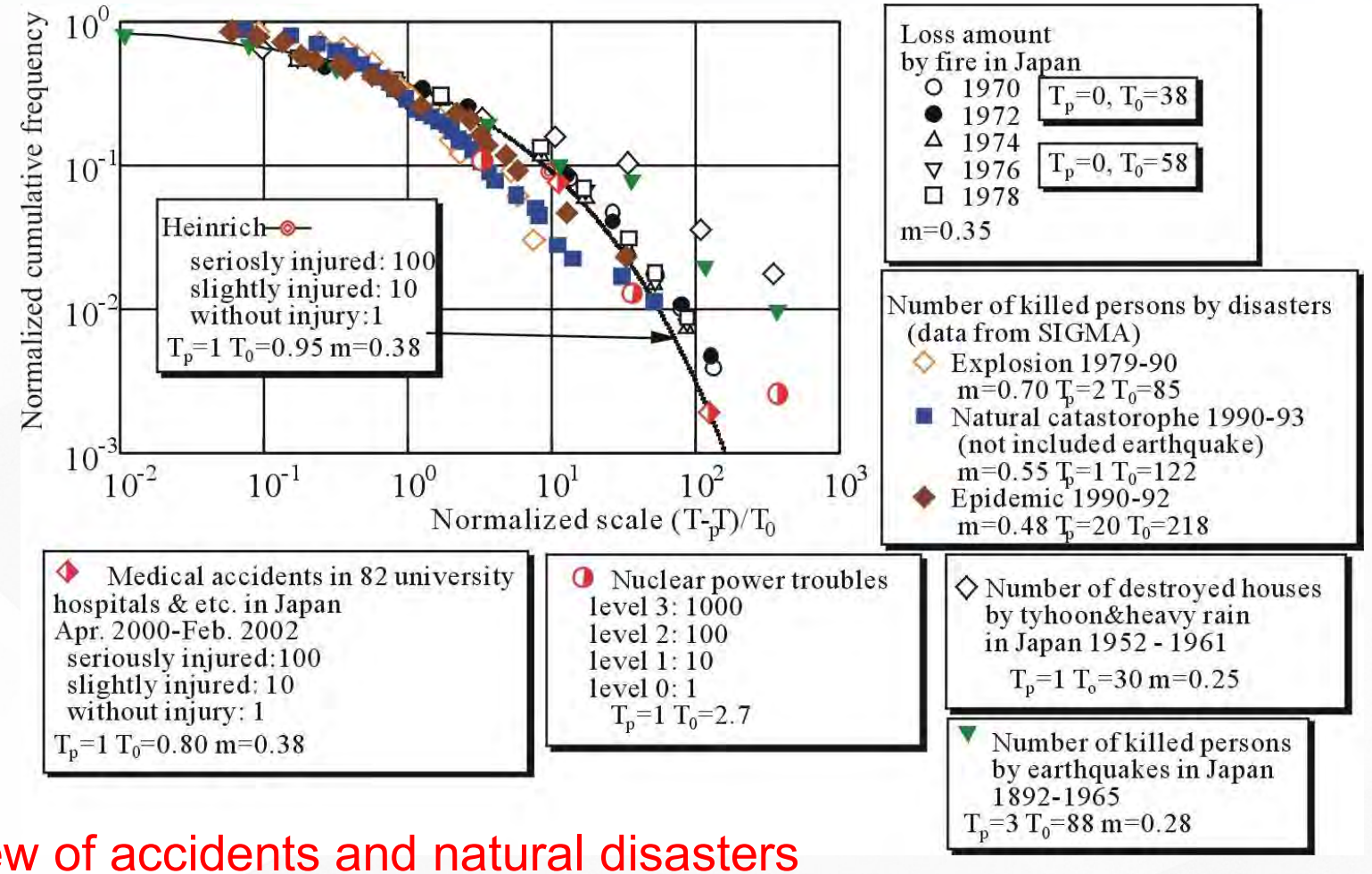
Accidents and natural disasters can be characterized by comparable probability distributions when analyzed in terms of their scale and frequency.



