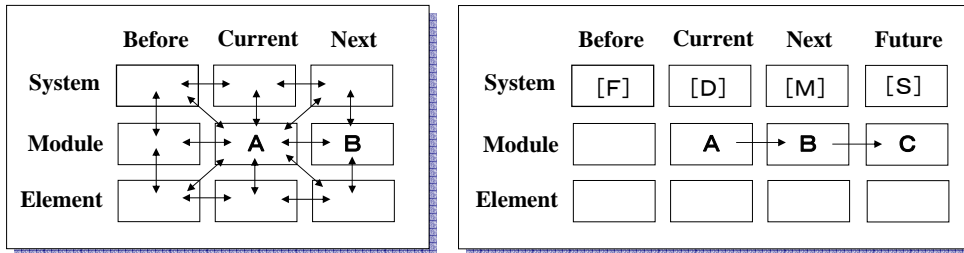


Technology Forecast by the 9-Window Method and the FDMS cycle

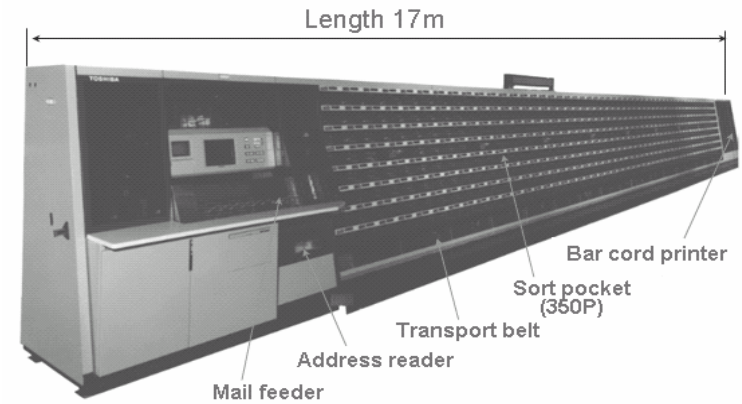
Kunio Fukatsu (TOSHIBA Social Automation Systems, Japan)

Sept.02.2006



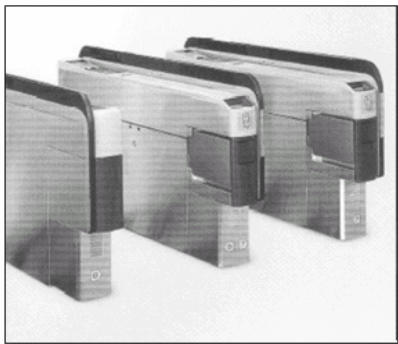
Social-automation systems(1)

mail-processing systems

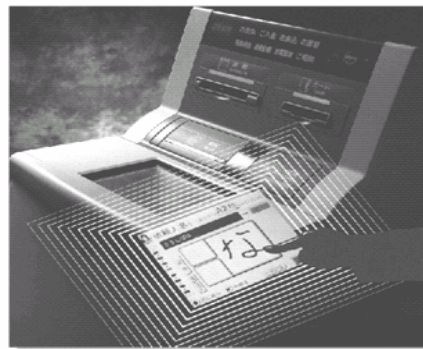


Social-automation systems(2)

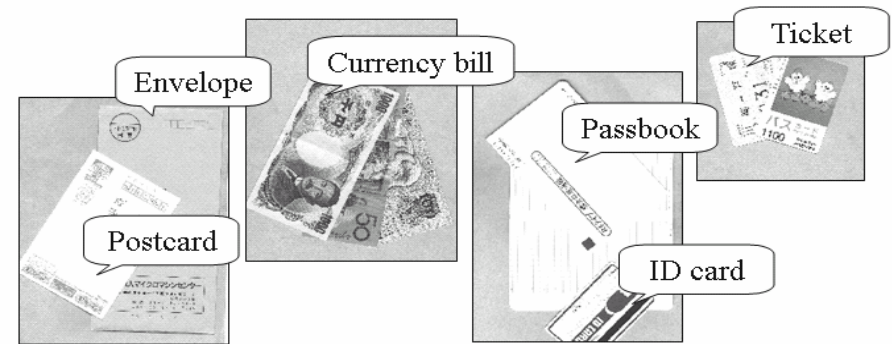
Ticket-gate system



Automatic teller machine



Social-automation systems(3)



Paper-handling technology

The aim of this study

Analysis

The generational changes and characteristics of the product design in **social-automation (SA) systems**.

