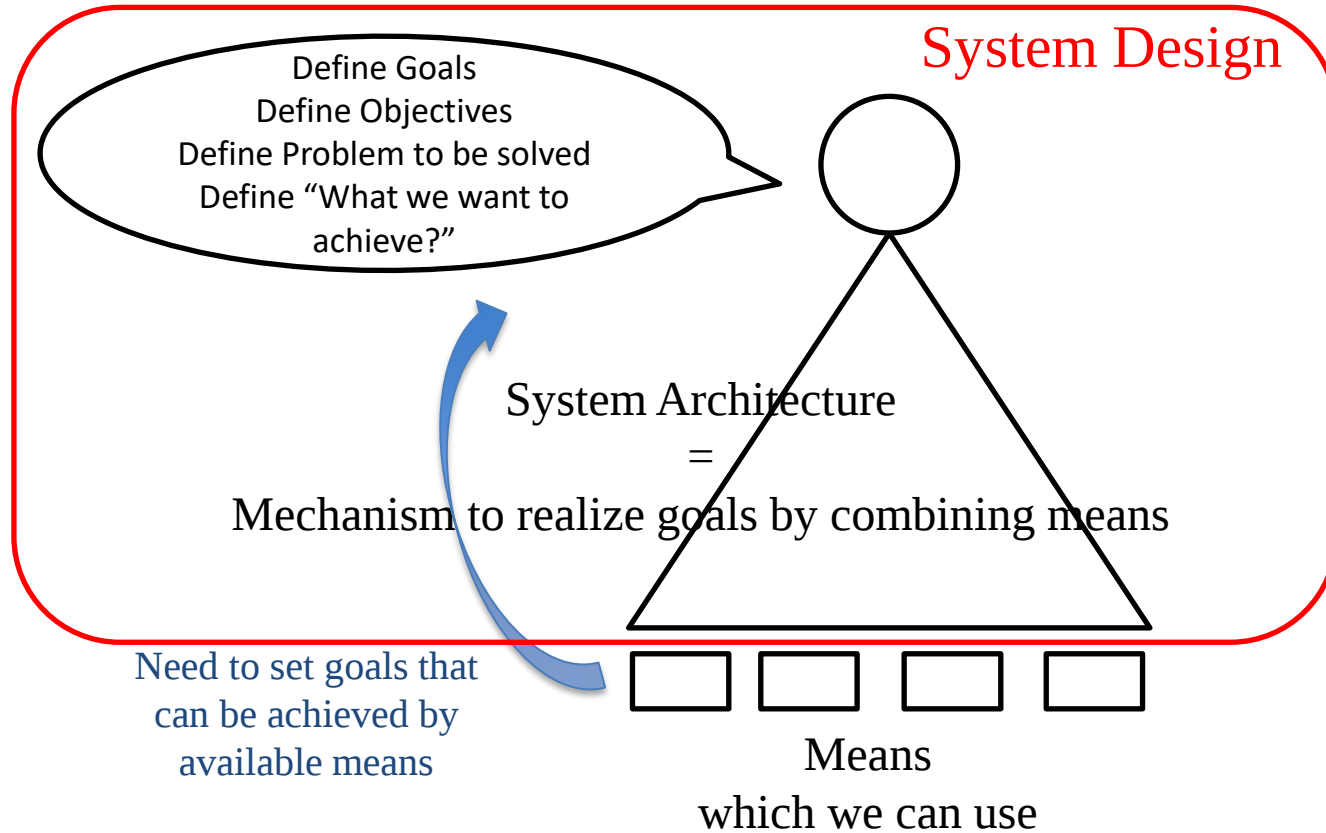


Manufacturing Approaches for the Digital Age

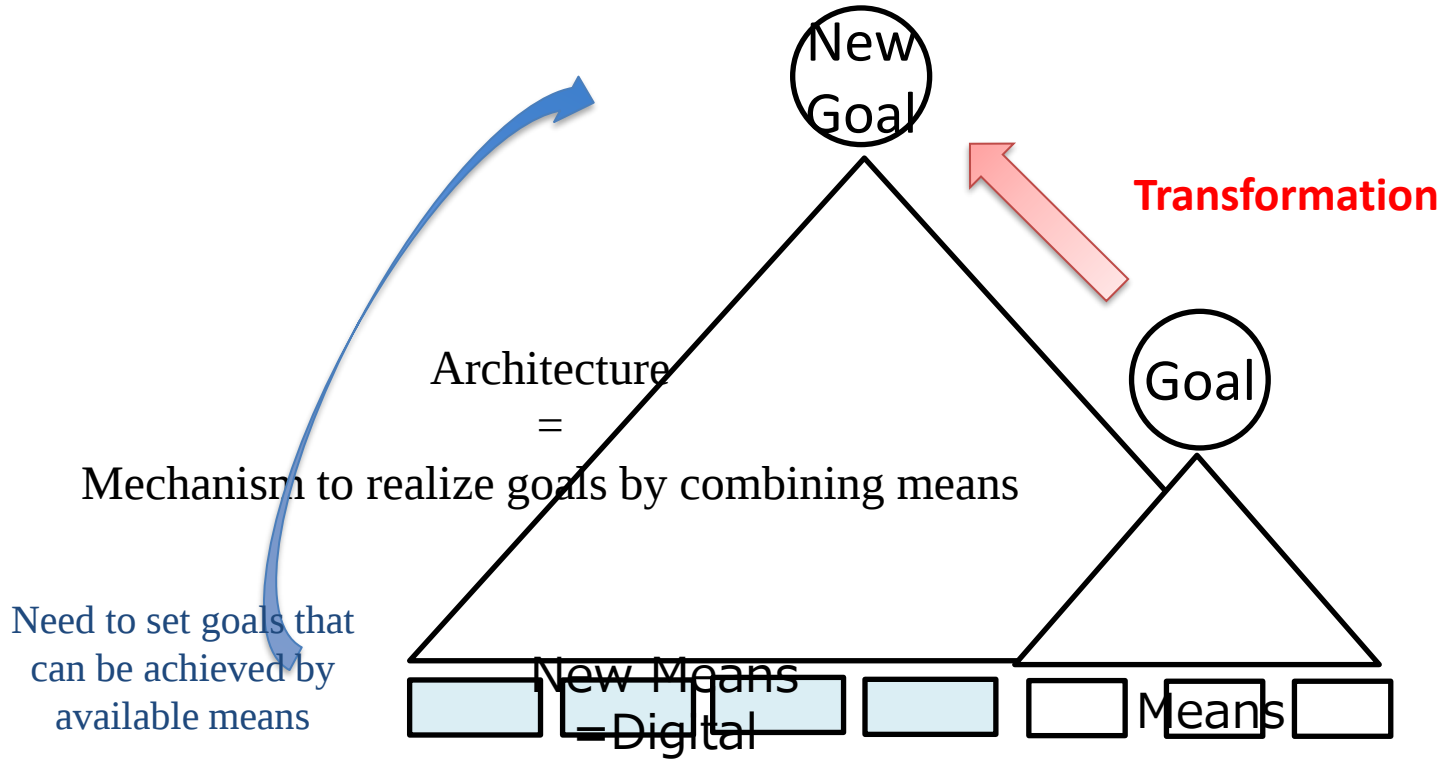
Seiko Shirasaka, Professor
Graduate School of System Design and Management
Keio University
shirasaka@sdm.keio.ac.jp

System Design

What is System Design?



Digital Era



Manufacturing Approaches for the Digital Age

Three points

We have to update manufacturing approach.

- Expansion of the scope to create a value
- Rapid Changes in Context
- Increase of important system characteristics and accountability

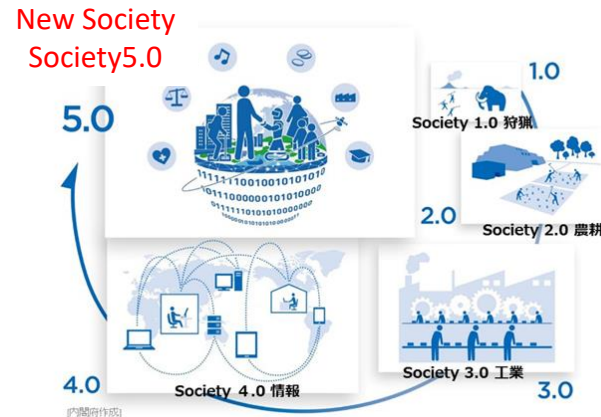
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Society 5.0