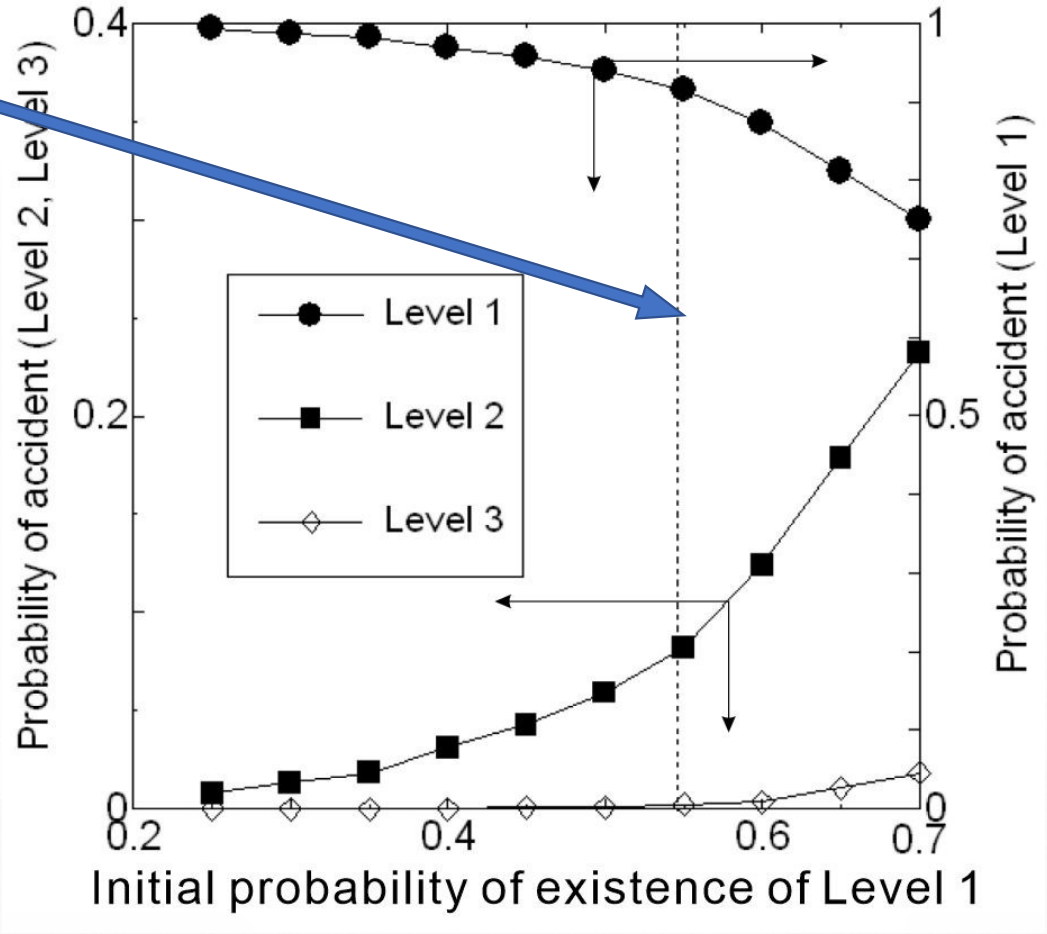
Statistical view of accidents and natural disasters

Heinrich's law:

Behind every serious accident (Level 3), there are typically 29 minor accidents (level 2) and 300 near-miss incidents (level 1).

The time evolution leading to a final severe accident is simulated using a pattern dynamics approach based on the Cellular Automaton method, a metaphor model that simplifies complex interactions with the surrounding environment into local neighborhood rules.

Reducing initial probability of level 1 could lead to a shift in the probability distribution.



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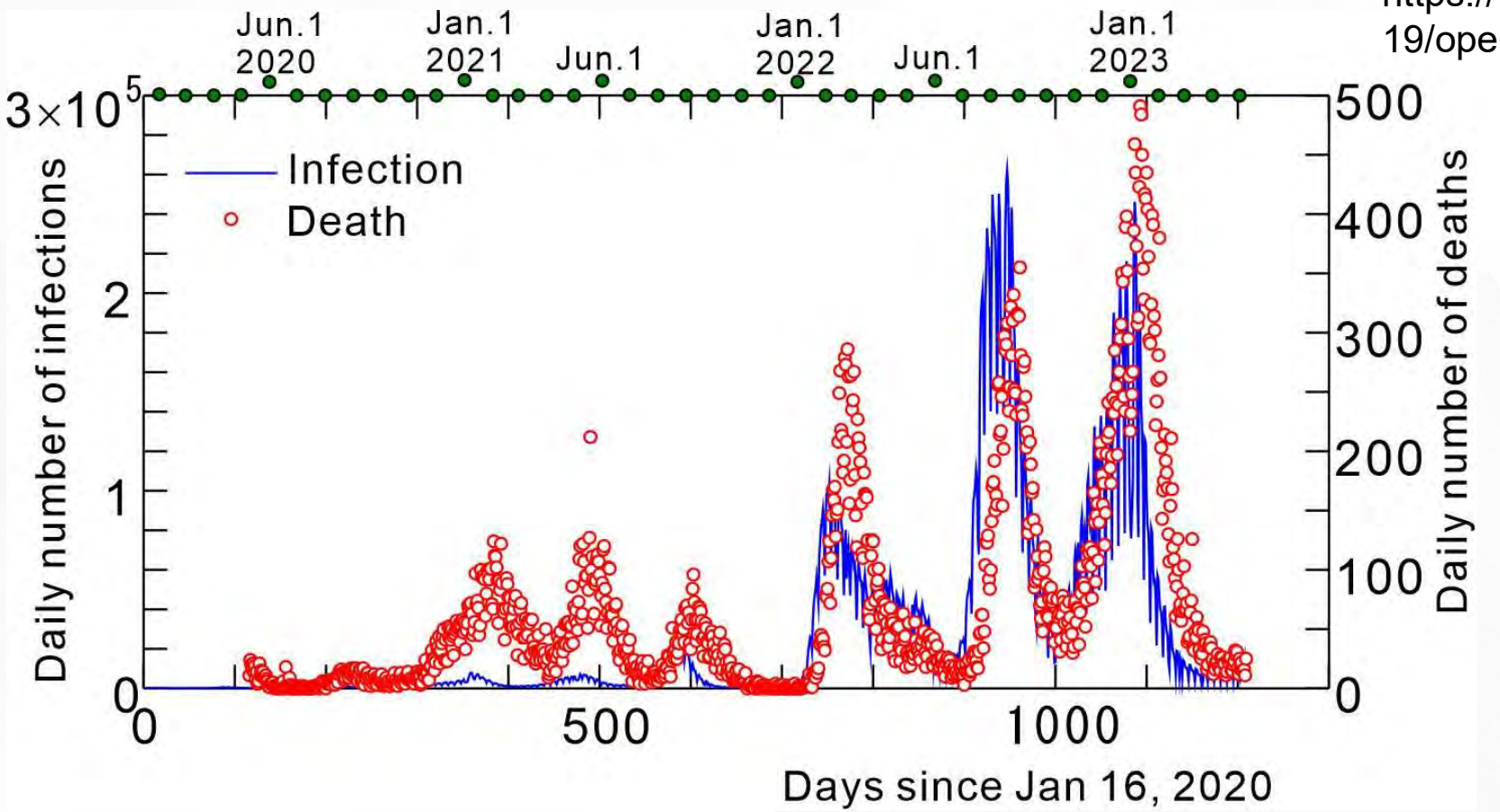
Qualitative changes accompany the process of spatiotemporal development.