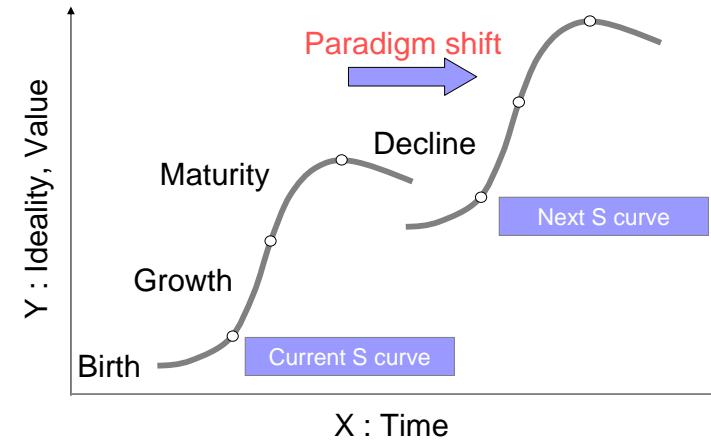
Hypothesis

The existence of **generational changes (FDMS cycle)** in the **S curve**. Each generations have unique characteristics.

Application

The existence of such a cycle enables us to consider and estimate the technology forecast of a product design. I propose a new idea-generation method which applied the original **9-picture method**.

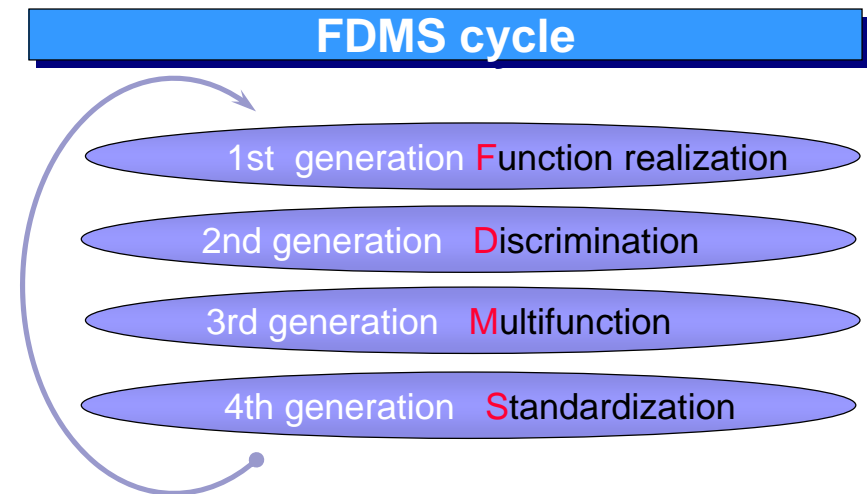
S curve in system evolution



Alternate generation of SA systems

	1 st generation Function realization (introduce media)	2 nd generation Discrimination	3 rd generation Multifunction	4 th generation Standardization (shift to next)
Automatic Mail Processing System	Introduction of Postal number	Send out sorting	Send out sorting Delivery sorting	Introduce new postal number
	<i>From 1968</i> Recognition of hand-written numbers	<i>From 1980</i> Recognition of Printed numbers	<i>From 1990</i> Recognition of hand-written addresses	<i>From 1998</i> sorting for delivery course
Automatic Ticket Gate System	Introduction of Magnetic ticket	Discrimination (Simplify)	Prepaid card handling	Multiple tickets handling
	<i>From 1970</i> Hard logic	<i>From 1980</i> Micro computer	<i>From 1990</i> Multi CPU	<i>From 1998</i> General OS Wireless card
Automatic Teller Machine (ATM)	Cash dispenser	Automatic depositor	Automatic Teller machine	Bill recycle ATM
	<i>From 1970</i> Withdrawal Introduce ID card	<i>From 1975</i> Withdrawal Deposit Passbook-handling	<i>From 1979</i> Withdrawal Deposit Transfer	<i>From 1983</i> Withdrawal/Deposit Transfer Coin handling