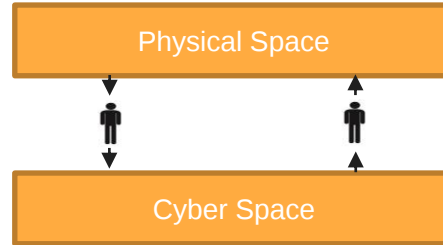
“A human-centered society in which economic development and the resolution of social issues go hand in hand through a system that highly integrates cyber space (virtual space) and physical space (real space). “ (The cabinet office of Japan)



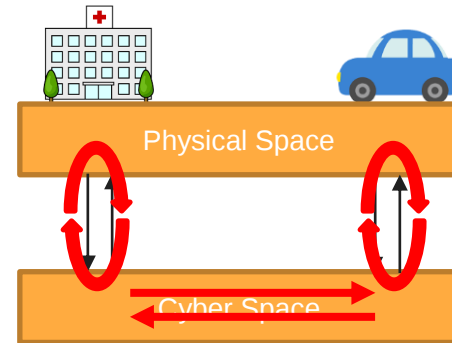
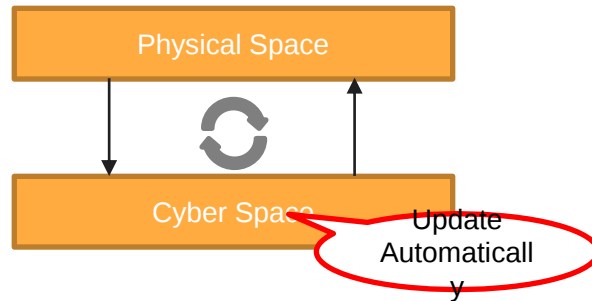
Source: Cabinet office of Japan

Society 5.0

Society4.0

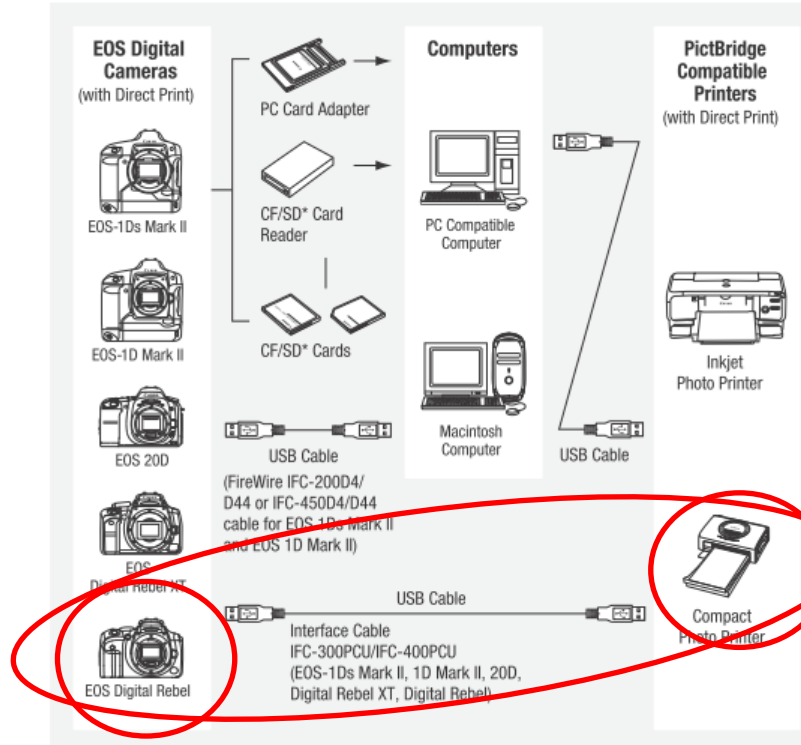


Society5.0



System of Systems

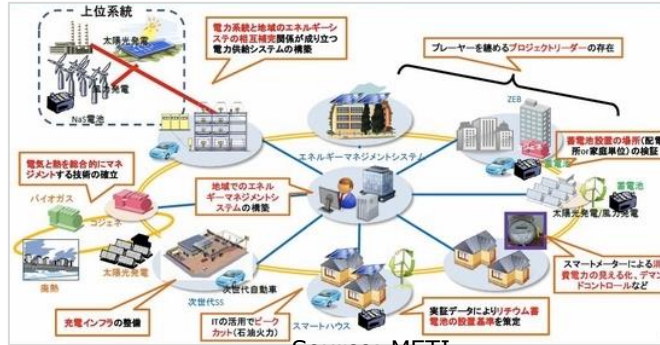
System of Systems



Source : INCOSE Systems Engineering Handbook

System of Systems

Movement in the World : A system is starting to connect.