Data from the Ministry of Health, Labour and Welfare
https://www.mhlw.go.jp/stf/covid-19/open-data.html



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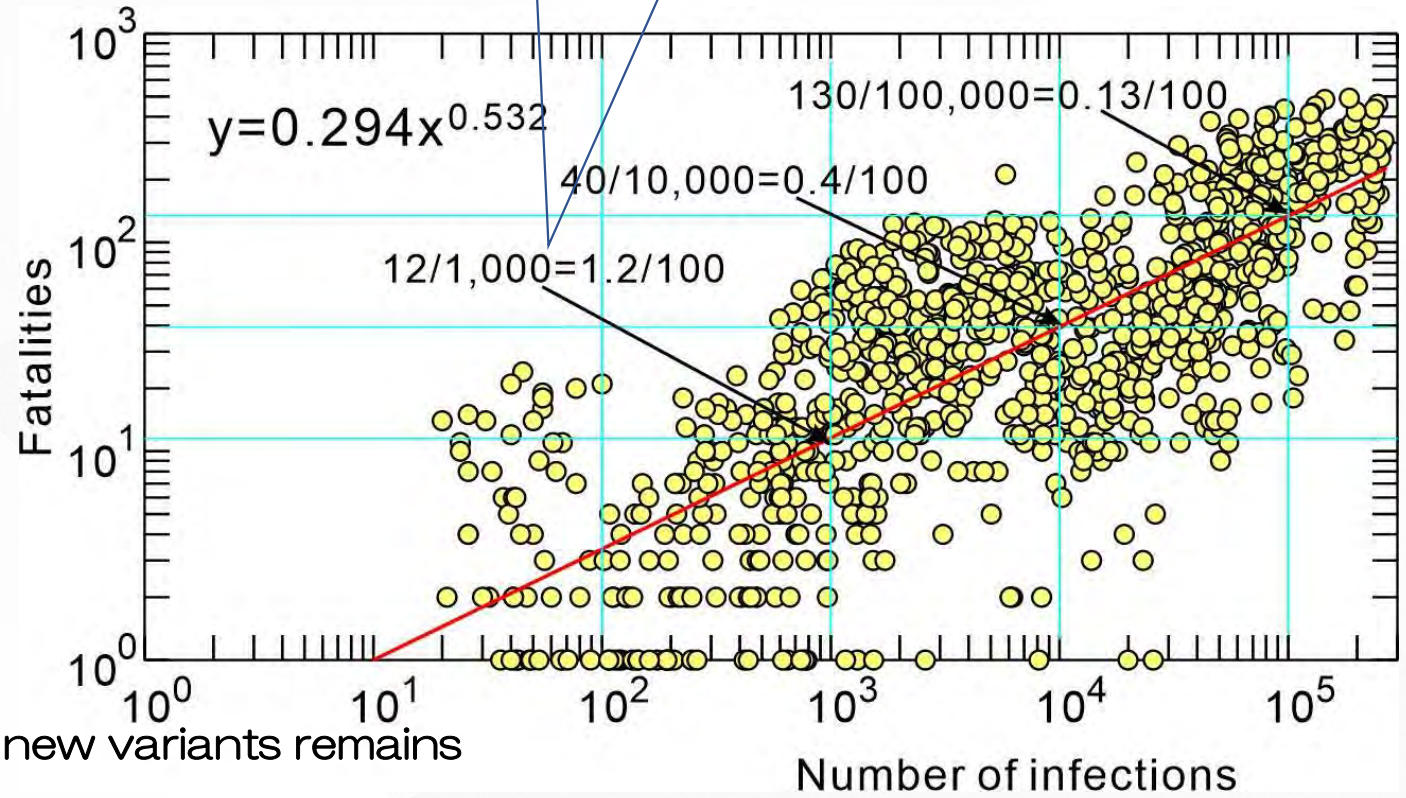
Various COVID-19 variants have emerged, and their characteristics differ greatly from one another.

Comparable to that of occupational accidents In Japan

Data from the Ministry of Health, Labour and Welfare https://www.mhlw.go.jp/stf/covid-19/open-data.html



The appearance of new variants remains unpredictable.

