# Lectures on Knowledge Management

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# DEFINITIONS: KNOWLEDGE

"**The fact of knowing a thing, state, person; A state of being aware or informed; Consciousness**". *Shorter Oxford English Dictionary (1973)*

**Knowing is usually thought to involve believing, though some say that it *replaces* belief, or that we can believe one thing whilst somehow knowing the opposite. Some think that knowledge is justified true belief.**

# DEFINITIONS: MANAGEMENT

**"The application of skill or care in the manipulation, use, treatment, or control of things or persons, or in the conduct of an enterprise, operation, etc.".**

Oxford English Dictionary

# DEFINITIONS: MANAGEMENT

**Data → PROCESS → Information**
**Information → INTERPRET → Knowledge**

**Data → PROCESS (use ALGORITHMS + DATA STRUCTURES) → Information**
**Information → INTERPRET (use HEURISTICS & ALGORITHMS + REPRESENTATION SCHEMES)→ Knowledge**

Oxford English Dictionary

# DEFINITIONS: MANAGEMENT

**"The application of skill or care in the manipulation, use, treatment, or control of things or persons, or in the conduct of an enterprise, operation, etc.".**

Oxford English Dictionary

# DEFINITIONS: MANAGEMENT

**identifying what knowledge assets a company possesses**

Where is the knowledge asset?  What does it contain? What is its use?  What form is it in?

How accessible is it?

**analysing how the knowledge can add value**

What are the opportunities for using the knowledge asset? What would be the effect of its use?

What are the current obstacles to its use? What would be its increased value to the company?

**specifying what actions are necessary to achieve better usability & added value**

How to plan the actions to use the knowledge asset? How to enact actions? How to monitor actions?

**reviewing the use of the knowledge to ensure added value**

Did the use of it produce the desired added value? How can the knowledge asset be maintained for this use? Did the use create new opportunities?

# DEFINITIONS

**Knowledge**

Language; Creativity; Planning, Thinking, Computation

**Intelligence**————————**Cognition**

The Internet expedites communication & computation

# DEFINITIONS

**A new approach to the conservation and (rapid) deployment of the knowledge of organisations, expected to result in innovative, lean organisations.**

# DEFINITIONS

The effective management of knowledge expedites solutions to problems by involving a number of different people within an organisation at different levels, and every participant can, if authorised, look at the output of others within the organisation. The management of knowledge serves best when it helps to access knowledge of successful and failed projects, best practice and biographical details of the participants.

# DEFINITIONS

- *Knowledge Management* - A term which was coined during the early 90s to discuss why Japanese companies had achieved such a dominant position.

- The term signalled the shift from the *industrial society* of the early 20th century, with its focus on *land, labour* and *capital* to a *knowledge-based* society which emphasised the human capital of an organisation.

# COURSE OUTLINE

# 1.Introduction & Origins

# 2.Knowledge Work & Society

# 3.Corporate Learning

# 4.Innovation Management

# 5.Best Practice

# COURSE OUTLINE

1. **Coursework due date    28 April 2004**

2. **Presentation/Oral Examination:   3$^{st}$ May 2004**

   **Presentation            10-15 minutes**

   **Oral Examination     10-15 minutes)**

# INTRODUCTION & ORIGINS

**Different metaphors to describe economic activity, productivity.**

**Consumption of chemicals: New products**

**Consumption of energy: New processes**

**'Consumption' of knowledge: New ?**

# INTRODUCTION & ORIGINS

**Different metaphors to describe economic activity, productivity.**

**Consumption of chemicals: New products**

**Consumption of energy: New processes**

**'Consumption' of knowledge: New ?**

# INTRODUCTION & ORIGINS

**Consumption & the management of consumed resource:**

**Raw material $\rightarrow$ Processing into finished goods$\rightarrow$ Delivery $\rightarrow$ Sales $\rightarrow$ Profit?**

**'Consumption' of knowledge: New ?**

*Management*

# INTRODUCTION & ORIGINS

**Consumption & the management of consumed resource:**

**Raw material → Processing into finished sevices/goods→ Delivery → Sales → Profit?**

**'Consumption' of knowledge: New ?**

*KnowledgeManagemen*

# INTRODUCTION & ORIGINS

**According to management guru Peter Drucker, it was only at the beginning of the 20$^{th}$ century (c.1895-1905) that management was <u>distinguished</u> from ownership in Germany.**

- **Georg Siemens, a leading banker of his time, asked Werner Siemens to hand over control of latter's near-bankrupt electrical engineering enterprise to professional managers.**

- **Andrew Carnegie and John D Rockefeller followed suit in the USA.  The period 1895-1905 coincides with the rise of the modern movement.**

# INTRODUCTION & ORIGINS

The post-modernist equivalent in the industrial genesis of the Northern Hemisphere was during the period spanning 1920-1950. This genesis saw command-and-control structures introduced by the chemical giant du Pont, by General Motors - one of the pioneers of automotive engineering - and by the engineering colossus General Electric. Hierarchically organised enterprises emerged during this period (see Drucker 1988), coinciding with the ascent of post-modernism in the arts, literature, music and politics.

# INTRODUCTION & ORIGINS

**Computer mediated change management: Changes in the economy, the society and perhaps the world at large, are sometimes precipitated by advances in science and technology;**

**Scientific and technological change is sometimes made possible by the use of computer systems –digital libraries, electronic communications are good examples here.**

**Can we use computers to monitor (and control?) how change is effected?**

# INTRODUCTION & ORIGINS

## *Classic Corporation and Industrial Society:*

Frederick W. Taylor, a US engineer in the early part of the 20th century, suggested that an organisation can predict its output accurately from

- **machine productivity;**

- **work processes; &**

- **time motion analysis of individual workers**

**THE WORKER WAS ESSENTIALLY VIEWED AS A UNIT OF PRODUCTION. ALL DECISION MAKING AND CREATIVE THOUGHT WAS THE RESERVE OF MIDDLE AND UPPER MANAGEMENT.**

# INTRODUCTION & ORIGINS

In 19$^{th}$ and early 20$^{th}$ century wealth was associated with control of energy resources. Knowledge and information were regarded as parameters of economic systems rather than as variables within them.

Economic systems were construed as energy systems wherein cause and effect operate continuously and proportionately.

**Knowledge and information are, by contrast, highly non-linear and disruptive.**

# INTRODUCTION & ORIGINS

## *Post-industrial Corporation & Society:*

'Senior-level executives [have] come to understand the economic power of knowledge' Huseman and Goodman (1998:211)).

'**KNOWLEDGE RESIDES AT ALL LEVELS OF ORGANIZATION. THE KNOWLEDGE ORGANIZATION REQUIRES AN ACCEPTANCE THAT PEOPLE AT THE TOP, OR EVEN A GROUP AT THE TOP, DO NOT CONSTITUTE THE REPOSITORY OF ALL KNOWLEDGE. SOMETIMES THE MOST VALUABLE KNOWLEDGE CAN BE FOUND AT THE LEVELS WHERE ORGANISATIONAL MEMBERS ARE CLOSEST TO CUSTOMERS AND SUPPLIERS (*ibid*:211-212)**

# INTRODUCTION & ORIGINS

## *Post-industrial Corporation & Society:*

The introduction of the prefix 'post' in *post*-modern and *post*-industrial, is usually used to indicate a rupture from the past.  The American Daniel Bell and the Frenchman Alan Touraine coined the term 'post-industrial' independently on either side of the Atlantic.  Touraine wrote a book entitled *The Post-Industrial Society*(1970) to be followed by Bell's more evangelical title  *The Coming of Post-industrial Society* (1973).  According to Prof. Gibson Burrell of the Warwick Business School, Bell talks about an  *expert class* and Touraine about *highly-skilled technicians.*

(Burrell, Gibson.  (1996). 'Hard times for the salariat'. In (ed.) Harry Scarbrough; pp52.)

# INTRODUCTION & ORIGINS

The post-industrial society has emerged in a climate where multi-nationals move design and manufacture of goods around the globe with the deftness of ballet artists. The conventional wisdom of the post-modern age, that of **mass production** and **well-stocked warehouses**, has made way for *technologies* with idiosyncratic names: *just-in-time* or *kan-ban*, *lean manufacturing*, *business process re-engineering*, and the curious neologism *knowledge management* in the mid-1990s.

# INTRODUCTION & ORIGINS

•**The term *knowledge management* is used to articulate the concept that knowledge is an asset on a par with the tangible assets of any organisation - land, capital, plant and machinery.**
•Management involves the control of assets, ergo knowledge should be managed from its inception through its nurturing to maturity to exploitation and to ultimate obsolescence.
•**Knowledge may be considered intangible and yet it has a lifecycle: conception-birth-maturity-death.**

# INTRODUCTION & ORIGINS

| | Post Modern Organisation | Post Industrial Organisation |
|---|---|---|
| *Structure* | PASSIVE, STATIC | REACTIVE, DYNAMIC |
| *Products* | DURABLE, DULL | DISPOSABLE, STYLISH |
| *Consumer Needs* | STABLE | CHANGING |
| *Markets* | GEOGRAPHICALLY WELL DEFINED | FUZZILY DEFINED |
| *Competition* | IDENTIFIABLE RIVALS: *WAR OF POSITION* | CHANGING RIVALS: *WAR OF MOVEMENT* |

# CASE STUDIES

**PricewaterhouseCoopers: Building a Global Network**

**The Music Industry in a Digital Networked World**

**A Case Study of Knowledge Management at Cap Gemini Ernst&Young**

**Measuring and Managing Intangibles in Mobile Commerce**

**SOURCE: http://www.EUintangibles.net**

# CASE STUDIES

**NewsML: Creating Value through News Content Management**

**Knowledge Net**

**Knowledge Management at Simens Spain**

**Cisco System: Building leading Internet Capabilities**

**Simens Share Net: Building a Knowledge Network**

**Monsanto: Leadership in New Environment**

# CASE STUDIES

**GROUP DETAILS:**

**People <4 but >2;**

**Co-ordinator**

**Topic of the case Study**

**SEND DETAILS TO RAFIF AL-SAYED**

**At        csp1rs@surrey.ac.uk**

# CASE STUDIES

**The strategy paper(50% mark) –Presentation (50%)**

**•Brief description of the organisation;**

**•Rationale for managing knowledge;**

**•Manual & computer based systems used for KM**

**•Reported successes or failures**

**•YOUR EVALUATION OF THE KM PROJECT**

**•Will you do KM the way you found it in the case study? Is KM a good thing for facilitating knowledge exchange? If so,  why? If not, why not?**

**• BIBLIOGRAPHY**

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

There are two major factors that have precipitated change during the second half of the 20$^{th}$ century:

- **Competition: International & Domestic**

- **Information & Communication Technologies (ICT)**

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

## *International Competition*

| | |
|---|---|
| 1960's | **The rise of Germany and Japan as major competitors of the US in automotive and white goods;** |
| 1980's | **The rise of the Pacific Rim countries (& India) as major centres of manufacture, and of R&D;** |
| 2000+ | **The Internet-based 24-hour world-wide economy:** *e-commerce → m-commerce* |

# INTRODUCTION & ORIGINS:
# CHANGE & MANAGEMENT

## *Domestic Competition*

### Old Players & New Players:

*IBM, DEC (†) Siemens, Philips*

↓

*Microsoft, SUN, Dell, SAP*

### *Small-to-Medium sized Enterprises (SME):*

*SME's contribute extensively to economic and technological innovation*

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

### *Information & Comms. Technologies (ICT)*

• **Moore's Law: The number of transistors packed on a chip doubles every 18 months;**

• **Computer and communications technologies are *symbiotic*: one facilitates the provision of another;**

• **ICT is about data (1950s), information (1960s) and knowledge processing (1980s).**

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

## *Information & Comms. Technologies (ICT)*

| Year | Processor | MIPS | Price ($) | Price ($) /MIPS |
|------|-----------|------|-----------|-----------------|
| 1975 | IBM Mainframe | 10 | 10,000,000 | 1,000,000 |
| 1976 | Cray 1 | 160 | 20,000,000 | 125,000 |
| 1981 | IBM PC | 0.25 | 2,000 | 12,000 |
| 1984 | SUN 2 | 1 | 10,000 | 10,000 |
| 1994 | Intel Pentium | 66 | 3,000 | 45 |
| 1998 | Intel Pentium II | 500 | 1,000 | 2 |

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

## *Information & Comms. Technologies (ICT)*

| Year | Host Computers on the (ARPA) Internet | Bandwidth |
|------|--------------------------------------:|----------:|
| 1969 | 4 | 9.6Kbps |
| 1985 | 1961 | 56Kbps |
| 1990 | 313,000 | 45Mbps **(1989 data)** |
| 1995 | 6,642,000 | 155Mbps |
| 1998 | >10,000,000 | 1024Mbps |
| 2000 | ? | 2048Mbps |

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

### *Key changes in which we transact:*

| | |
|---|---|
| **Education** | ***Distance Learning*** |
| **Banking** | ***Automated Teller Machines (ATM)*** |
| **Retail** | ***Point-of-Sale Terminals; Home Shopping*** |
| **Entertainment** | ***Virtual Reality*** |
| **Business (Personal)** | ***E-mail; e-commerce; m-commerce*** |
| **Design/Diagnosis** | ***Tele-presence*** |
| **Education/Training** | ***Virtual University*** |

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

## *Terminology and symbols of change:*

•*Realignment*: Mergers and acquisitions

•*Restructuring*: Reporting structures; organisational ethos

•*Downsizing*: Reducing work-force, investment, production capacity

⬇

Material gain, sometimes short-term, at the expense of the loss of the intellectual capital

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

## Instruments for:

**ASSESSING** organisational knowledge;

**DEVELOPING** and **FOSTERING** knowledge;

**SHARING** knowledge;

**EVALUATING** knowledge.

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

## DEVELOPING and FOSTERING knowledge Within Organisations

| | |
|---|---|
| Facilitate: | **On-the-job training; Learning by doing; Job rotation; Career development** |
| Conduct: | Customer Satisfaction research; Market research; |
| Organise: | **Strategic Technology Study; R&D activities; External seminars & training;** |
| Evaluate: | Projects; People. |
| Promote: | **Cross-disciplinary interaction** |

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

### *DEVELOPING and FOSTERING knowledge across Organisations*

| | |
|---|---|
| Monitor: | Market activities; R&D activities; Technology developments |
| Network: | (at) Trade Shows, State-of-the-Art seminars; Technical Conferences; |

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

### DEVELOPING and FOSTERING
### knowledge Within Organisations

| | |
|---|---|
| Facilitate: | On-the-job training; Learning by doing; Job rotation; Career development |
| Conduct: | Customer Satisfaction research; Market research; |
| Organise: | Strategic Technology Study; R&D activities; External seminars & training; |
| Evaluate: | Projects; People. |
| Promote: | Cross-disciplinary interaction |

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

*DEVELOPING* and *FOSTERING*
*knowledge across Organisations*

Knowledge Bottleneck: Where there are people there is not much new knowledge; where there is new knowledge, there are not many people.