Source: METI



出典：テキサスインスツルメント資料より抜粋

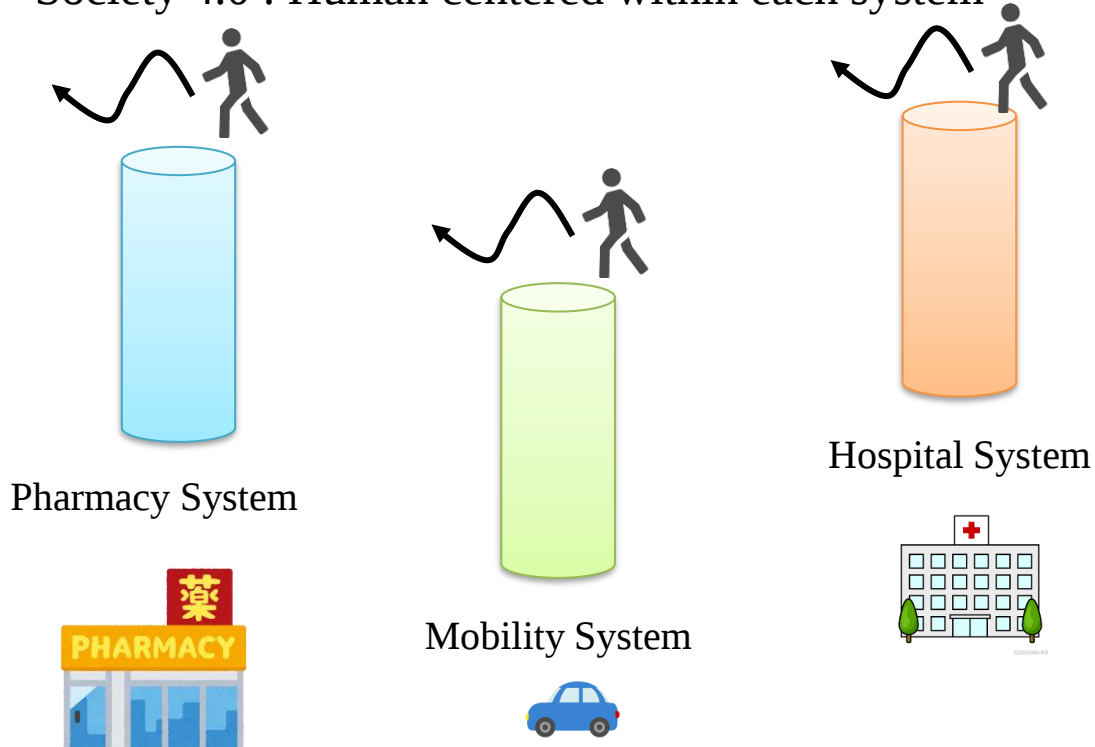


出典：「インダストリー4.0 実現戦略報告書」より抜粋

Society 5.0

CPS-based human-centered society

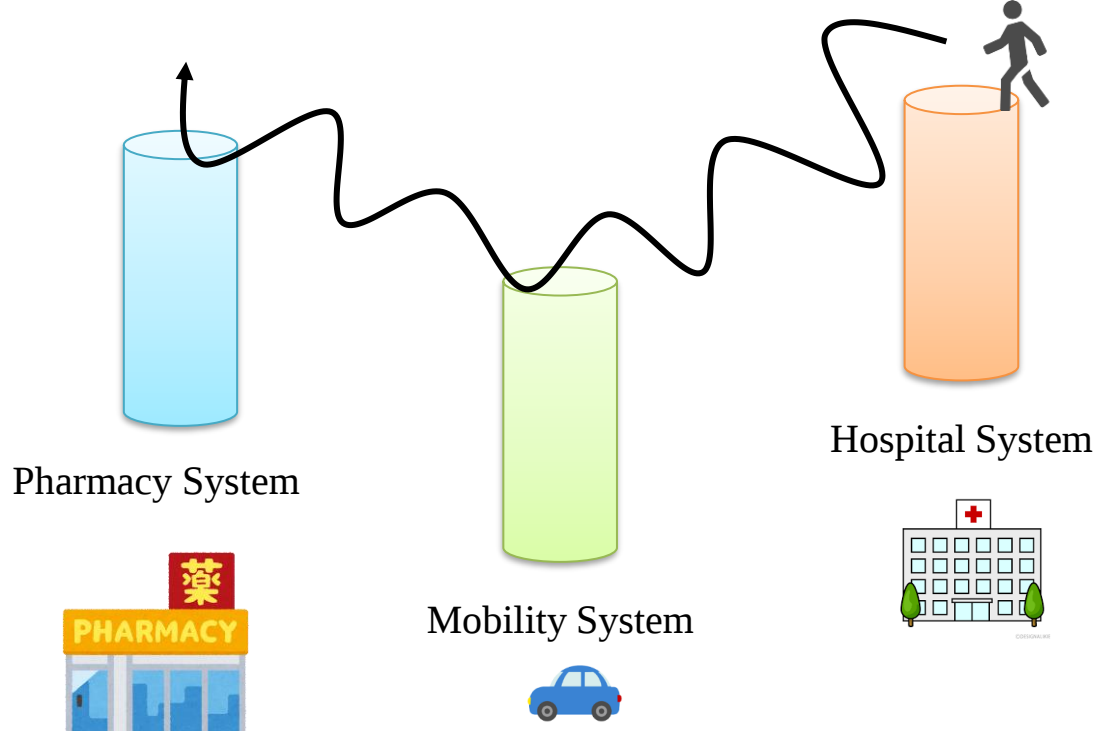
Society 4.0 : Human centered within each system



Society 5.0