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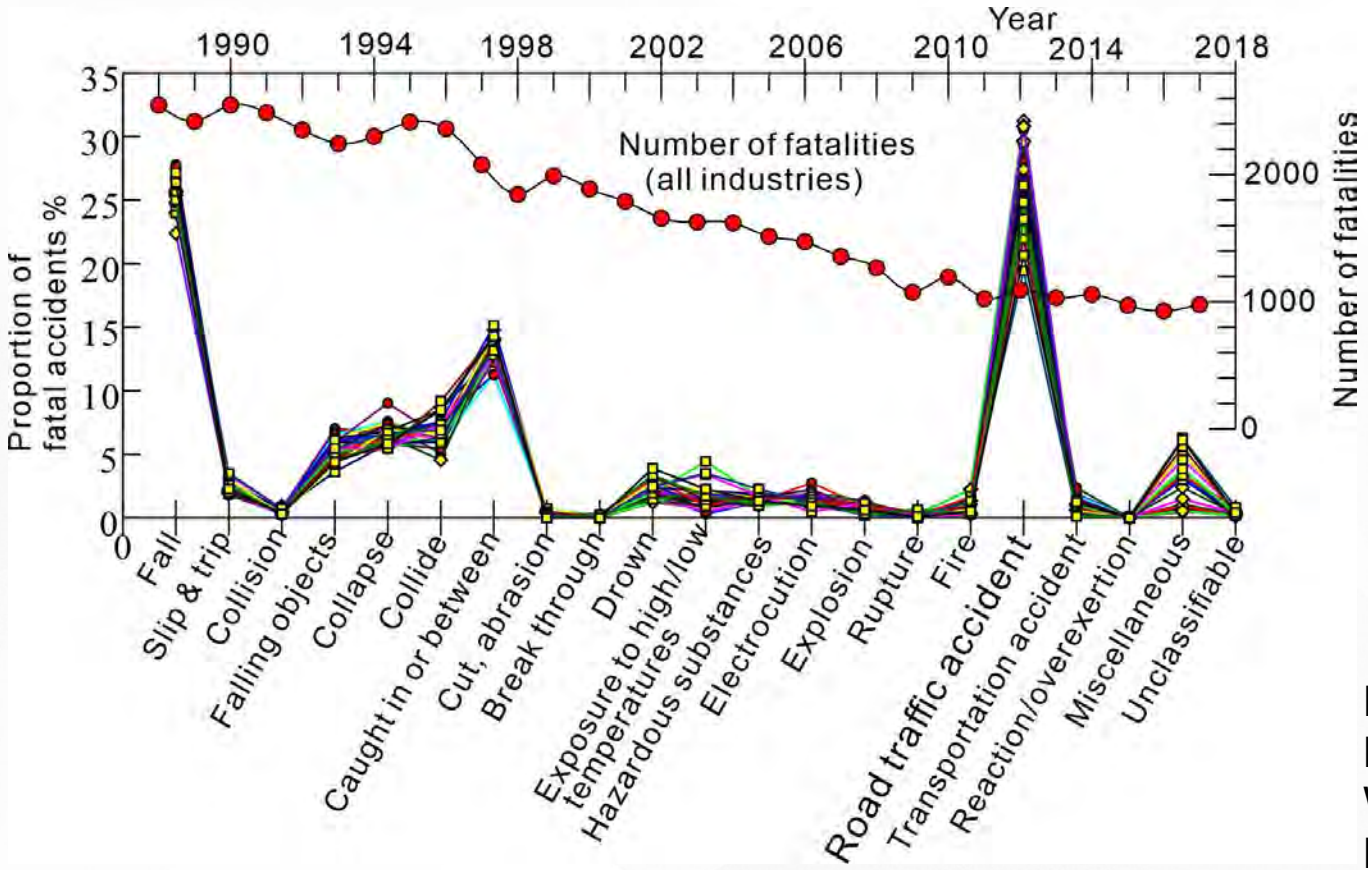
Number of fatalities has decreased significantly.
But, the proportional distribution by cause has remained largely unchanged.