# INTRODUCTION & ORIGINS: CHANGE & MANAGEMENT

*DEVELOPING and FOSTERING knowledge across Organisations*

Knowledge Bottleneck: People don't find it easy to exchange information with each other: for social, economic, technological and linguistic reasons; time, money are key factors.

# INTRODUCTION & ORIGINS:
## CHANGE & MANAGEMENT

*DEVELOPING* and *FOSTERING* *knowledge across Organisations*

Knowledge Bottleneck: Currently, it is not possible to exchange information in a timely, convenient and cost-effective manner.

# KNOWLEDGE WORK & SOCIETY

**Peter Drucker introduced the terms *knowledge work* and *knowledge worker* in the 1960's. The term *knowledge management* refers to the management of the knowledge of the knowledge-workers.**

# KNOWLEDGE WORK & SOCIETY

**Maximise the Enterprise's knowledge related effectiveness:**

**1. Governance Functions**

**2. Staff Functions**

**3. Operational Functions**

**4. Valorization: Realising the value of knowledge.**

**Knowledge Management Handbook –    J  Leibowitz.**

# KNOWLEDGE WORK & SOCIETY

- **The term knowledge was usually used in the context of research and development – knowledge based on theory and laboratory experience.  Drucker, Nonaka and Takeuchi, and others have extended the scope of the term by including knowledge based on experience and based on practice.**
- **The term *Knowledge work* was coined to distinguish this kind of work from *manual work*.**

# KNOWLEDGE WORK & SOCIETY

## *Knowledge Society*

The knowledge workers, their managers, the owners of the enterprises, and the customers of the goods, services and information produced by the enterprises, are interdependent on each other.  It has been claimed that these 'players', in their interactions, develop edifices of culture and a kind of a society: the *knowledge society.*

# KNOWLEDGE WORK & SOCIETY

## *Knowledge Society*

Culture:     Shared Values;
             Exchange System
             Kinship structures

Society:     Compliance – Punishment &
             Reward;
             Organised group of people

# KNOWLEDGE WORK & SOCIETY

## *Knowledge Society*

Organisational structures and interactions within the organisation → Organisational Theory.

**Information Processing** within the organisation→ Psychological theory.

# KNOWLEDGE WORK & SOCIETY

## *Knowledge Society*

- **The knowledge society, like others, demands a system of recruitment, values and their transmission from one generation to the next, and some means of enforcement and discipline.**

- The implication of the knowledge society is that there may be times when the society will expect the individuals to subordinate their interests, and sometimes perhaps their existence, to what may be perceived by the more persuasive members of the community to be in the wider society's best interests.

- **The management of expertise, the key asset of the knowledge worker, appears to be the central concern amongst those who have reservations about the whole enterprise of the knowledge society.**

# KNOWLEDGE WORK & SOCIETY

## *Knowledge Society*

- A society based on exchange of knowledge, based on structures that facilitate the exchange, and based on protocols for enforcing discipline and for rewarding achievements;
- Knowledge Society: Knowledge <u>of</u> an organisation?
- Do organisations have knowledge which is other than what individual members of the organisation have?

# KNOWLEDGE WORK & SOCIETY

•Individuals have knowledge: facts, rules, theories, beliefs; know-how, skills; meta-knowledge for criticising and innovating upon existing knowledge.

•Individuals use organisations for physical and intellectual sustenance: for testing their knowledge and learning things new.

•Organisations have structures for physically and intellectually supporting individuals.

•Organisations can deploy knowledge, make it obsolescent, help in innovation.

# KNOWLEDGE WORK & SOCIETY

- **Knowledge of the individuals permeates through organisations:**

    - **Through hierarchies;**

    - **Through matrices;**

    - **Through networks;**

- **Knowledge permeates through these graphs (constellations of nodes and links) formal & informal mechanisms and processes.**

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# CORPORATE LEARNING



**Academia**
Pursuit of knowledge;
Transmission of culture;
Instilling *values*.

**Professional Institutions**
Validation of experience;
Code of Conduct;
Representation of Interest.

**State/Federal Institutions**
Protection of individuals;
Promulgation of order;
Regulation of organisations.

**'The' Market**
Promotion of competition;
Facilitates investment;
Champions individual.

# CORPORATE LEARNING

## *Can organisations learn? Organisational type*

| *Metaphor* | *Salient Features* |
|---|---|
| Organism | Mutation; Species; Competition; Genetic transmission; interaction between part & whole |
| Brain | Connectivity; Local and Global Interactions; Supervised/Unsupervised Learning |
| Culture | Ideology; exchange systems; morals; rules |
| Political System | Power distribution; Control of intellectual and material resources; |
| Autopoiesis | Autonomy; circularity; and self-reference; self renewal/self creation |
| Domination | Sub-ordination; Charisma; Rational-legal |

# CORPORATE LEARNING

### *Can organisations learn to learn?*

Can organisations learn in an *on-going way?*

What are the main *barriers* to learning?

Are these barriers intrinsic to the *nature* of human organisation?

Can these barriers be *overcome*?

Does learning requires the ability to detect and correct errors:

- in relation to *set operating norms*?

- not only in relation to set operating norms but by *questioning* the operating norms?

# CORPORATE LEARNING

## *Can organisations learn to learn?*

•Learning by instruction;

•Learning by experimentation;

•Learning by rote;

•Learning by observation;

•Learning from examples;

•Learning by doing;

•Learning by analogy;

•**Learning from mistakes and errors;**

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

Cybernetics is a subject that deals with the self-maintenance and self-control of systems, both mechanical and organic, through a feed-back process. Cyberneticians also study the communication of information in such systems.

Donald Schon (MIT) & Chris Argyris (Harvard) used the principles of cybernetics to provide a framework for thinking about *learning organisations.*

# CORPORATE LEARNING

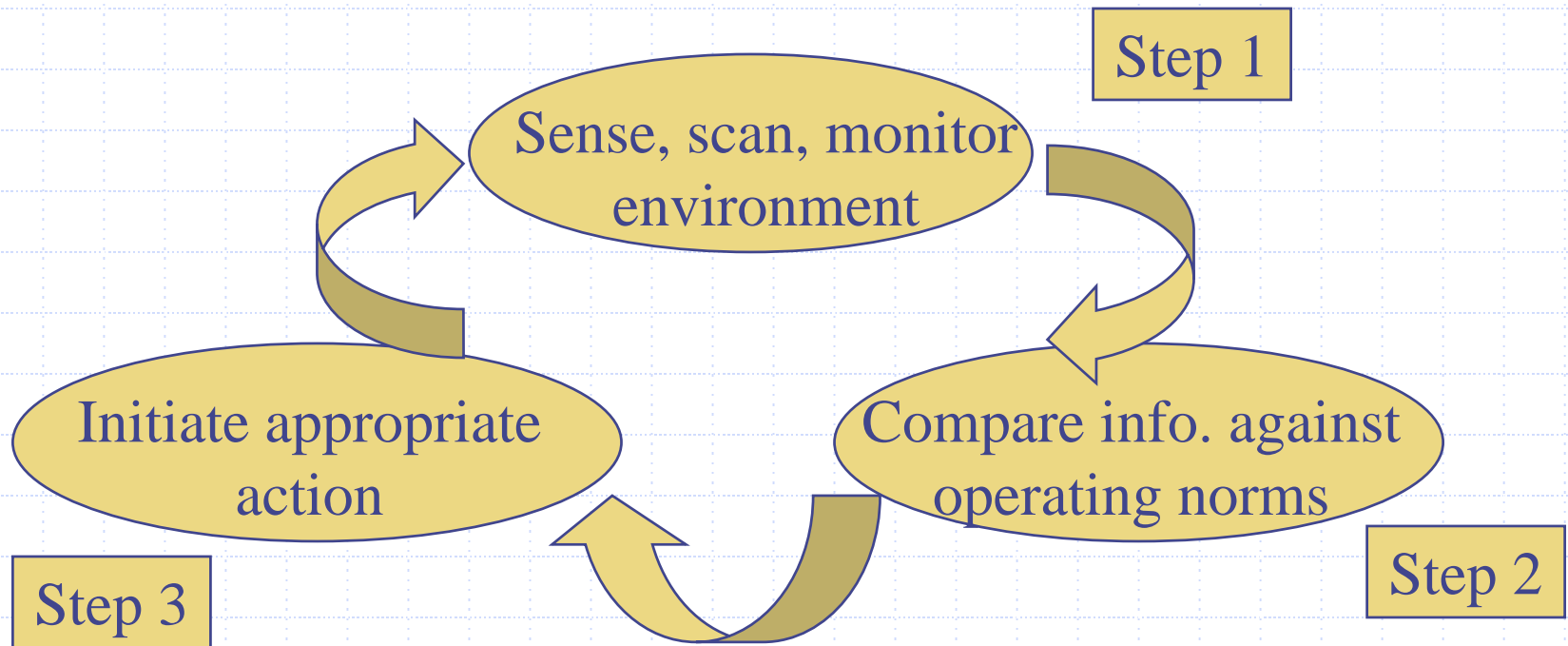## *Can organisations learn? Feedback and Control*

**Control**: In engineering it means to allow a machine to run within safe parameters and for the machine to operate efficiently.

**Feedback**: An important component of any dynamic system.  The ability to take into account both the inputs and outputs of a system.

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Single loop learning:*

Step 1

Sense, scan, monitor environment

Compare info. against operating norms

Initiate appropriate action

Step 3

Step 2

# CORPORATE LEARNING

***Can organisations learn? Feedback and Control***

*Double loop learning:*

*Data –Process→*

*Information –*

*Interpret→*

*Knowledge←based*

*on← Belief*

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*
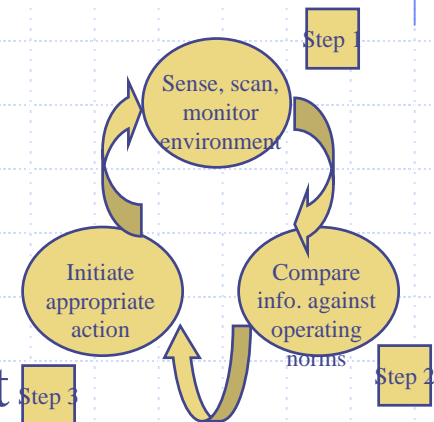
*Double loop learning:*

*Data –Process→*

*Information –*

*Interpret→*

*Knowledge←based*

*on← Belief*

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Single loop learning:*

The operation of a thermostat: The thermostat is constantly sensing, scanning and monitoring its environment (Step1); checking whether to (a) do nothing; (b) increase the heat; (c ) decrease the heat (Step 2); the send an appropriate control signal to the energy source (Step 3).
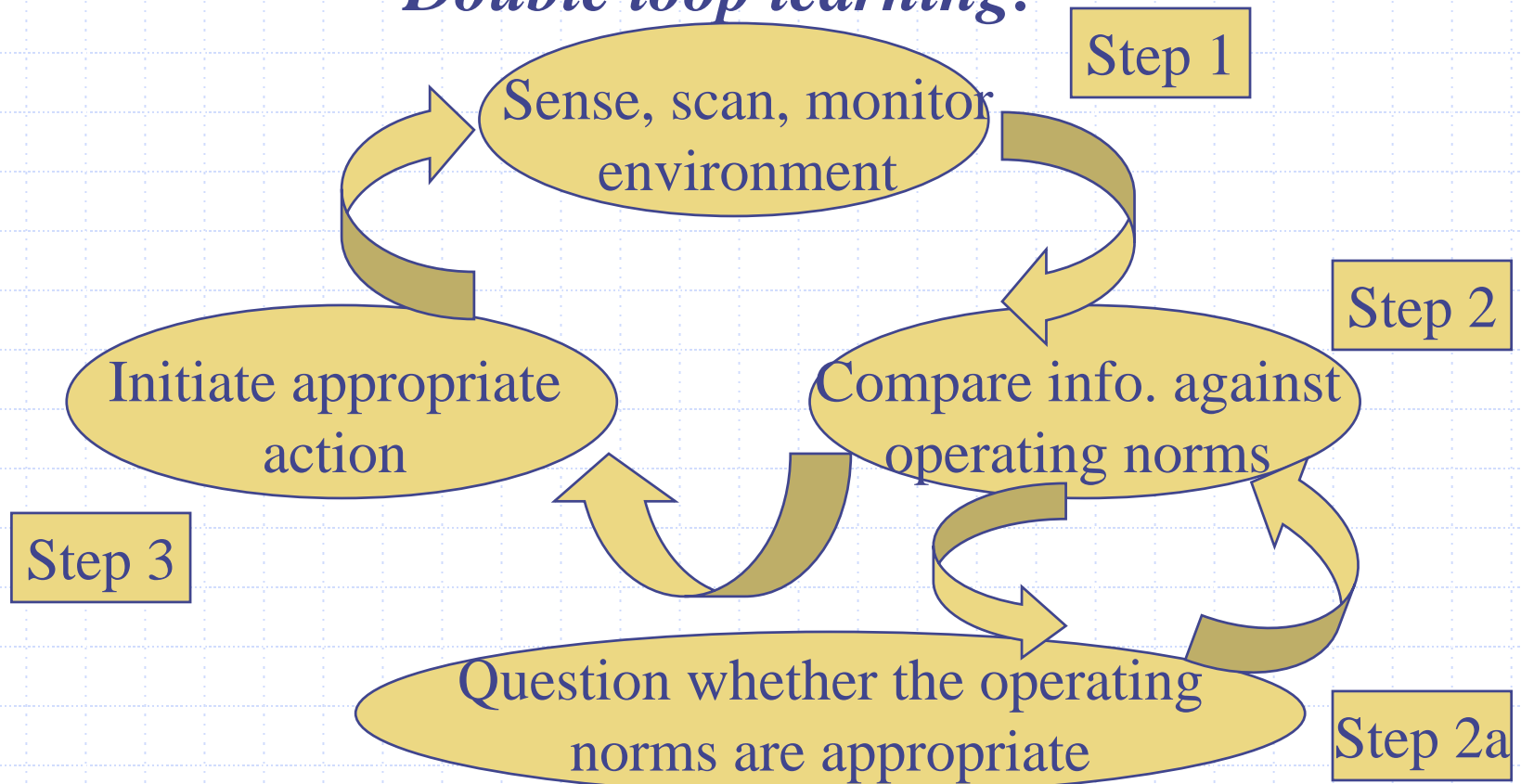
Step 1

Sense, scan, monitor environment

Initiate appropriate action

Compare info. against operating norms

Step 3

Step 2

There are preset operating norms that can only be adjusted through an external agency.  For instance: <=5 Centigrade turn heating on; >=10 C turn cooler on.  Independent of changes in the environment.