CPS-based human-centric society

Society 5.0 : Human centered with combined each system



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VUCA World

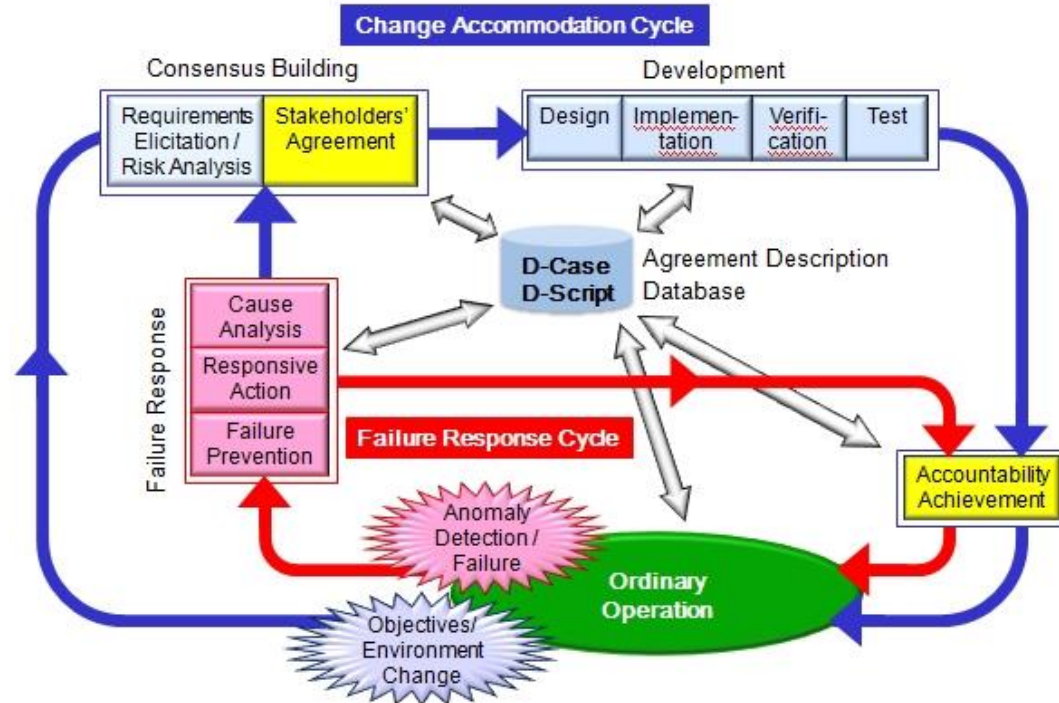
Volatility, **U**ncertainty
Complexity, **A**mbiguity