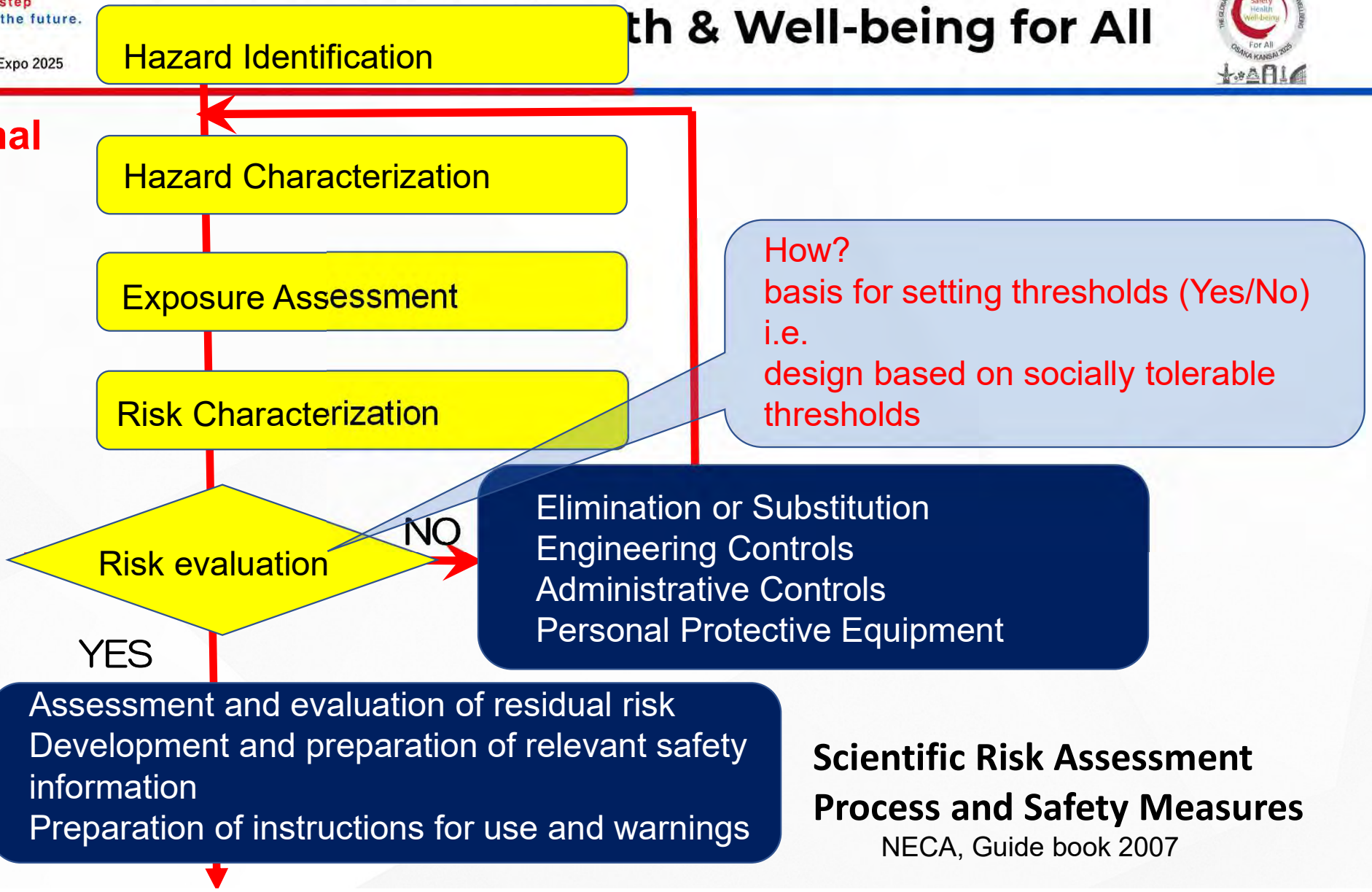
Why?



Trends in Fatal Occupational Accidents (30 Years)Total

Data from
Ministry of Health, Labor and Welfare, Labor Standards Bureau, Safety and Health Department, Safety Division

Occupational Safety and Health



Scientific Risk Assessment Process and Safety Measures

NECA, Guide book 2007

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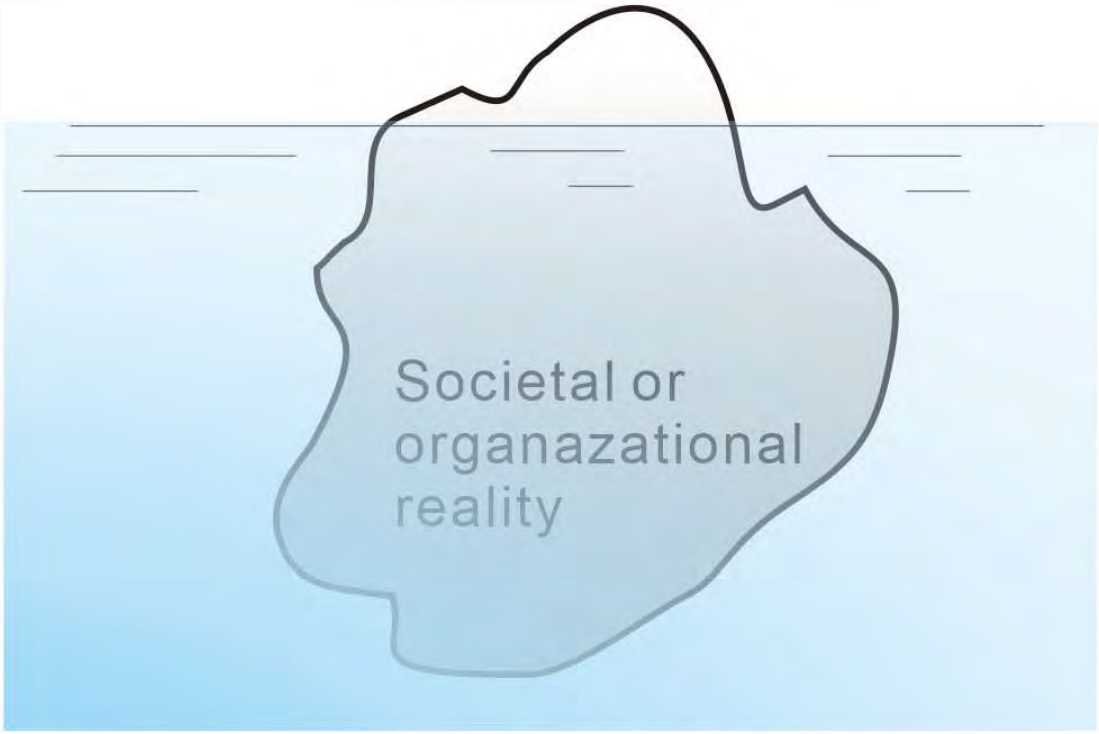
Surface-level indicators rarely reveal the full scope of societal reality.