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*
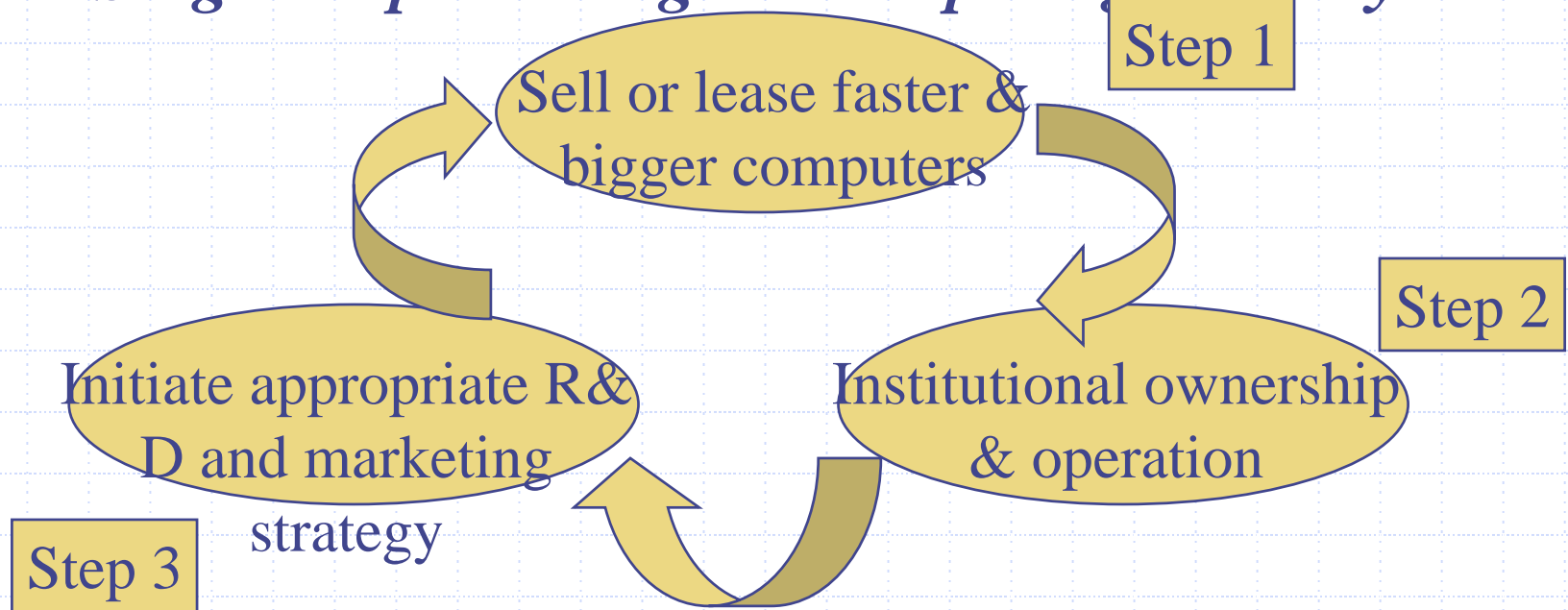
### *Double loop learning:*

Step 1

Sense, scan, monitor environment

Step 2

Initiate appropriate action

Compare info. against operating norms

Step 3

Question whether the operating norms are appropriate

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Single loop learning: In computing industry*

Step 1

Sell or lease faster & bigger computers

Step 2

Institutional ownership & operation

Initiate appropriate R&D and marketing strategy

Step 3

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning: In computing industry*

Step 1

Sell or lease faster & bigger computers

Step 2

Institutional ownership & operation

Initiate appropriate R&D and marketing strategy

Step 3

Why institutional ownership & control?

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning: In computing industry*



Step 1

Sell or lease faster & bigger computers

Step 2

Institutional ownership & operation

Initiate appropriate R&D and marketing strategy

Step 3

We should allow individual ownership & control.

Step 2a
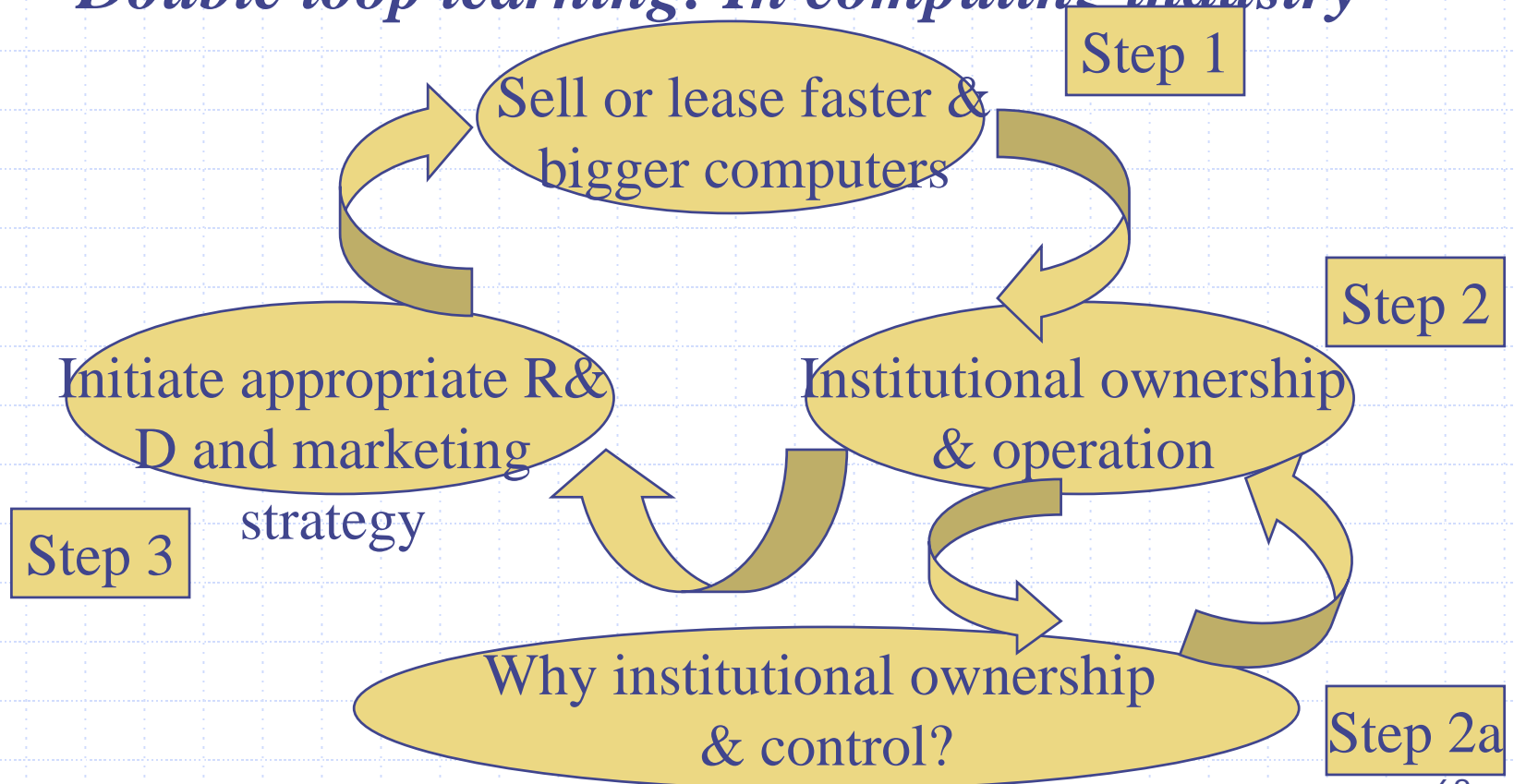
# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Single loop learning: Apple's contribution*
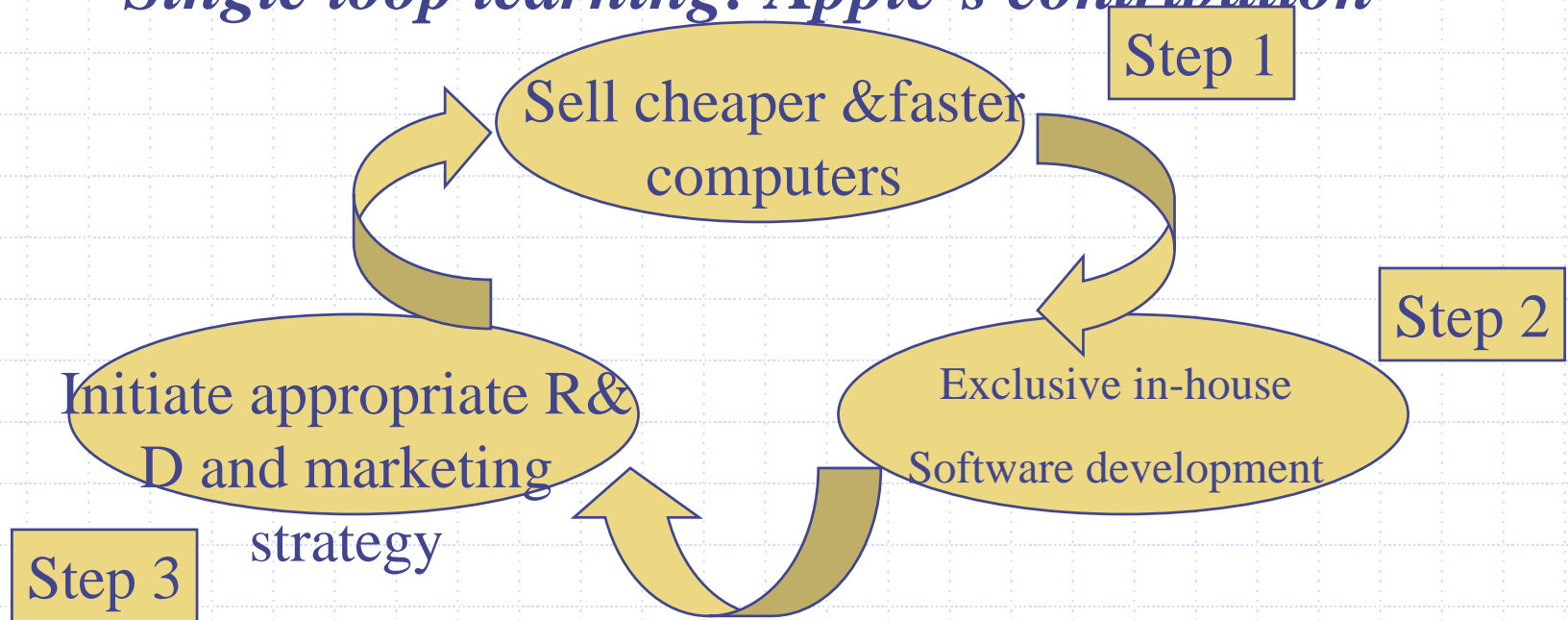
Step 1