Four-generation design cycle model



Characteristics of generation

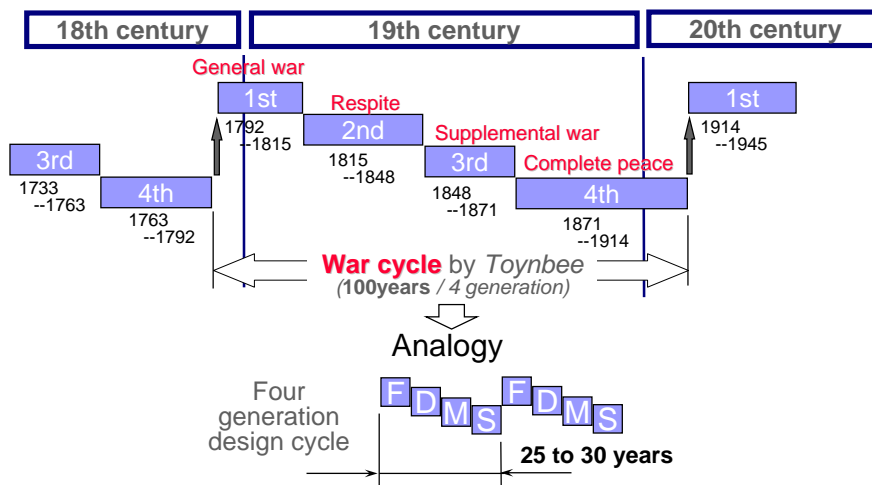
- <F> **First generation... "Function realization"**
Basic new functions based on the new media format are realized as a result of innovations in conventional business practices and equipment.
- <D> **Second generation... "Discrimination"**
Additional, discriminatory functions for the basic functions in the previous generation are realized.
- <M> **Third generation... "Multifunction"**
Multifunction capable of many discriminatory functions are provided by each company with low cost, and these lead to competition among products.
- <S> **4th generation... "Standardization"**
Standardization and systematization are promoted in terms of the publicly used features of social systems, and the systems become a social necessity.

Hypothesis

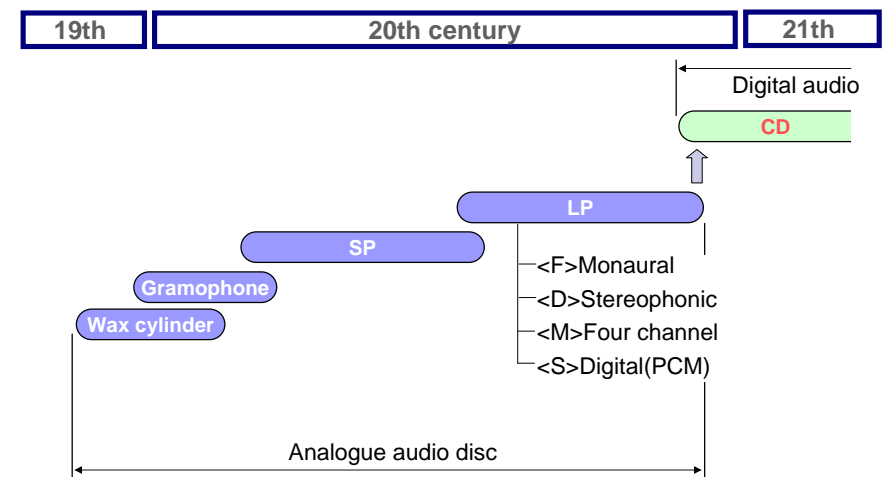
Social-automation systems exhibit a [FDMS] cycle as a result of

- intercompany competition restricted by continuity of the media format.
- generational change of the team which have different backgrounds share characteristic attitudes and objective design functions.