Most of what drives a society or organization lies beneath the surface — invisible, yet influential.

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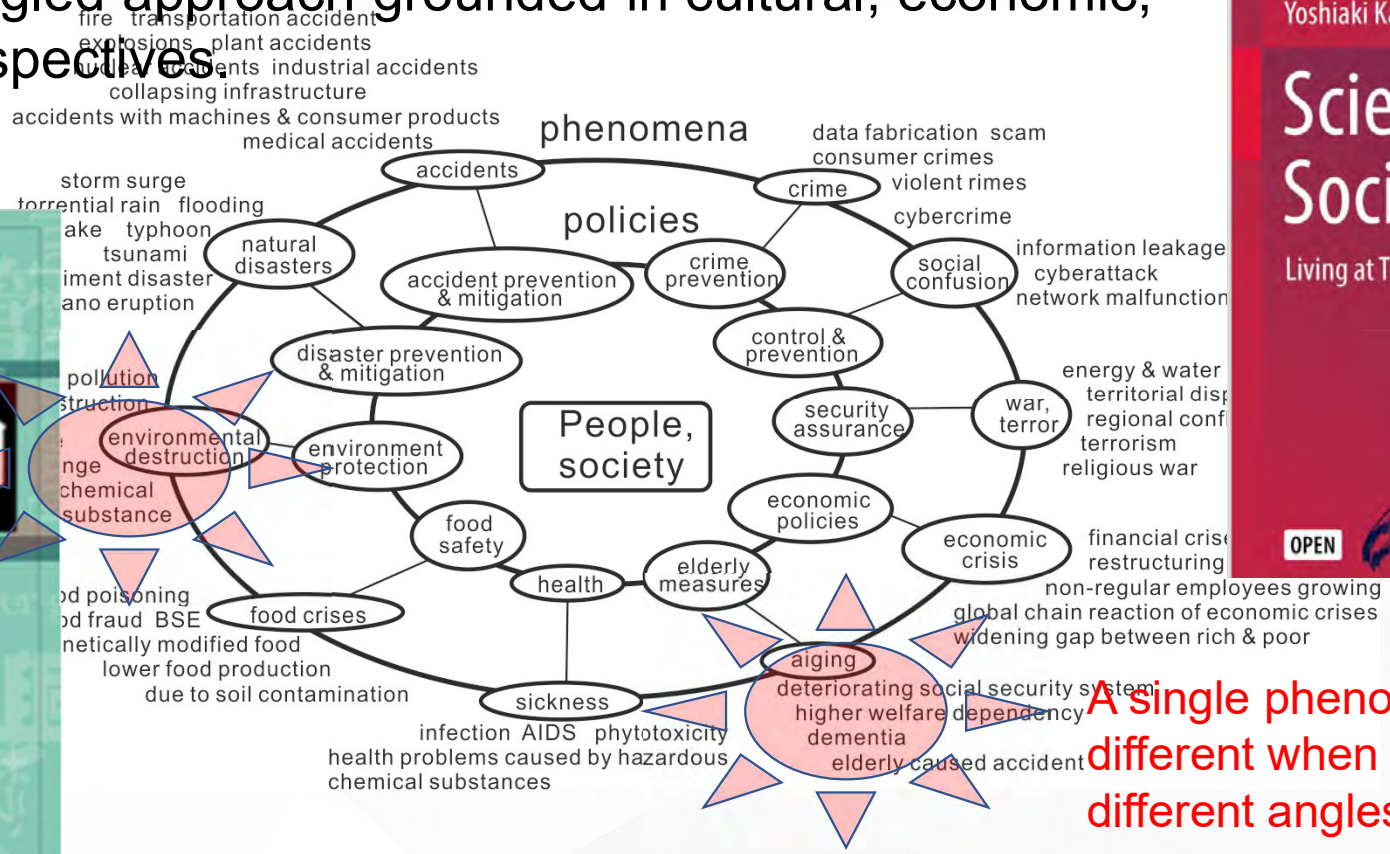
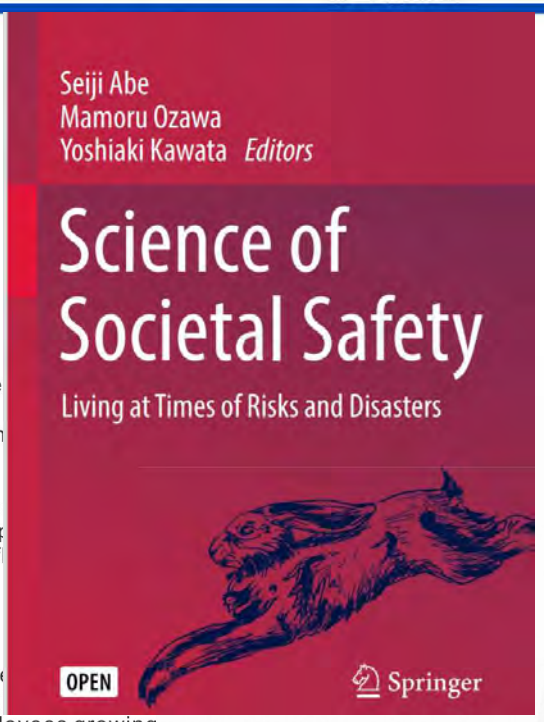
Uncovering the hidden layers of societal reality requires a scientific, multi-angled approach grounded in cultural, economic, and historical perspectives.