Sell cheaper &faster computers

Step 2

Exclusive in-house Software development

Initiate appropriate R&D and marketing strategy

Step 3

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning: IBM contribution*

Step 1

Sell cheaper &faster computers

Step 2

Exclusive in-house Software development

Initiate appropriate R&D and marketing strategy

Step 3

We should allow others to develop Software for the PC

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning: IBM contribution*

Step 1

Sell cheaper &faster computers

Step 2

Exclusive in-house Software development

Initiate appropriate R&D and marketing strategy

Step 3

We should allow others to develop Software for the PC

Step 2a
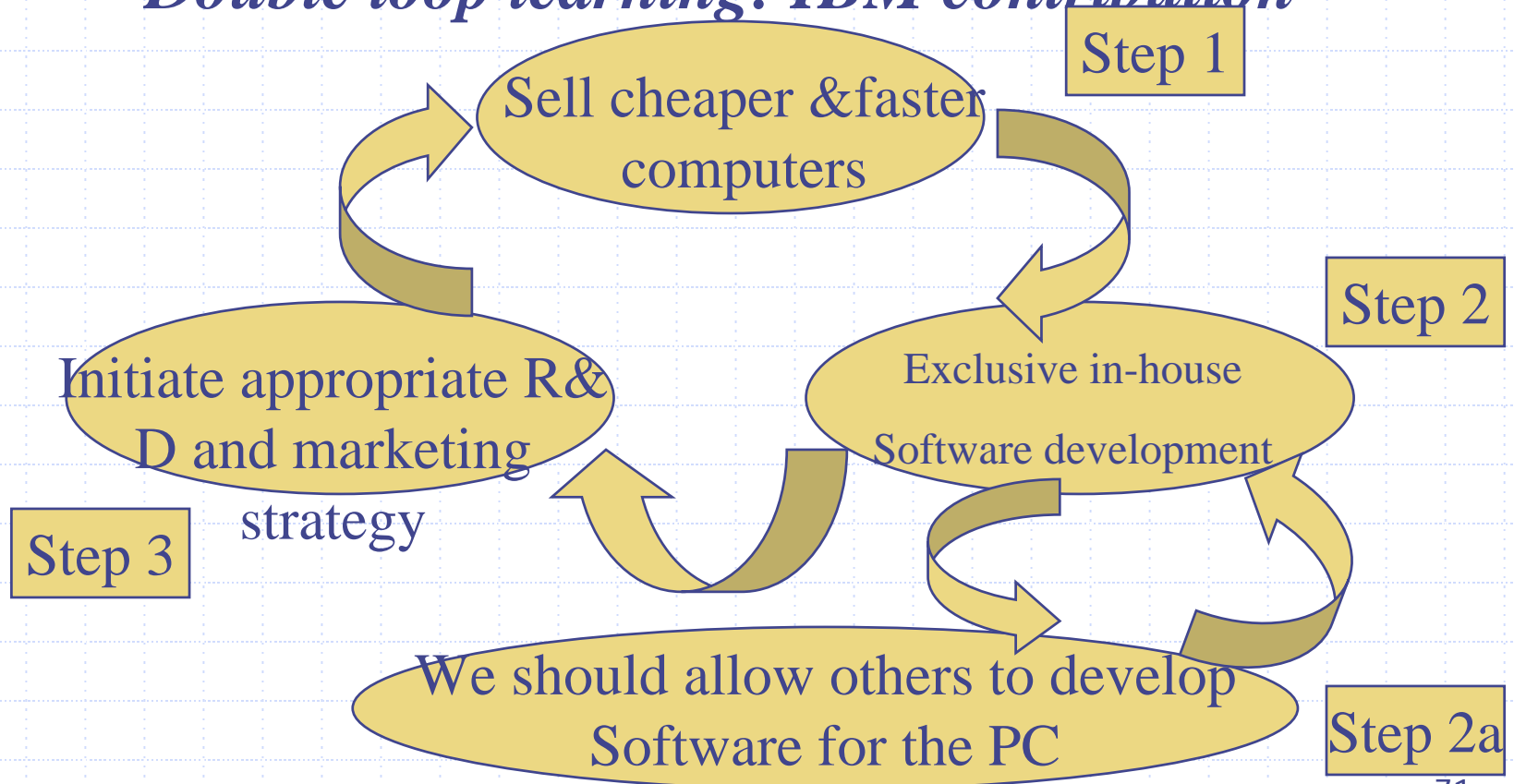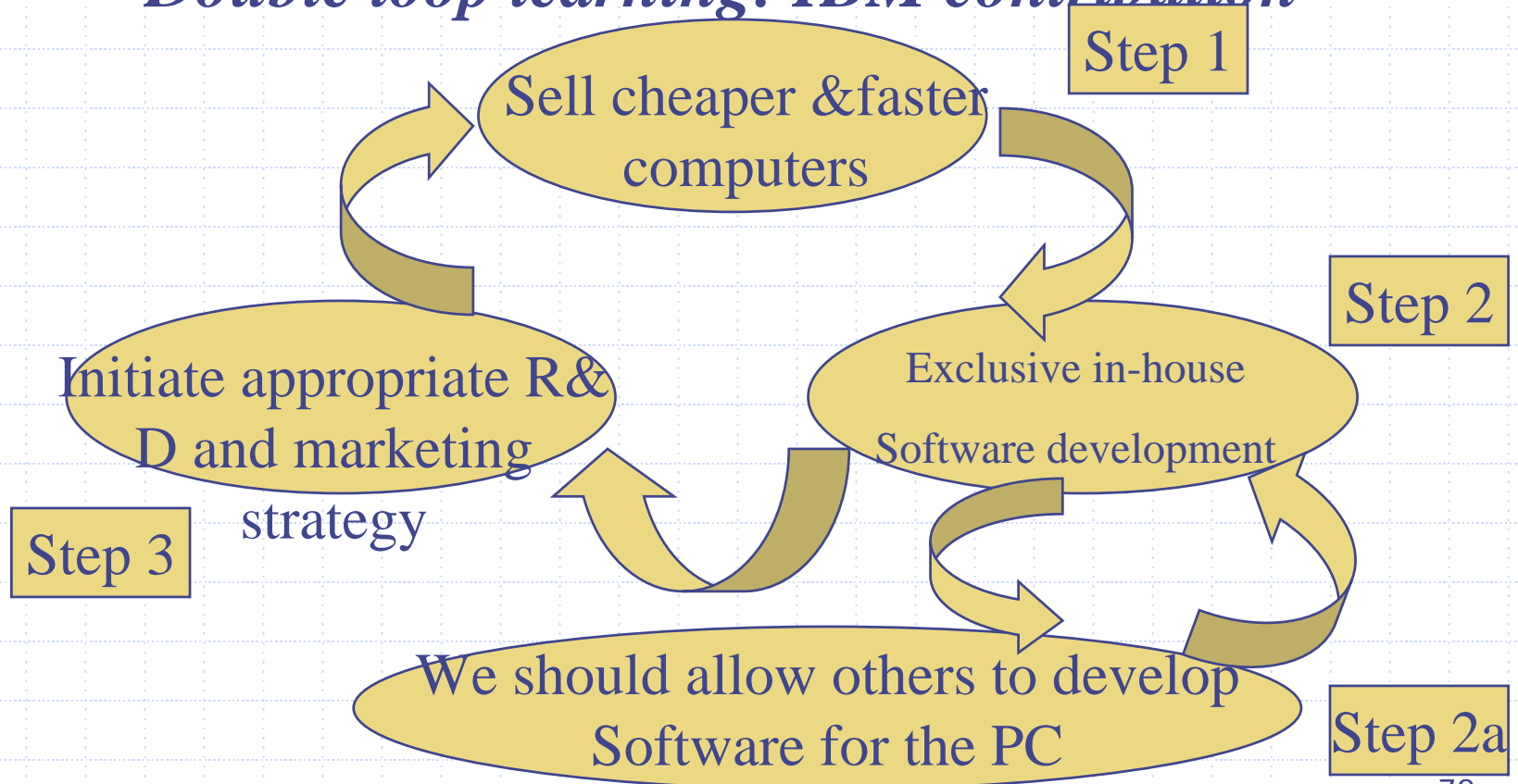
# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Double-loop learning is like a thermostat which can ask the question: Why have you set my operating norms as X C for hot and Y for cold?  Although the thermostat questions it still goes on controlling the environment
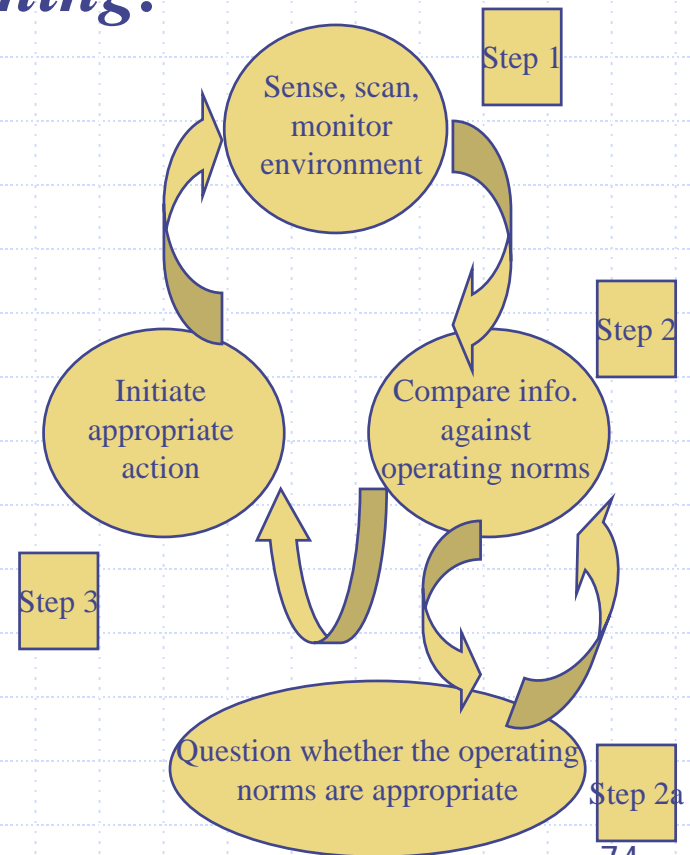
Sense, scan, monitor environment

Step 1

Step 2

Compare info. against operating norms

Initiate appropriate action

Step 3

Question whether the operating norms are appropriate

Step 2a

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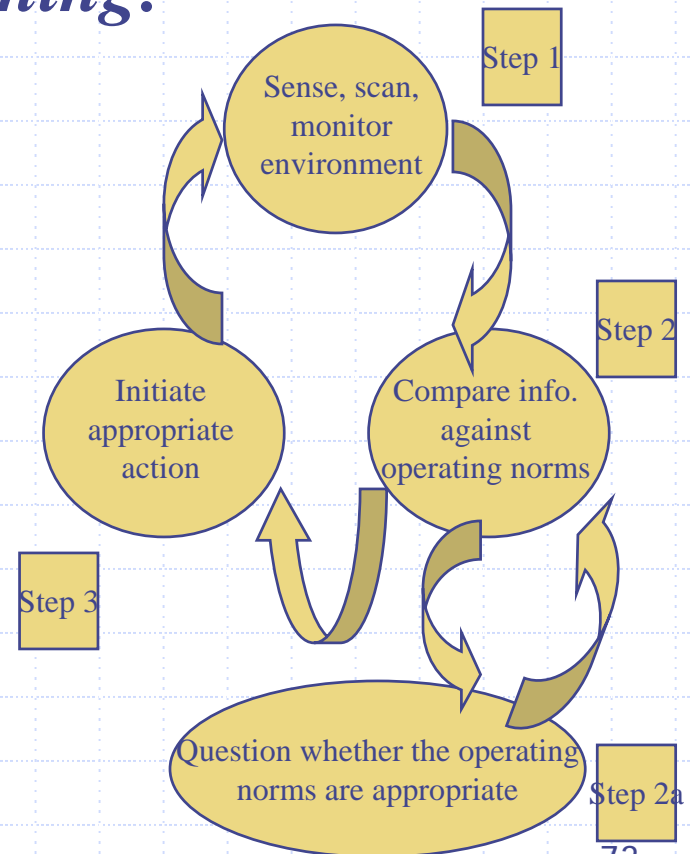
# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Challenge the norm but
attempt to preserve order
by noting *reference points*.

Questioning is important
but has to ensure that
organisation is consulted
as a whole.

Step 1

Sense, scan,
monitor
environment

Step 2

Initiate
appropriate
action

Compare info.
against
operating norms

Step 3

Question whether the operating
norms are appropriate

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

# SELF ORGANISATION

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Brain as a metaphor for organisations is very relevant here in that the animal brain shows such a *self*-organising behaviour.
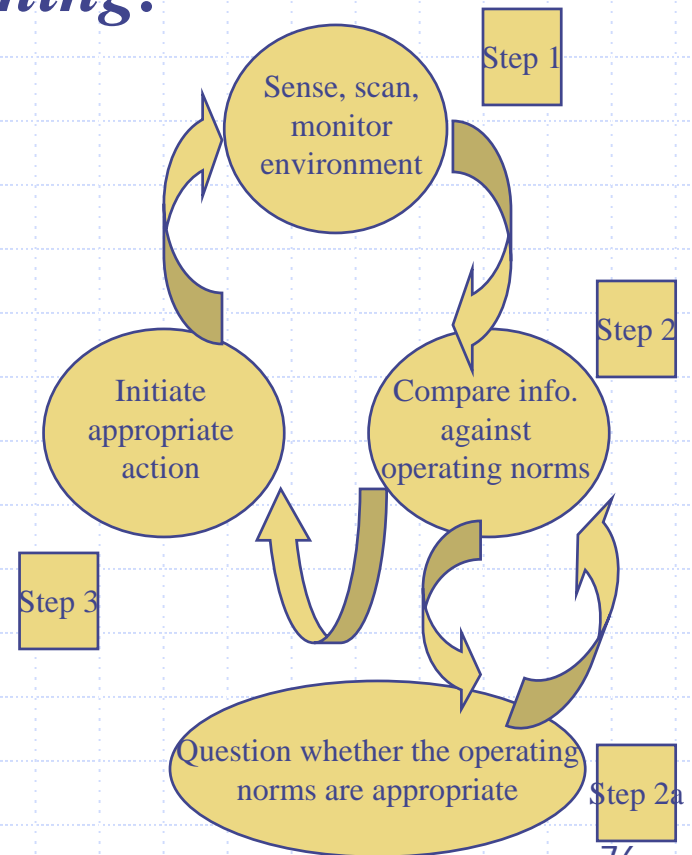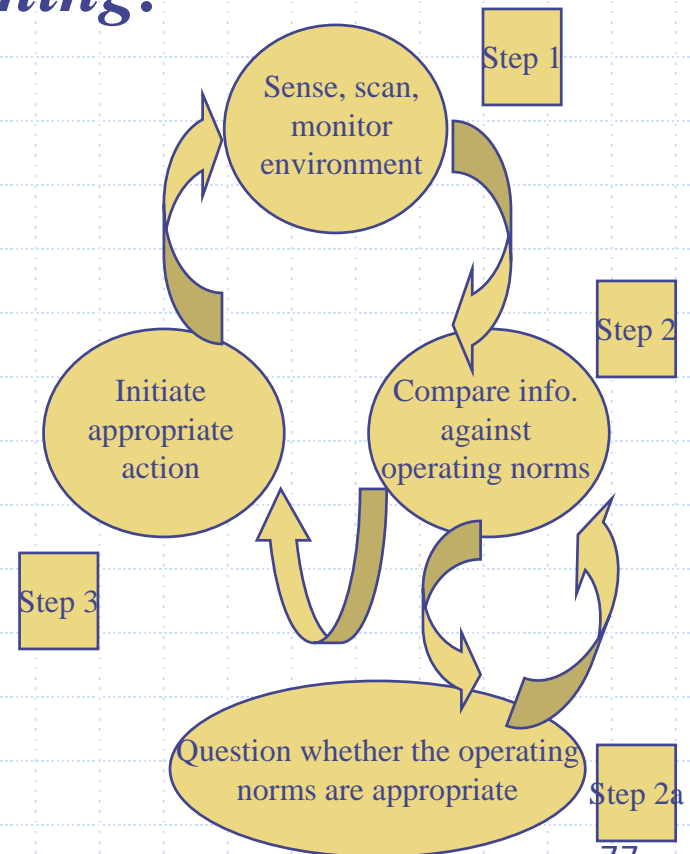
Step 1

Sense, scan, monitor environment

Step 2

Compare info. against operating norms

Initiate appropriate action

Step 3

Question whether the operating norms are appropriate

Step 2a

# CORPORATE LEARNING

## Can organisations learn? Feedback and Control

### Double loop learning:

Defensive reasoning and the *doom loop*. (Agyris 1998:85)
Highly successful operatives, not used to failure create the information bottleneck – obstruct Step 2a.