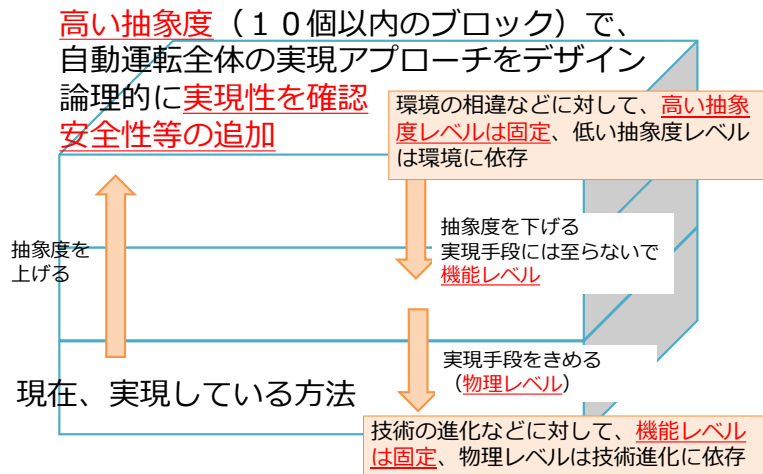
Connections increase VUCA.
ex. Society 5.0 (Systems of Systems)

Open System Dependability

- DEOS Process

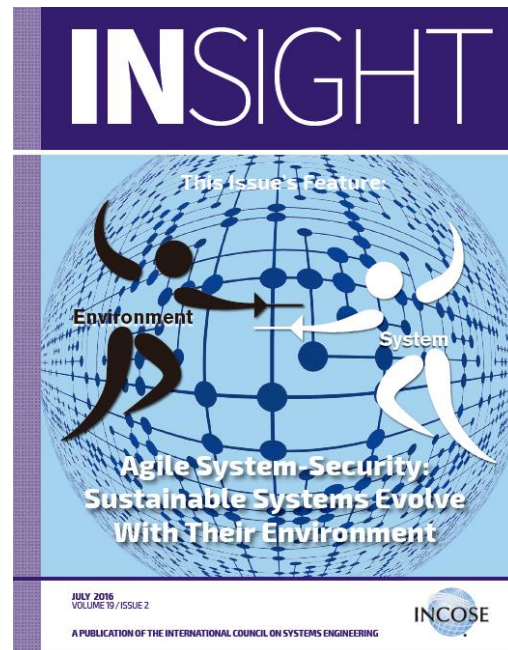


Architecture that can easily adapt to change



The Architecture of Automated Driving

How we can make changes and still be able to accept them with less re-examination



Security

An architecture that takes into account dynamic changes

Three points

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-ilities

- "-ilities" is a Related Discipline of Systems Engineering.
- It is called "Specialty Engineering."
- SEBOK Part6
 - Reliability, Availability, and Maintainability
 - Human Systems Integration
 - Safety Engineering
 - Security Engineering
 - System Assurance
 - Electromagnetic Interference/Electromagnetic Compatibility
 - Resilience Engineering
 - Manufacturability and Producibility
 - Affordability
 - Environmental Engineering