A single phenomenon may look different when seen from different angles.

One cannot fully understand the whole by concentrating on isolated points.

Kansai University's Challenge

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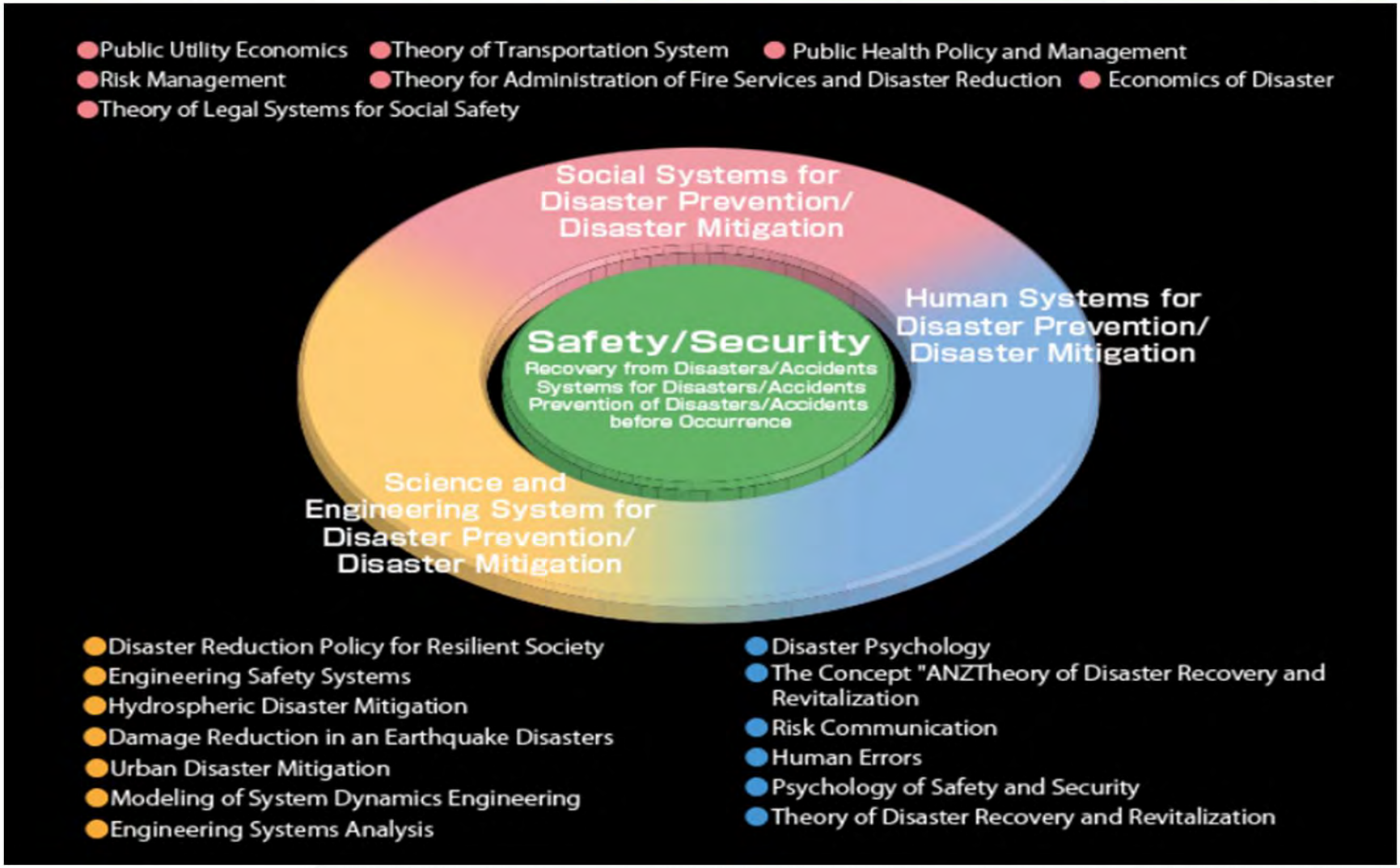
The structure of undergraduate and graduate curricula



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In addition to the regular curriculum

Ph.D. of Disaster Management Program (PDM)

The Ph.D. program in Disaster Management at Kansai University equips students with advanced analytical skills and comprehensive knowledge to make a meaningful impact in the field of disaster management, covering areas such as disaster mitigation, preparedness, response, and recovery. The curriculum provides a multidisciplinary, integrative approach, combining training in engineering, economics, psychology, and management. This ensures that graduates emerge as leaders with innovative ideas for disaster reduction, both in practical settings and academic research.