Step 1

Sense, scan, monitor environment

Step 2

Compare info. against operating norms

Initiate appropriate action

Step 3

Question whether the operating norms are appropriate

Step 2a

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# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Knowledge Management:

Best Practice (Extant knowledge); Reuse

Innovation (New knowledge); Novel Usage

Life Cycle:

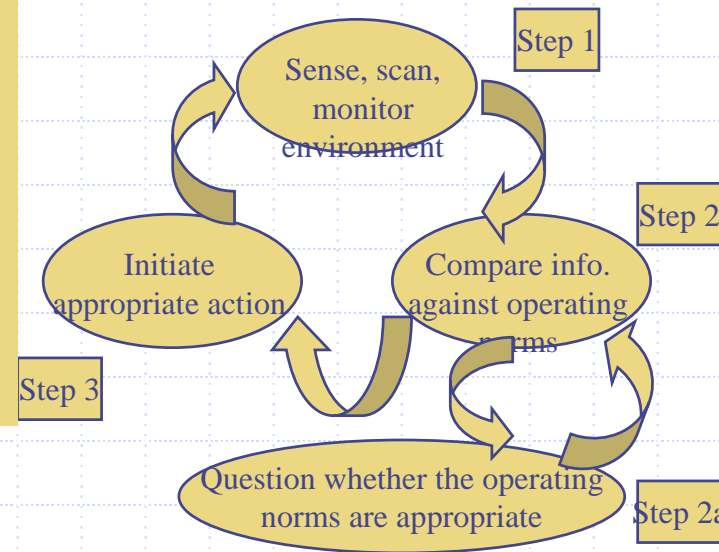Creativity (Inception) → Growth → Currency → Maturity → Decay and Obsolescence

Decay→ Pruning
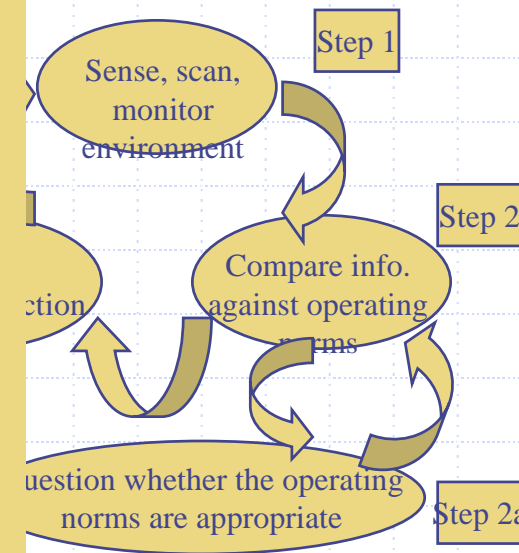
Step 1

Sense, scan, monitor environment

Step 2

Compare info. against operating norms

...ction

Question whether the operating norms are appropriate

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

**Knowledge Management**

**(Creating & Sustaining plus Pruning)**

**Learning Organisations**

Step 1

Sense, scan, monitor environment

Step 2

Compare info. against operating norms

Initiate appropriate action

Step 3

Question whether the operating norms are appropriate

Step 2a

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Single/Double loop learning:*

Defensive reasoning and the *doom loop*. (Agyris 1998:85)

Defensive Routines:     1. Hold back bad news

2. Amplify good news

3. Tell people what they want to hear

Structures that encourage defensive reasoning:

a. Formal structures; Rules

b. Job descriptions

c. Groupthink → we are the best!

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

### Knowledge Management:

Facilitate a transparent flow of information;

Facilitate easy exchange of information;

Facilitate easy recall of information;

Facilitate access to forecasting, modelling and simulation systems

### What then?

Allows an organisation to involve workers at all levels to share information;

Allows an organisation to share information about the inputs and reactions to its outputs primarily from the customers

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

### Feedback on current operations and existing norms

Positive feedback: More leads to more; less leads to less;
Negative feedback: More leads to less, and less to more.
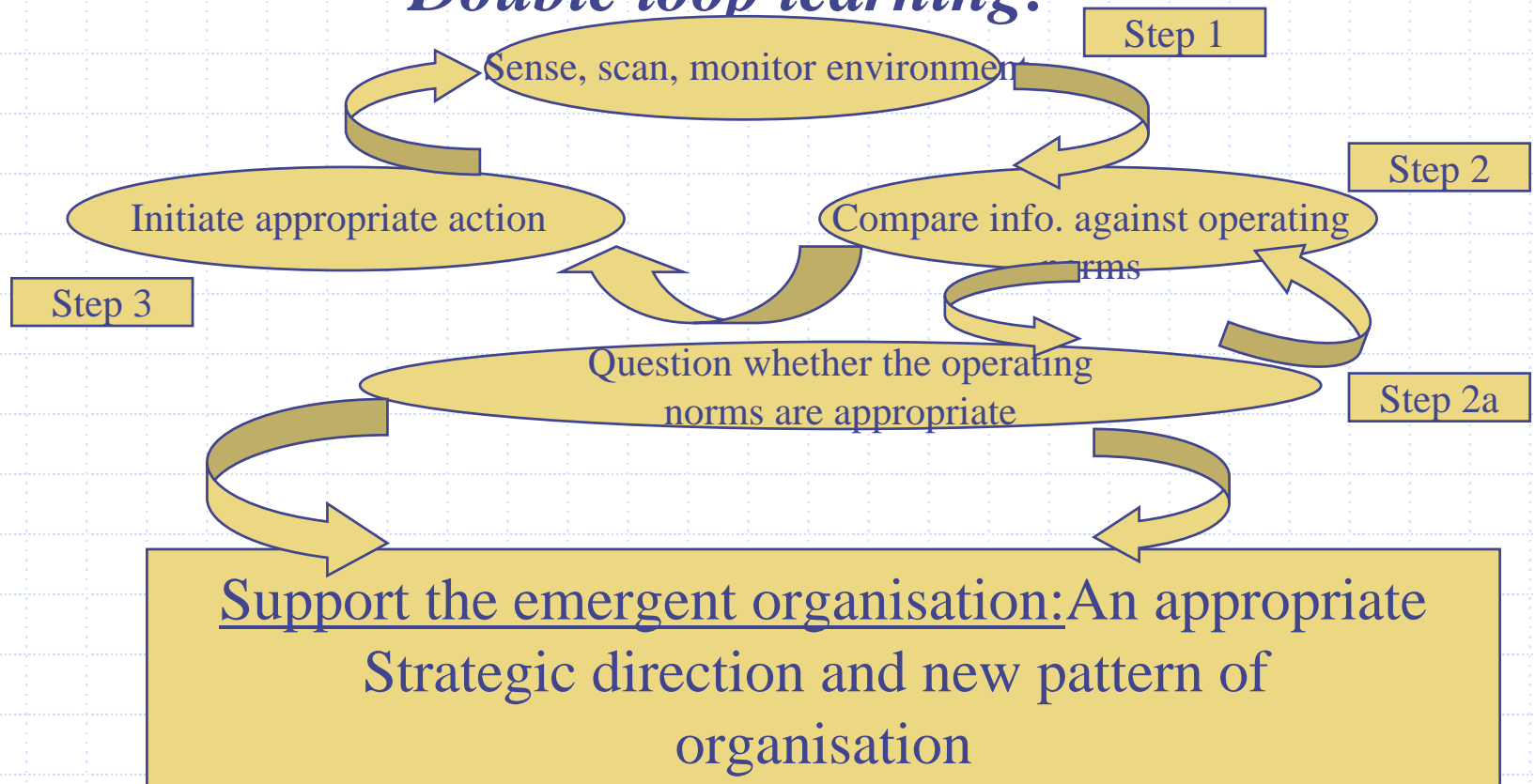
### Who is it for?

People who are good at defensive reasoning;
People who cherish existing job descriptions, rules, and cliques

# CORPORATE LEARNING

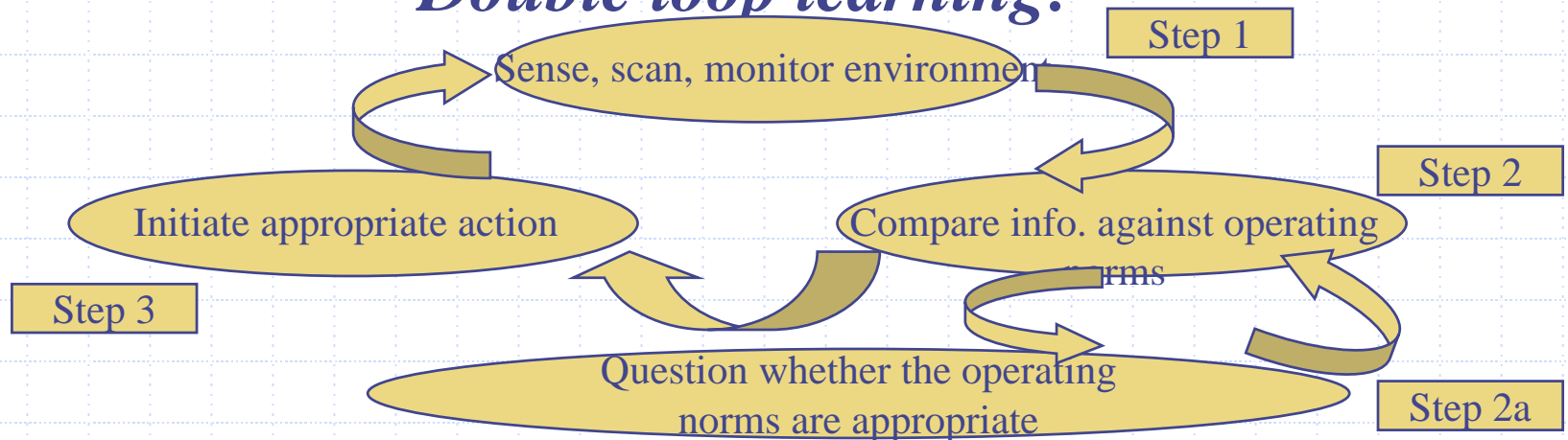## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Step 1

Sense, scan, monitor environment

Step 2

Initiate appropriate action

Compare info. against operating norms

Step 3

Question whether the operating norms are appropriate

Step 2a

Support the emergent organisation:An appropriate Strategic direction and new pattern of organisation

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Step 1

Sense, scan, monitor environment

Step 2

Initiate appropriate action

Compare info. against operating norms

Step 3

Question whether the operating norms are appropriate

Step 2a

Emergent Structures

Life-long learning;

**Quality Movement** originated in Japan – everything has to be challenged: all norms to be examined

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

Sense, scan, monitor environment — **Step 1**

Compare info. against operating norms — **Step 2**

Question whether the operating norms are appropriate — **Step 2a**

Initiate appropriate action — **Step 3**

## Emergent Structures

Life-long learning;

**Quality Movement** originated in Japan – everything has to be challenged: all norms to be examined

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# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

How can you run an organisation that is constantly changing without setting clear goals and objectives?

**Cybernetics provides an answer.**

Behaviour of intelligent beings is governed or guided by a sense of *vision*, adherence to *values* or *norms*. Otherwise **randomness prevails.**

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

**Cybernetics provides an answer.**
Behaviour of intelligent beings is governed or guided by a sense of *vision*, adherence to *values* or *norms*. Otherwise **randomness prevails.**

**Reference points in a cybernetically controlled system that guide the behaviour of the system.**

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*
### Cybernetic quality

Goals and targets reflect *noble* intentions

# BUT

**Achievements of goals and targets is to be moderated by an understanding of the limits that need to be placed on behaviour ($\rightarrow$ the reference points)**
**And**
**We have problems with this open system approach**

# CORPORATE LEARNING

## Can organisations learn? Feedback and Control

Double loop learning:

**Cybernetic quality**

Goals and targets reflect *noble* intentions

**Ach** rate

**an** laced

## Information Flow

**We have problems with this open system approach**

Access

Recall

R E F E R E N C E

# CORPORATE LEARNING

*Can moorganisations learn? Feedback and Control*

*Double loop learning:*

**Cybernetic quality**

**Keep the strategic and operational dimensions in harmony:**

**•TQM 'failed' (initially): Strategic objective which required constant questioning was interrupted by single loop 'operatives' in the organisations.**

**•Continuous improvement needs a careful balance amongst what needs to be changed and at what speed.**

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# CORPORATE LEARNING

*Can moorganisations learn? Feedback and Control*

*Double loop learning:*

**Cybernetic quality and Self organisation**

- **Structures to support change;**
- **Structures that support risk taking (if your solution does not work we wont fire you)**

# CORPORATE LEARNING

***Can moorganisations learn? Feedback and Control***

*Double loop learning:*

**Cybernetic quality and Self organisation**

**•USA: Hard/fast objectives clearly stated;**

**• Japan: Explore and understand different objectives; be prepared to change.**

# CORPORATE LEARNING

## *Can organisations learn? Feedback and Control*

### *Double loop learning:*

**Cybernetic quality**

Goals and targets reflect *noble* intentions

### BUT

**Achievements of goals and targets is to be moderated by an understanding of the limits that need to be placed on behaviour (→ the reference points)**

**And**

## We have problems with this open system approach:
## •Distribution of power in the organisation;
## •Loss of control and expertise during the transition from old power structures to new power structures

# CORPORATE LEARNING

1. Nature of Environment

2. Nature of task facing

3. Organisation of work

4. Nature of authority

5. Communications System

6. Nature of employee commitment

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

John Seely Brown formerly of Xerox Parc has suggested that:  The research department has to do more than simply innovate new products. It must design technological and organisational 'architectures' that make a continuously innovating company possible 'coproducing' technological and organisational innovations.

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

**For Seely Brown, four key-points redefine what is 'technology', 'innovation', and, indeed, research:**

1. Research on new work practices is as important as research on new products
2. Innovation is everywhere; the problem is learning from it.
3. Research can't just produce innovation; it must 'coproduce' it.
4. The research department's ultimate innovation partner is the customer.

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Document → Lens → Project→ Image → Photorecptors – (Dry Toner) → Photocopy

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Microprocessor Control of Moving Parts → Coordination; Cheaper Memories → Collect Fault Reports & Relayed to Service Engineers

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Microprocessor Control of Moving Parts → Coordination;
Cheaper Memories → Collect Fault Reports & Relayed to Service Engineers.