Source : Systems Engineering Body of Knowledge

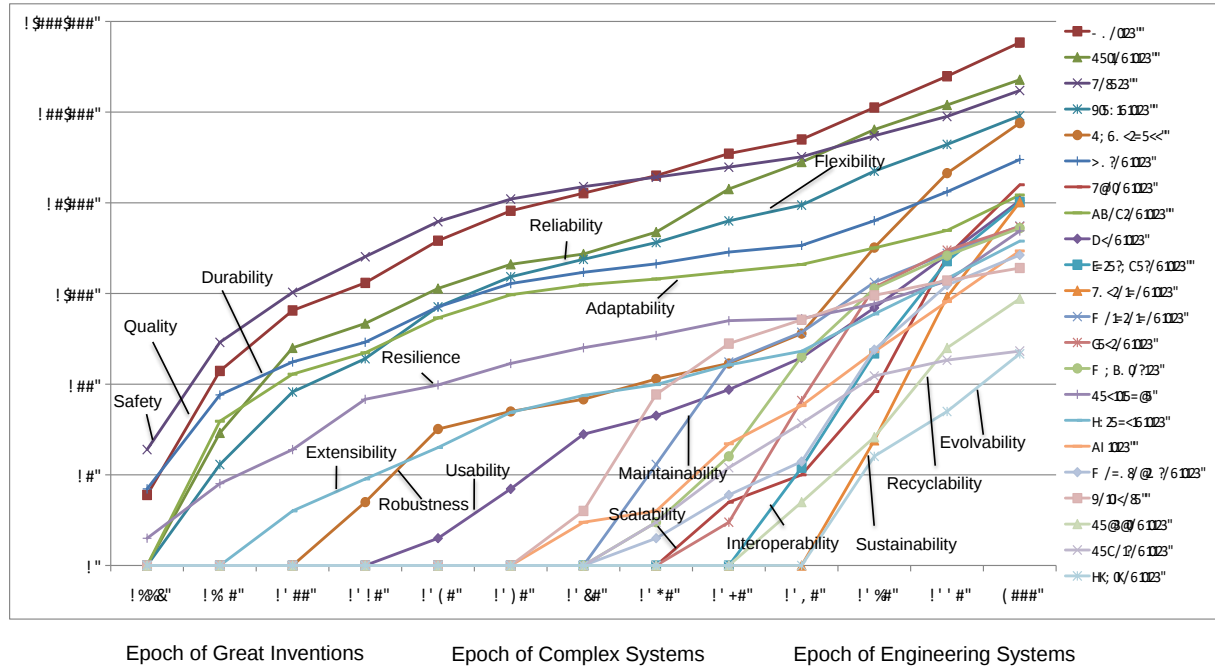
-ilities

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"-ilities" is a property that has to be viewed as a system
“**system** characteristic” or “Lifecycle properties”

-ilities

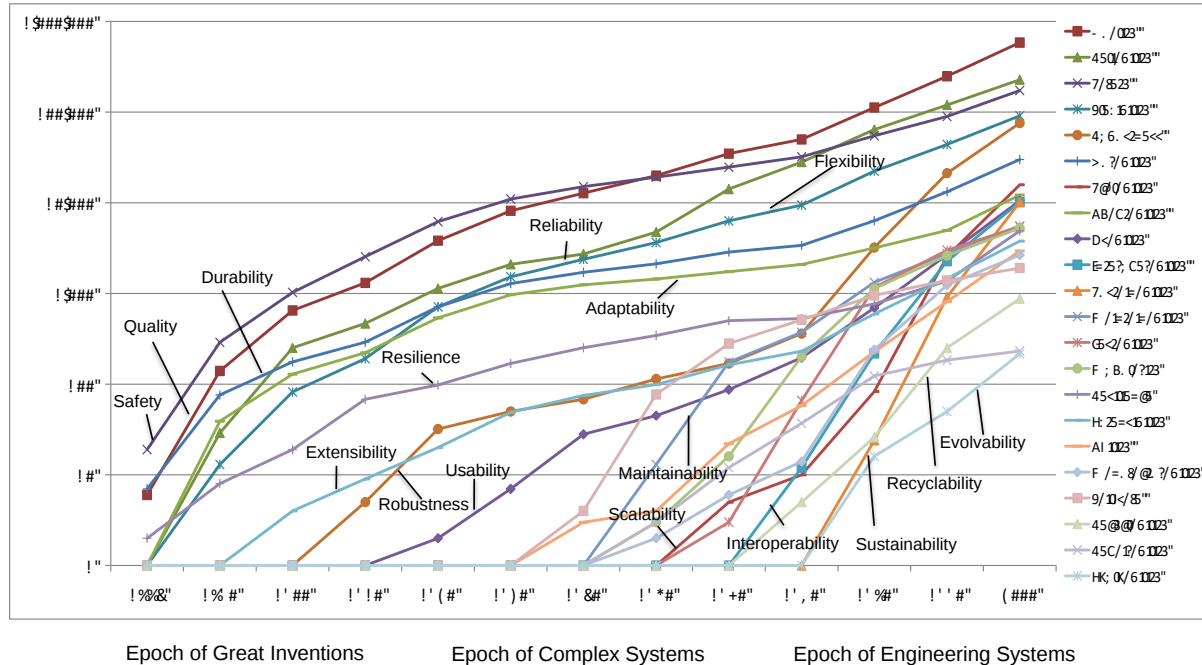
Cumulative Number of Journal Articles published about each Illity



Source : Engineering Systems, MIT press

-ilities

Cumulative Number of Journal Articles published about each Illity



More and more system characteristics are being required to be proved.
Functional Safety (26262, RAMS)

Summary

- The digital technology makes us to re-define the goals and architecture.
- Three points where we have to update manufacturing approach.
 - Expansion of the scope to create a value
 - Rapid Changes in Context
 - Increase of important system characteristics and accountability

Design the future!

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日吉駅前 協生館