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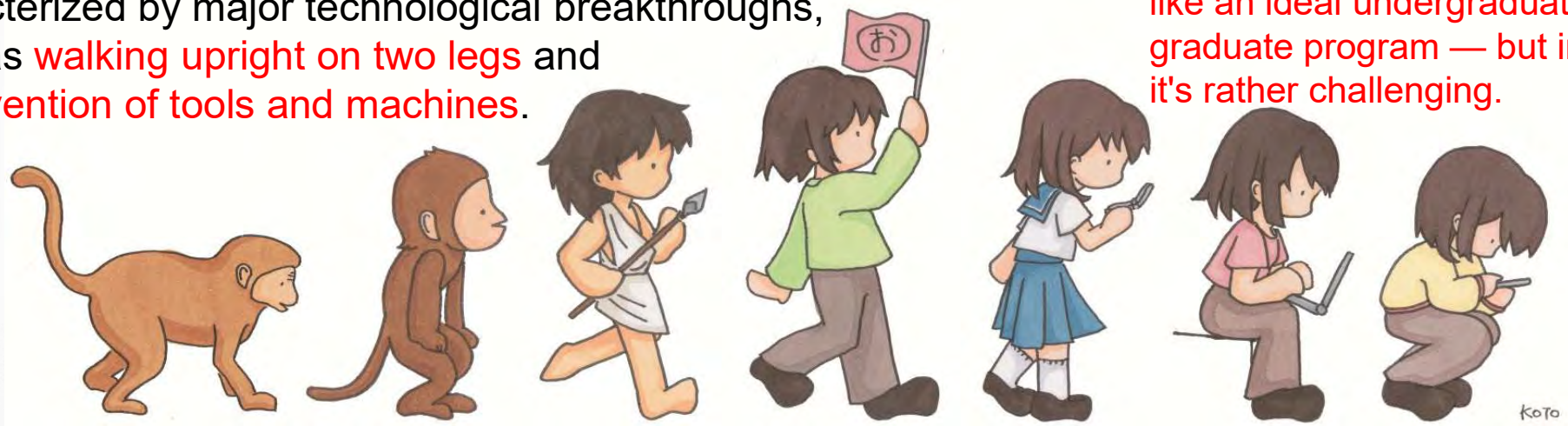
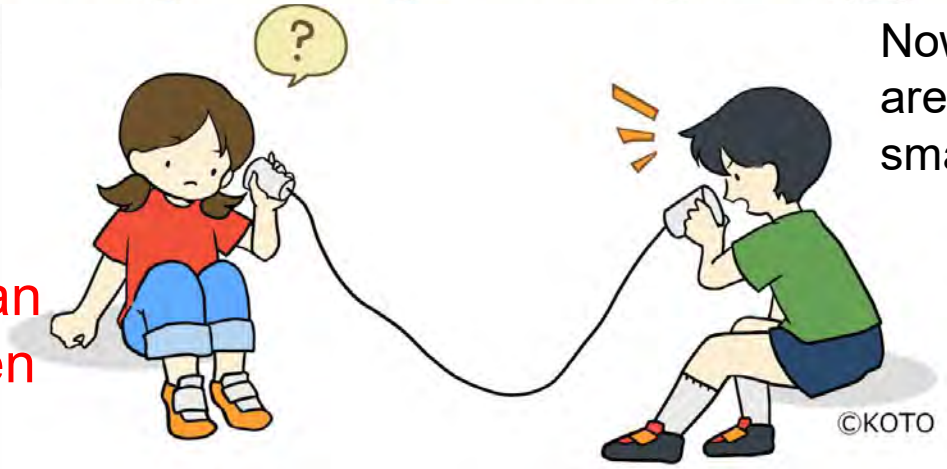
Throughout history, humankind's progress has been characterized by major technological breakthroughs, such as walking upright on two legs and the invention of tools and machines.



So, in a way, we created what looks like an ideal undergraduate and graduate program — but in practice, it's rather challenging.



Nowadays, young people in particular are increasingly absorbed in their smartphone screens.

Is meaningful human communication even achievable?

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Question:

What social impact does teaching and learning at your Faculty of Societal Safety Science have? Please give an example of the career path of one of your students.

The Faculty and Graduate School of Societal Safety Sciences at Kansai University were established in response to major disasters such as the 1995 Great Hanshin-Awaji Earthquake and the 2005 Fukuchiyama Line train accident. This was the first initiative of its kind in Japan.

To mark its founding, symposiums were held and publications were released. Since then, a series of books has been published annually, including several English-language volumes. One notable example is the open-access textbook Science of Societal Safety (Springer), which has received over 200,000 accesses—clear evidence of its significant impact on society.

Following the Great East Japan Earthquake on March 11, 2011, faculty members and students actively conducted field investigations. One of our professors served as a member of the official investigation committee on the nuclear accident, and I myself participated in investigations of the nuclear and thermal power plant accidents as a member of the Japan Society of Mechanical Engineers.

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Our graduates of Societal Safety Sciences go on to work in local government, police, fire services, and consulting.

At the Faculty of Societal Safety Sciences, students study a broad range of fields—engineering, law, economics, psychology, and more—making them generalists rather than narrow specialists. This produces a new kind of safety professional, different from traditional experts.

One graduate became a faculty member at the Japan Coast Guard Academy. Another, from Fukushima, joined TEPCO to contribute to his hometown's recovery and now works on nuclear decommissioning.

Such broad and hands-on education equips our students to lead future safety and disaster management efforts both in Japan and beyond.