Remote Invocation Communication (RIC) Program → Expert System

RIC Knowledge Base: Performance data for the different mechanical parts of a
photo-copier;
Rules for predicting breakdown
Inferences on the rule base and send a message to service
engineers;
Scheduling of service engineer's resources
(Maintenance fees were a large part of the revenue)

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Photocopier → Facsimilie Production → Collating,
Binding, 1→2 sides, 2→2 sides; Print time
and date
A high-value, multi-functional, self-diagnostic SYSTEM

Any SYSTEM allows many-pathways of use and ABUSE.
Xerox engineers made the copier 'idiot proof' → designed
the possibility of error.
Complex user manuals – written by the designers of the
copiers.

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

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A high-value, multi-functional, self-diagnostic SYSTEM

Any SYSTEM allows many-pathways of use and ABUSE.

Xerox engineers made the copier 'idiot proof' → designed the possibility of error.

Complex user manuals – written by the designers of the copiers.

The DEMON copier

The user had to learn to operate a photo-copier!!!!!

20 minutes to clear paper jam.

Even for minor problems engineers were called

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

USABILITY: Xerox researchers in other departments were videoed using the machines and the result was a video-nasty

Only then the designers changed their mind. Changed the design dramatically

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

USABILITY: Changed the design dramatically

Instead of the paper manuals we had nice GUI displays; error messages were displayed in English with extensive use of symbols.

Paper jams now take 1 minute to clear.

# INNOVATION MANAGEMENT: CORPORATE LEARNING

***Case Studies in Corporate Learning - Xerox***

Knowledge → Abstract, concepts, reflection → Isolated, intellectual act → Research is an individual act

Knowledge → Concrete, applications, practice → Collective, practical act → Research involves a community of workers

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Research ➔ Methods in hard sciences: physics, chemistry, mathematics, biology

Research ➔ Sciences that deal with behaviour of the individual and that of groups ➔ psychology, sociology, anthropology

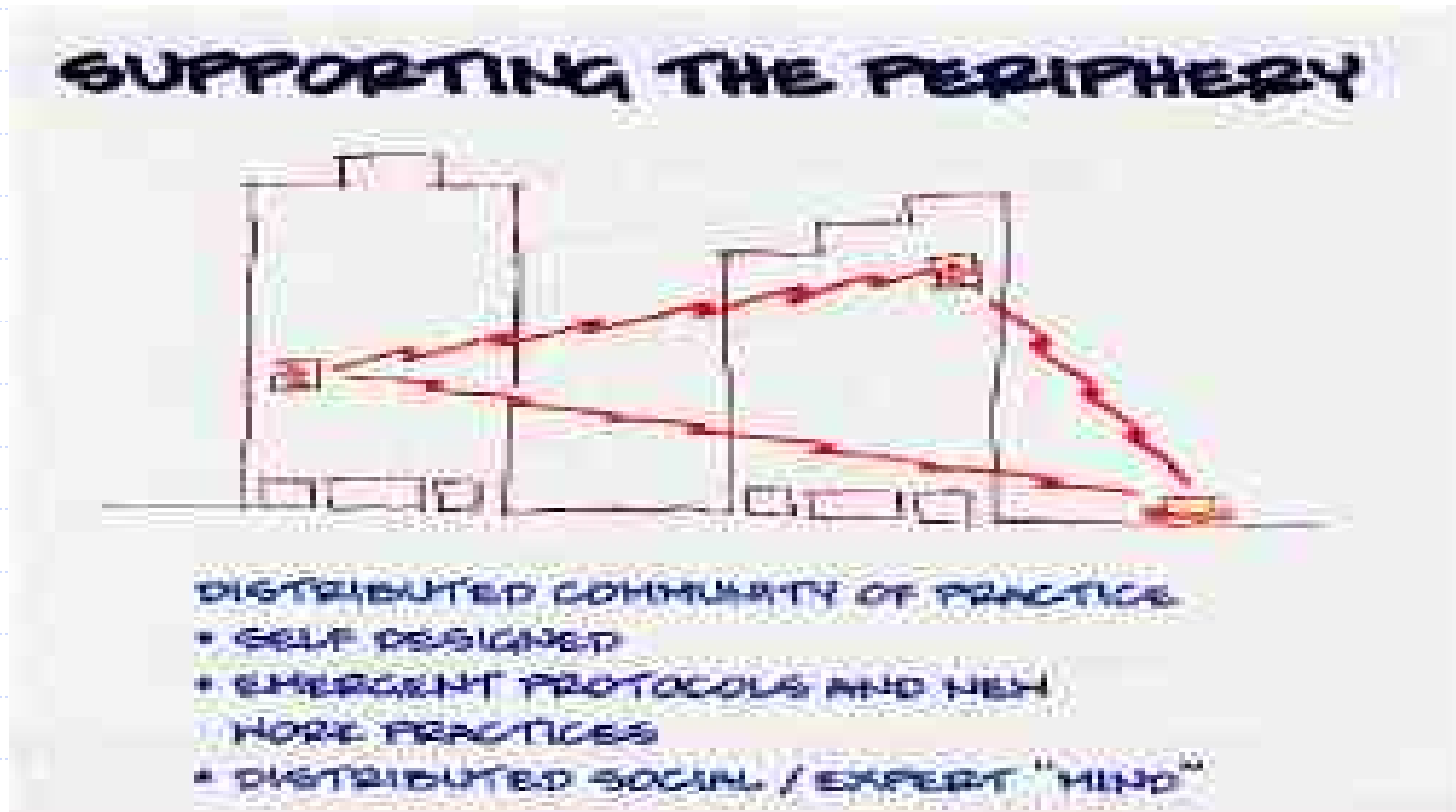# INNOVATION MANAGEMENT: CORPORATE LEARNING

## Learning to unlearn

www.creatingthe21stcentury.org/JSB3-learning-to-unlearn.html

**Storytelling: Scientist's Perspective: John Seely Brown Learning to unlearn**

The curious thing is that with these exponential changes, so much of what we currently know is just getting to be wrong. So many of our assumptions are getting to be wrong. And so, as we move forward, not only is it going to be a question of learning but it is also going to be a question of unlearning. In fact, a lot of us who are struggling in large corporations know first hand that the hardest task is to get the corporate mind to start to unlearn some of the gospels that have made them successful in the past and that no longer will actually work in the future

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*



SUPPORTING THE PERIPHERY

DISTRIBUTED COMMUNITY OF PRACTICE
* SELF DESIGNED
* EMERGENT PROTOCOLS AND NEW WORK PRACTICES
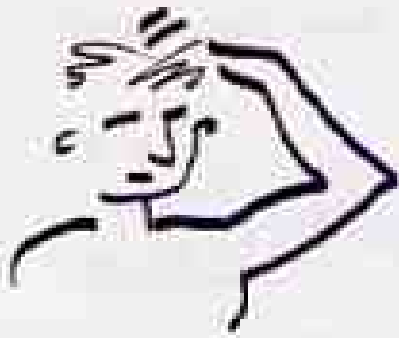* DISTRIBUTED SOCIAL / EXPERT "MIND"

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*



A PARADOX IN KNOWLEDGE MANAGEMENT

KNOWLEDGE IS:
* STICKY—HARD TO MOVE TO OTHER PARTS OF THE FIRM
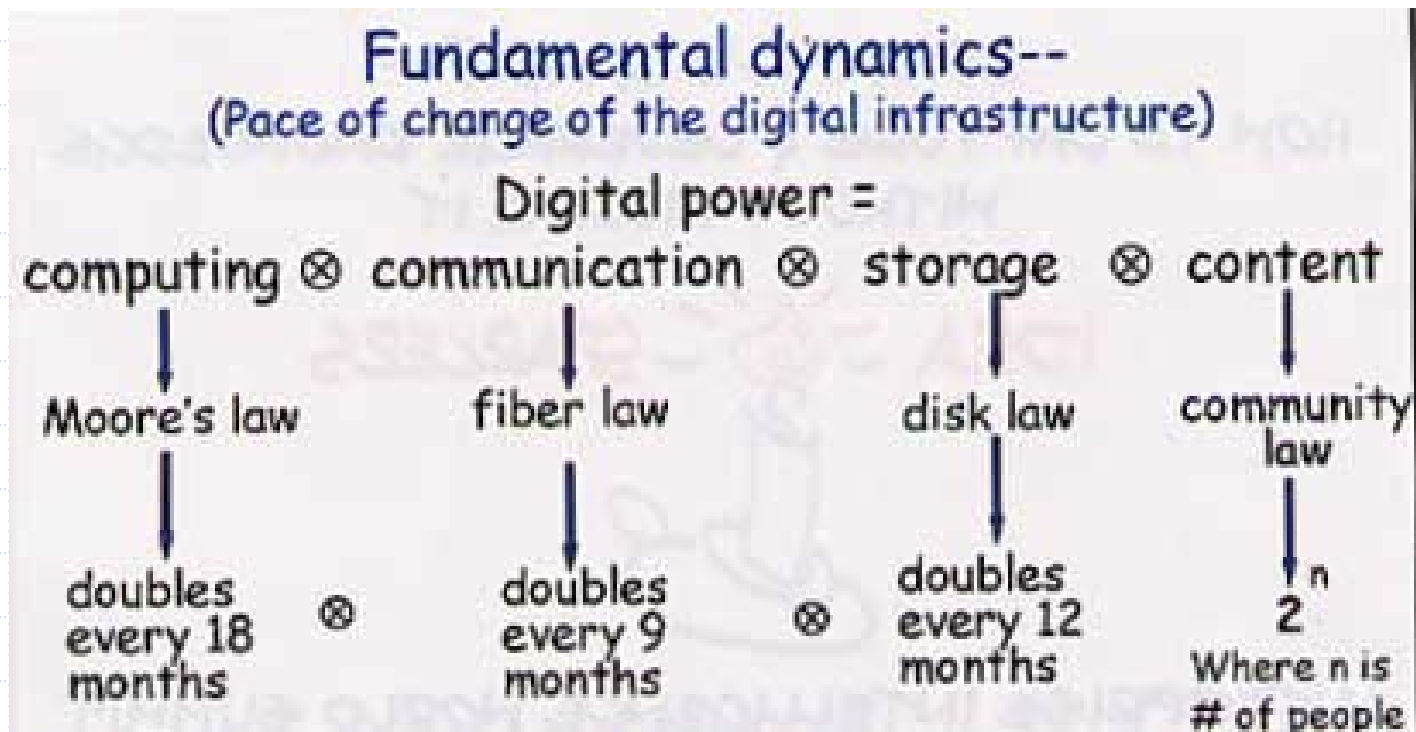* LEAKY—MOVES TOO EASILY OUT OF THE FIRM
* INTANGIBLE—CAN'T BE EASILY MEASURED

HOW—CAN SOMETHING BE MANAGED THAT IS BOTH STICKY & LEAKY, AND ALSO INTANGIBLE?

YES, IF YOU CAN UNDERSTAND THE DYNAMICS OF TRUST

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Fundamental dynamics--
(Pace of change of the digital infrastructure)

Digital power =

computing ⊗ communication ⊗ storage ⊗ content

Moore's law          fiber law          disk law          community law

doubles ⊗ doubles ⊗ doubles $2^n$
every 18          every 9          every 12          Where n is
months            months           months           # of people

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Storytelling: Scientist's Perspective: John Seely Brown

# INNOVATION MANAGEMENT: CORPORATE LEARNING

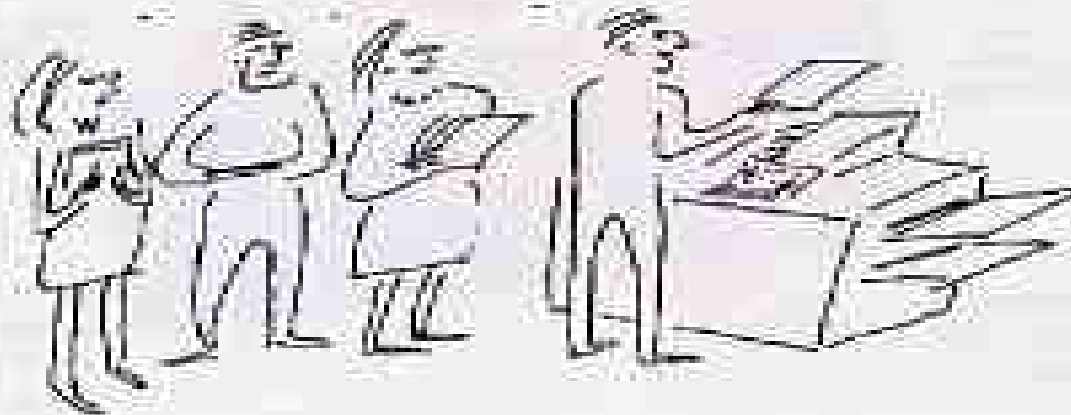## *Case Studies in Corporate Learning - Xerox*

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

*NARRATIVE: An account of a series of events, facts, etc., given in order and with the establishing of connections between them; a narration, a story, an account.*
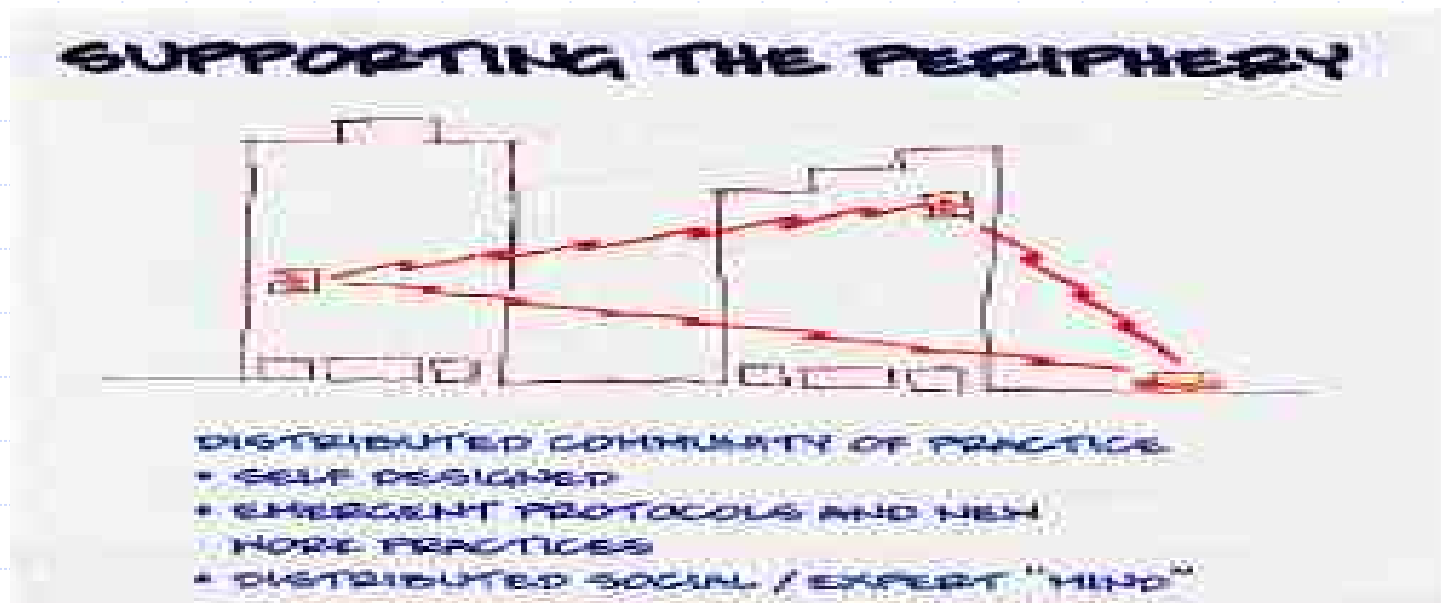
LEARNING TO USE TECHNOLOGY FROM AND WITH OTHERS...