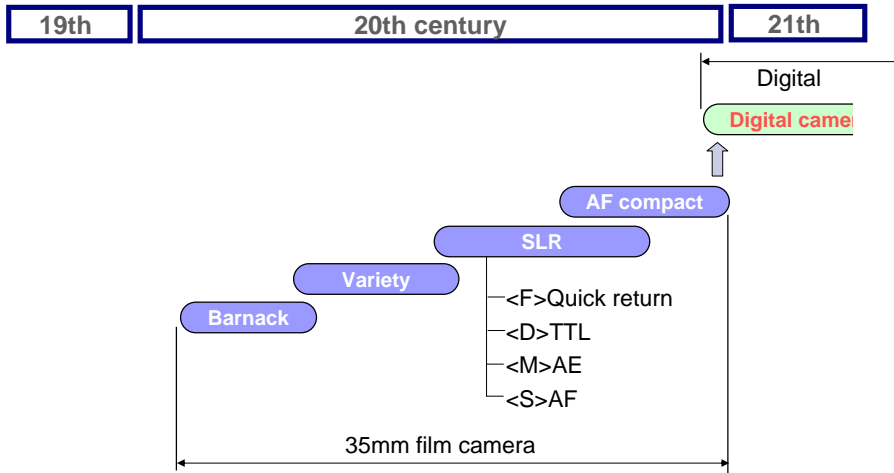
Analogy to social-cycle



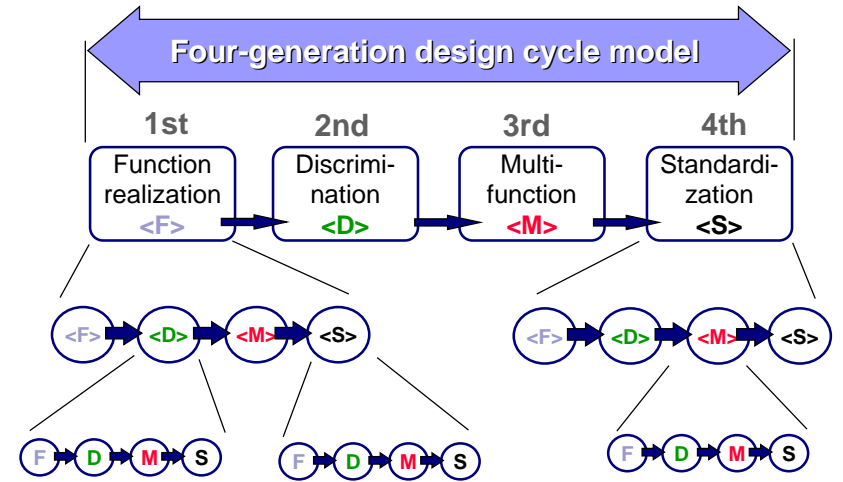
Generation change of audio record



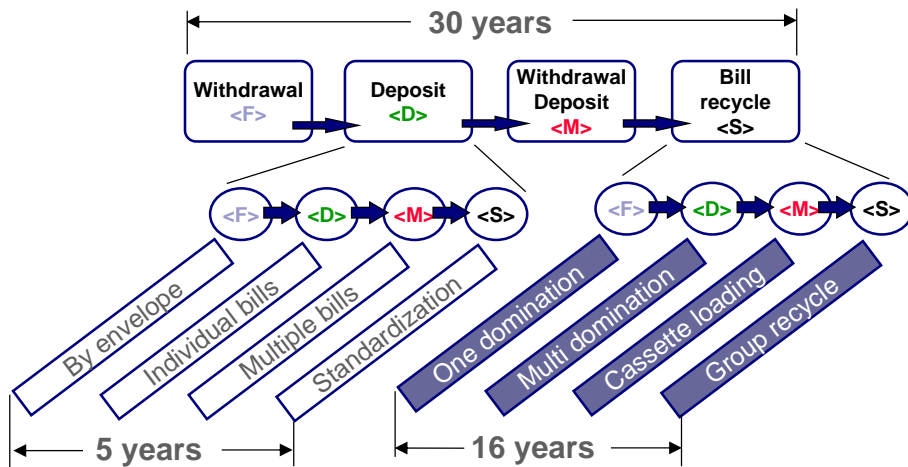
Generation change of camera



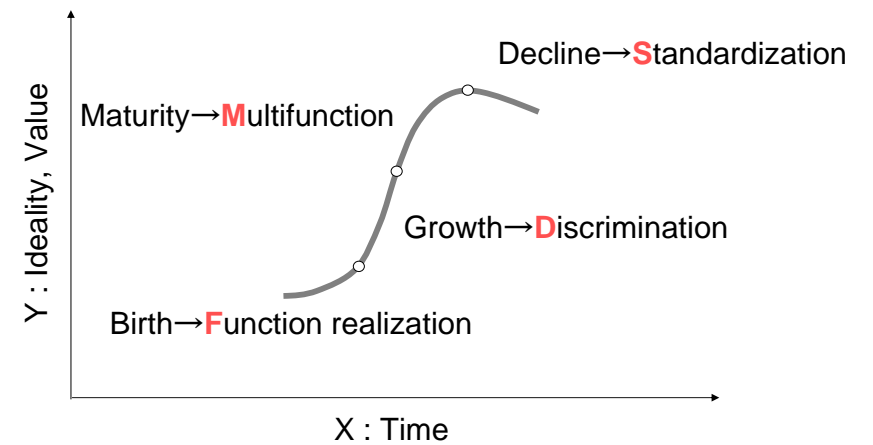
Multi layered FDMS cycle



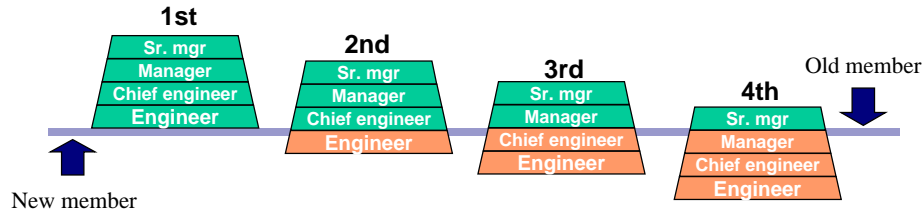
FDMS cycle of Bill Module for ATM



FDMS cycle in the S curve



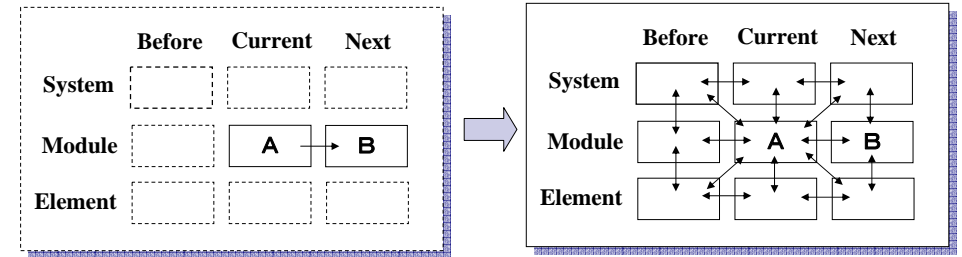
Generation change in a design team



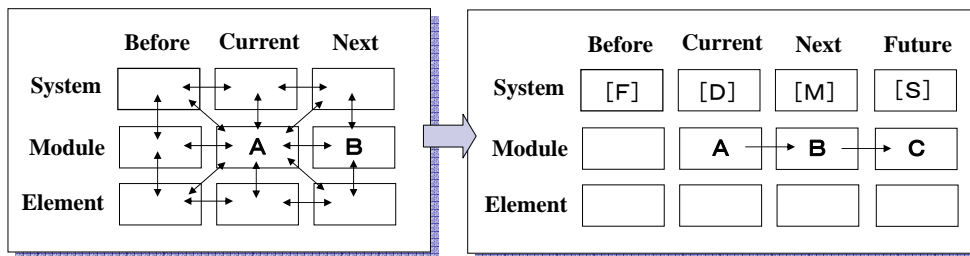
- Elemental function
- Additional idea
- Combination
- Next generation
- Potential needs
- High speed
- Total balance
- Higher level
- Lower cost
- Arrangement
- Coexistence
- Downsizing

Characteristics of idea in each generation

Basic 9-window method



Extension of 9-window method

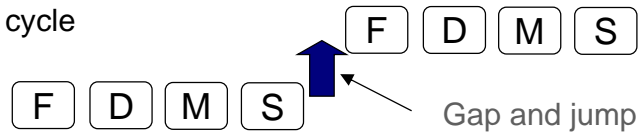


Evolution of ATM and subsystem