LEARNING AND HELPING WHILE WAITING

# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

ANTHROPOLOGY:    The science of man, or of mankind, in the widest sense.
The science of the nature of man, embracing Human Physiology and Psychology and their mutual bearing.
The 'study of man as an animal' (Latham). The branch of the science which investigates the position of man zoologically, his 'evolution,' and history as a race of animated beings.



SUPPORTING THE PERIPHERY

DISTRIBUTED COMMUNITY OF PRACTICE
* SELF DESIGNED
* EMERGENT PROTOCOLS AND NEW WORK PRACTICES
* DISTRIBUTED SOCIAL / EXPERT "MIND"

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# INNOVATION MANAGEMENT: CORPORATE LEARNING

## *Case Studies in Corporate Learning - Xerox*

Anthropology:
- The science of man, or of mankind, in the widest sense.
- The science of the nature of man, embracing Human Physiology and Psychology and their mutual bearing.

The 'study of man as an animal' (Latham). The branch of the science which investigates the position of man zoologically, his 'evolution,' and history as a race of animated beings.

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

The Japanese model, much talked about in the early 1990's as the model of innovation and self organisation, had a number of exemplars: Canon, Honda, Sharp and NEC.

According to Professors Ikujiro Nonaka and Hirotaka Takeuchi, Hitotsubashi University (Japan), these organisations managed to change by exploiting the knowledge held within their organisations – their *core competence*- and engaged with the post-industrial society.

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

Professors Ikujiro Nonaka and Hirotaka Takeuchi, Hitotsubashi University (Japan) have argued that an enterprise which is thriving, has a bright future, is an enterprise which is (almost) always **creating** knowledge.

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

Creating new knowledge, or revising existing knowledge, requires the participation of the **KNOWLEDGE CREATION CREW** according to Nonaka and Takeuchi:

| *knowledge practitioners* | **front line employees – researchers and team leaders in different specialisms;** |
|---|---|
| *knowledge engineers* | **middle managers in R&D departments** |
| *knowledge officers* | **top managers of different divisions.** |

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

Canon succeeded by focusing on 'a small multi-feature product [copier] that could be used by anyone and produced at minimum cost'.  This involved the knowledge creation crew at Canon leveraging knowledge.

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

With Canon's range of superb personal copiers, you can. Each model offers unique advantages in terms of size, features and functions – providing a wealth of choice when it comes to selecting your personal favourite. **→ Analogue Copiers**

**< >**

**FC 100**
**The FC100 is a convenient, easy-to-use copier for either office or personal use. It provides continuous high quality copies, thanks to Canon's unique All-in-One cartridge concept.**

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

With Canon's range of superb personal copiers, you can. Each model offers unique advantages in terms of size, features and functions – providing a wealth of choice when it comes to selecting your personal favourite. **→ Analogue Copiers**

FC120



< 

**Easy to use and stylish, the compact FC120 has a 50-sheet bypass which handles all your copying needs effortlessly. Automatic and manual also exposure ensure a perfect finish for fine text and graphics.**

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

With Canon's range of superb personal copiers, you can. Each model offers unique advantages in terms of size, features and functions – providing a wealth of choice when it comes to selecting your personal favourite. **➔ Analogue Copiers** **PC890**

<
>

**The PC890 is a top-of-the-range compact desktop personal copier that incorporates Canon's revolutionary single cartridge system and a 30-sheet automatic document feeder.**

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# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

**With Canon's range of superb personal copiers, you can. A digital flatbed Copier and Laser Printer in one compact unit, Canon's digital Personal Copier models deliver professional results. They give you enhanced laser output quality at up to 14 pages per minute, and require next to no maintenance. Some also include optional network printing, making them ideal fro small and larger offices alike. → DIGITAL COPIERS**

PC-D320
**The PC-D320 offers all the benefits of hassle-free, high quality copying, complete with the added advantage of digital efficiency. For convenient and clear copying.**

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

**Think differently: Create new ideas, unlearn old practices**

**CANON:**  Not an office copier BUT a personal copier
Design for a small space, not a large space
Produce disposable system, not repairable systems
Market to individuals not organisations

PC-D320
**The PC-D320 offers all the benefits of hassle-free, high quality copying, complete with the added advantage of digital efficiency. For convenient and clear copying.**

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

Think of the Fit as a downsized version of Honda's new five-door Civic and you won't go far wrong. It's another mini MPV with a cleverly packaged five-door body and racy styling cues such as those headlights (styled after those of a Ferrari 360 Modena). Much more interesting than the Logo it replaces, the Fit comes to Europe in 2002 under a different name - Jazz, which, Hondaphiles will recall, the company used for a defiantly quirky tallboy mini offered here in the '80s. In terms of design, the Fit is fairly straightforward. Key to its character are its whizzy, new, 65 mpg, 1.3-litre engine and the bright, roomy and airy cabin. The Jazz is not now to be built in the UK, as originally planned, but could nonetheless be the car that breaks Europe's supermini stronghold.

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

The knowledge 'creation' crew at Honda started to think about *automobile evolution* during the 1980's and started to design an automobile with more room for humans and less for the machine. New knowledge was required for an automobile which was short in length and tall in height, a concept that was named *Tall Boy*.

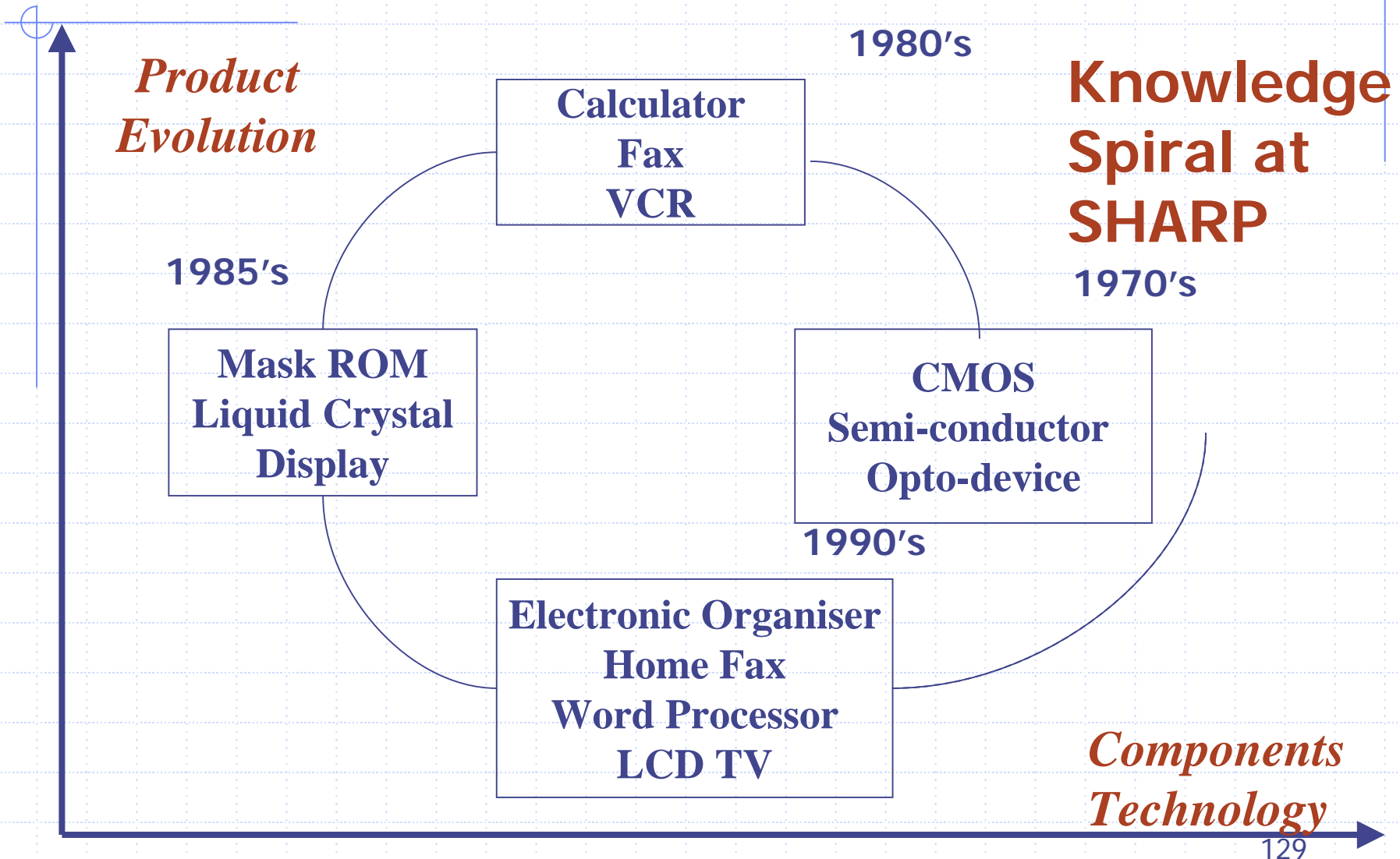# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

## *Case Studies: Japanese Miracle*

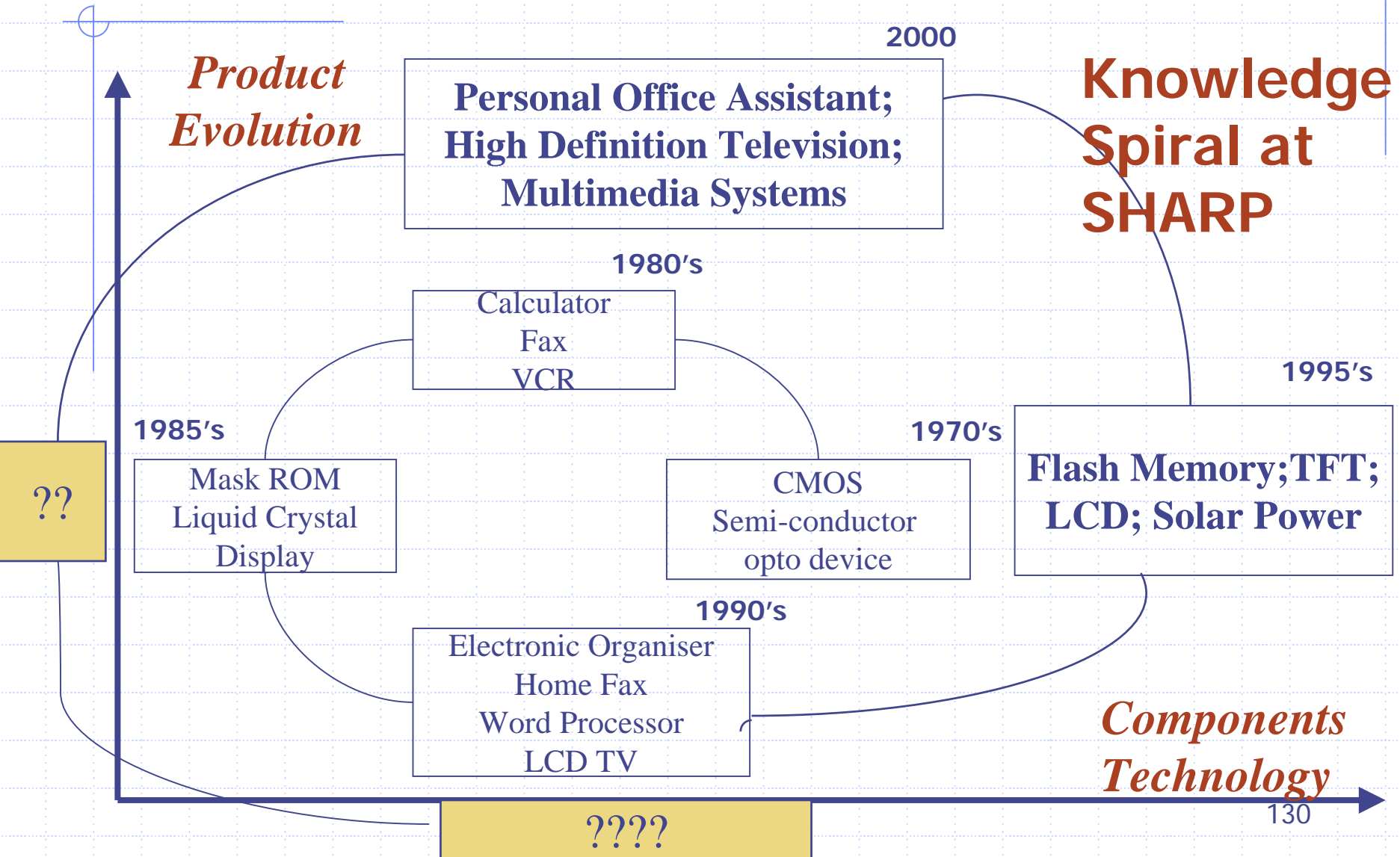| Organisation | Core Competence | New Business Areas |
|---|---|---|
| Canon | Imaging, optics, microprocessor controls | Copiers, laser printers, cameras, scanners |
| Honda | Engines, power turbines | Automobiles, motorbikes, lawn mowers, generators |
| NEC | VLSI, systems integration | Infotainment, office systems |
| Sharp | Smart white goods | Multimedia, Personal Office Assistants |

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# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

Knowledge Creation Crew:

•Is selected from different specialisms in the organisation;

•Works at different levels of organisation – undertakes research projects (PRACTITIONERS); commissions new research (ENGINEER); comments on new products (PRACTITIONERS); make executive decisions (OFFICERS)

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

**Product Evolution**

**Knowledge Spiral at SHARP**

**1980's**

**Calculator
Fax
VCR**

**1970's**

**1985's**

**Mask ROM
Liquid Crystal
Display**

**CMOS
Semi-conductor
Opto-device**

**1990's**

**Electronic Organiser
Home Fax
Word Processor
LCD TV**

**Components Technology**

# INNOVATION MANAGEMENT: LESSONS FROM JAPAN

*Product Evolution*

**Knowledge Spiral at SHARP**

**2000**

Personal Office Assistant;
High Definition Television;
Multimedia Systems

**1980's**

Calculator
Fax
VCR

**1995's**

Flash Memory;TFT;
LCD; Solar Power

**1985's**

Mask ROM
Liquid Crystal
Display

**1970's**

CMOS
Semi-conductor
opto device

??