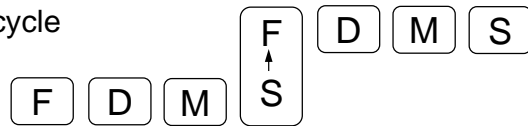
	Before	Current	Next	future		
System (ATM)	F Cash dispenser	D Automatic depositor	M ATM	S→F Recycle ATM	D R-ATM Cassette load	M R-ATM Large capacity
Module (Passbook printer)		F Introduce mg-stripe	D Protect miss ope-	M Multi account	S Issue new book	F Electric passbook
Element (Auto turn page)			F Single page turn	D Multi page turn	M Cover turn	S

Variation of FDMS cycle

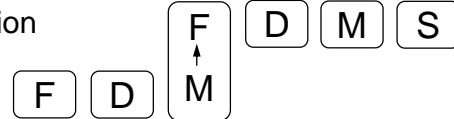
Basic cycle



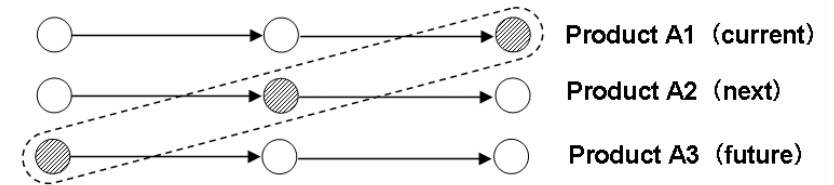
Ideal cycle



Variation



Concurrent engineering by multi-window method



Conclusion

■ I propose an application of the 9-window method to the design problem of media-oriented systems, in which the existence of the generational design cycle is observed.

■ The new idea-generation method enables us to consider and estimate the technology forecast of a product design.