**1990's**

Electronic Organiser
Home Fax
Word Processor
LCD TV

*Components Technology*

????

# Innovation

## Knowledge Spiral at SHARP

**Products/Services**

**Scientific Progress & Technical Change**

Social Attitudes

# Corporate Learning
## KNOWLEDGE WORK & SOCIETY



Officer

Engineer

Practitioner

Leveraged Knowledge

Document DB

'Artefact' DB
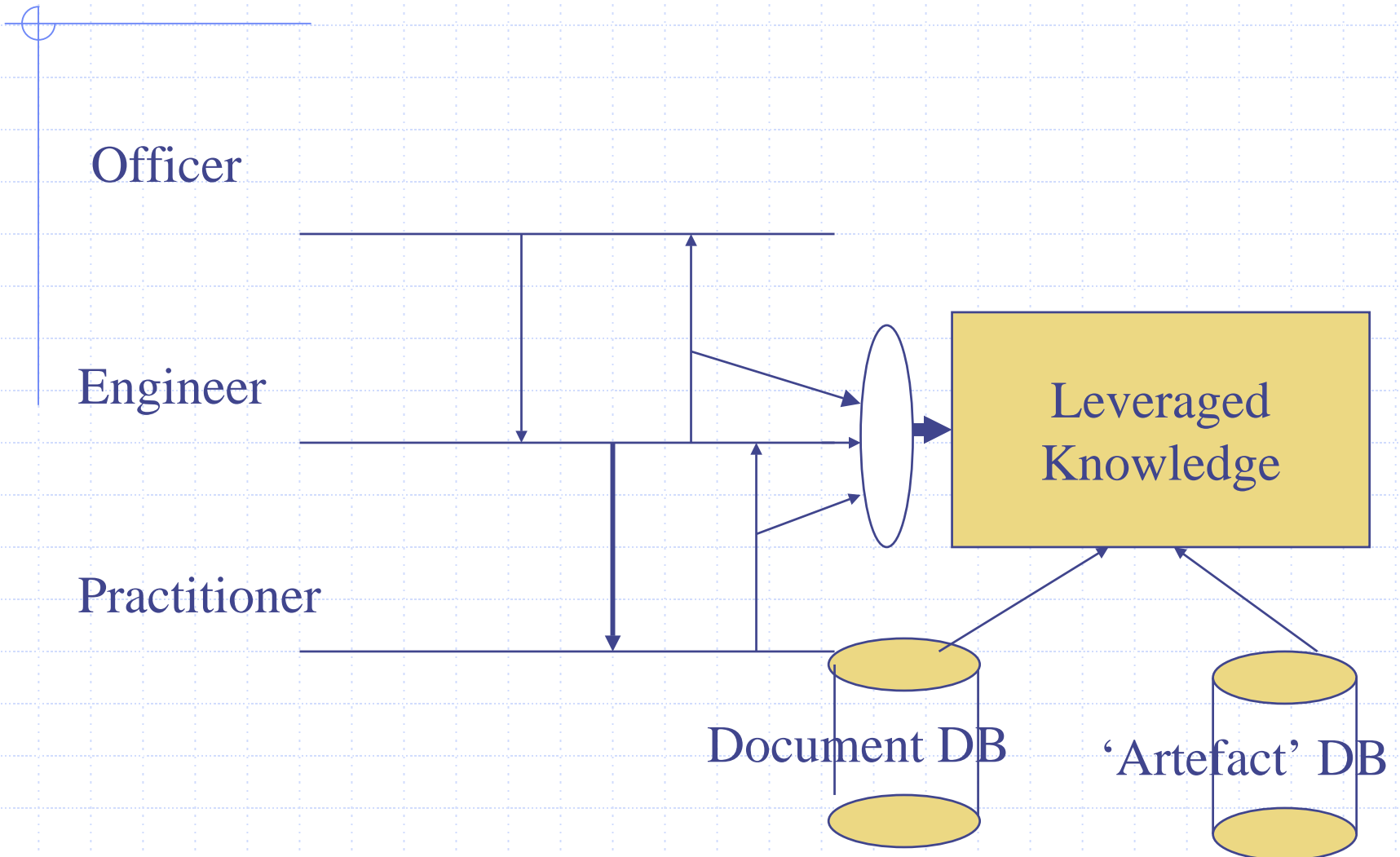
# A MODEL FOR INNOVATION MANAGEMENT

- Is their any way, managerial or technological, by which the processes and mechanisms that facilitate the permeation of knowledge be harnessed ?

- Harnessing knowledge sometimes could mean responding to or precipitating changes in markets, fashions, belief and values.

- And, at other times harnessing knowledge may help in a campaign or struggle to contravene the belief and values of the individuals or other organisations

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# A MODEL FOR INNOVATION MANAGEMENT

- The key question is how the knowledge of an individual or a group of individuals impacts on an organisation?

- **There are a number of models in the knowledge management literature that help us to understand some of the ways in which how individuals or groups impact organisation (Seung et al 1999). Most of these models are based on a life-cycle analogy:**

*Creation – Growth –Maturity – Utility – Death*

**We will be studying one of these models due to Nonaka and Takeuchi.**

# A MODEL FOR INNOVATION MANAGEMENT

*Two dimensions of knowledge creation in organisation: explicit and tacit knowledge*

| **Explicit Knowledge** (OBJECTIVE) | Knowledge of rationality (**mind**); Sequential knowledge (**there and then**); Digital knowledge (**theory**). |
|---|---|
| **Tacit Knowledge** (SUBJECTIVE) | Knowledge of experience (**skills**); Simultaneous knowledge (**here and now**); Analog knowledge (**practice**). |

# A MODEL FOR INNOVATION MANAGEMENT

*Two dimensions of knowledge creation in organisation: explicit and tacit knowledge*

The transmission of knowledge in an organisation?

Before transmission starts, you must understand what you are transmitting and how will it be received.

•Do I have the knowledge which will benefit others or the organisation? (Ontological question)

•Is my knowledge in a suitable form to be transmitted or received? (Epistemological question)

# A MODEL FOR INNOVATION MANAGEMENT

## *Dimensions of knowledge creation in an organisation*

| Dimension | Type |
|---|---|
| Explicit | Symbolic |
| Implicit | Embodied |
| Implicit/Tacit | Ingrained |
| Tacit | Culturally acquired |

# A MODEL FOR INNOVATION MANAGEMENT

*Two dimensions of knowledge creation in organisation: explicit and tacit knowledge*

| | |
|---|---|
| **Explicit Knowledge (OBJECTIVE)** | Articulated mainly as texts that use special languages of science and technology;<br>Knowledge which is largely formalized, consensual and public;<br>Knowledge available in informative texts, e.g., learned journals, technical reports and advanced textbooks, and in instructive texts, for instance, manuals, instruction leaflets. |
| **Tacit Knowledge (SUBJECTIVE)** | Articulated usually through speech using the special languages but suffused with metaphors, analogies and similes;<br>Knowledge which is largely informal, idiosyncratic and private; Statements, annual reports, inter-office memos, advertisements, product catalogues |

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# A MODEL FOR INNOVATION MANAGEMENT

Invention: Many paths available

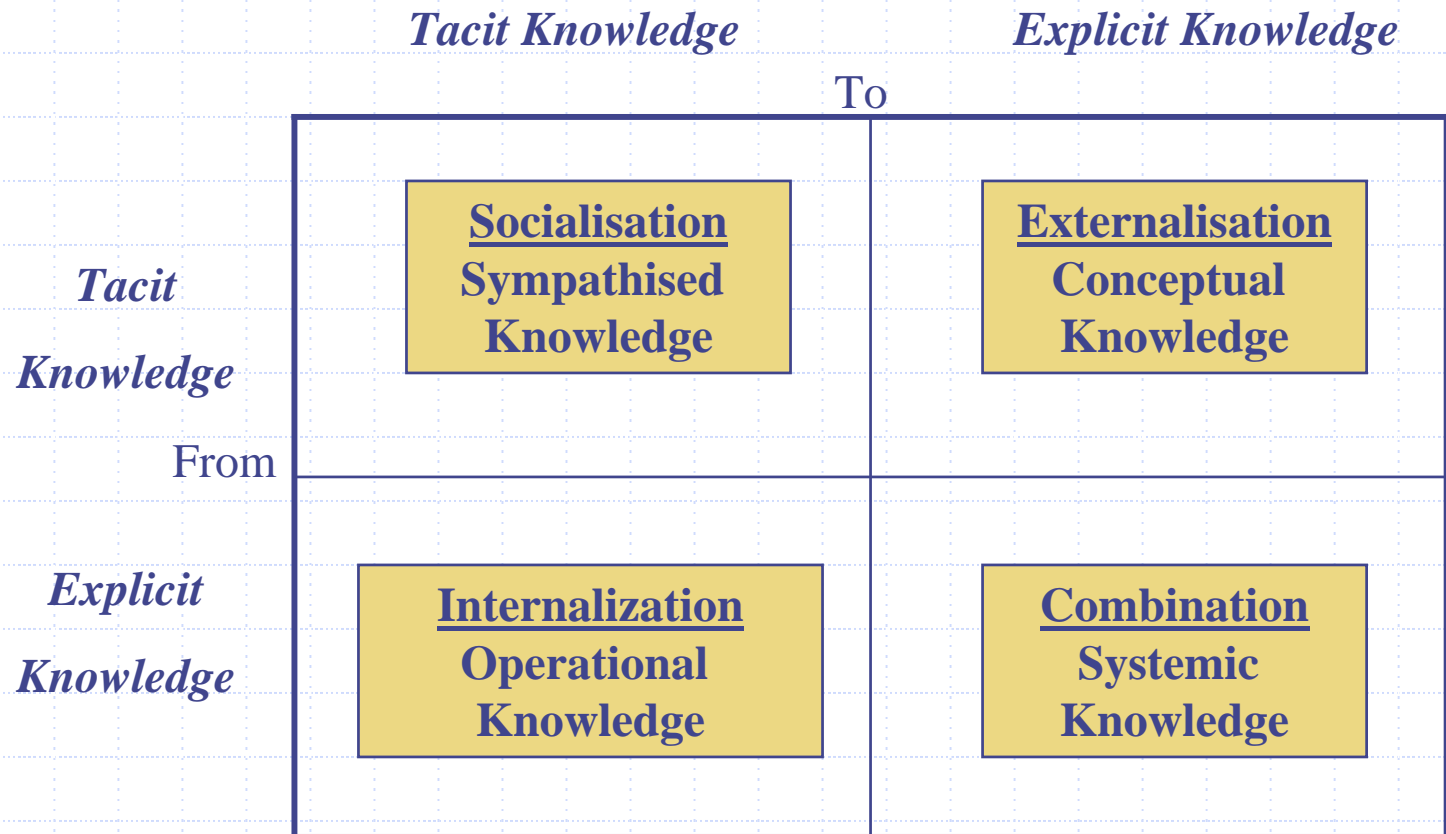Computing Technology: Choice between digital and analog;

Chosen Technology: Digitial → Sequential and Parallel

Chosen Technology: Sequential → Silicon vs Germanium

Chosen Technology: Silicon

# A MODEL FOR INNOVATION MANAGEMENT

## *Nonaka & Takeuchi's Knowledge Conversion Modes*

|  | Tacit Knowledge | Explicit Knowledge |
|---|---|---|
| | **To** | |
| **Tacit Knowledge** | **Socialisation** Sympathised Knowledge | **Externalisation** Conceptual Knowledge |
| **From** | | |
| **Explicit Knowledge** | **Internalization** Operational Knowledge | **Combination** Systemic Knowledge |

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## *Nonaka & Takeuchi's Knowledge Conversion Modes*

### *Field Building*

When workers within and across disciplinary boundaries interact with each other:

• the workers build a **field of interaction**; the field facilitates the sharing of each others experience and their views about the organisation they work in –products, services, vision;

• the workers engage in a **dialogue**

• the workers translate an external situation into an internal model or simulation of the world;

• the workers build **a mental model and share the model**

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## *Nonaka & Takeuchi's Knowledge Conversion Modes*

### *Dialogue*

When workers within and across disciplinary boundaries interact with each other:

• **the workers engage in a dialogue**

• **the workers share knowledge by using partial similarities between their rather different backgrounds → analogies**

- • **Horse is to zebra as dog is to -------?**

•**the workers also carry over knowledge from one domain to another → metaphors (from the Greek meaning 'to carry over)**

- • **atomic system is like the planetary system**

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## *Nonaka & Takeuchi's Knowledge Conversion Modes*

### *Linking Explicit Knowledge*

When workers within and across disciplinary boundaries interact with each other:

• **the workers engage in using analogies and metaphors**
• **the workers start linking knowledge which has been articulated and knowledge which they have created → networking;**
• **the workers start creating new products and services**

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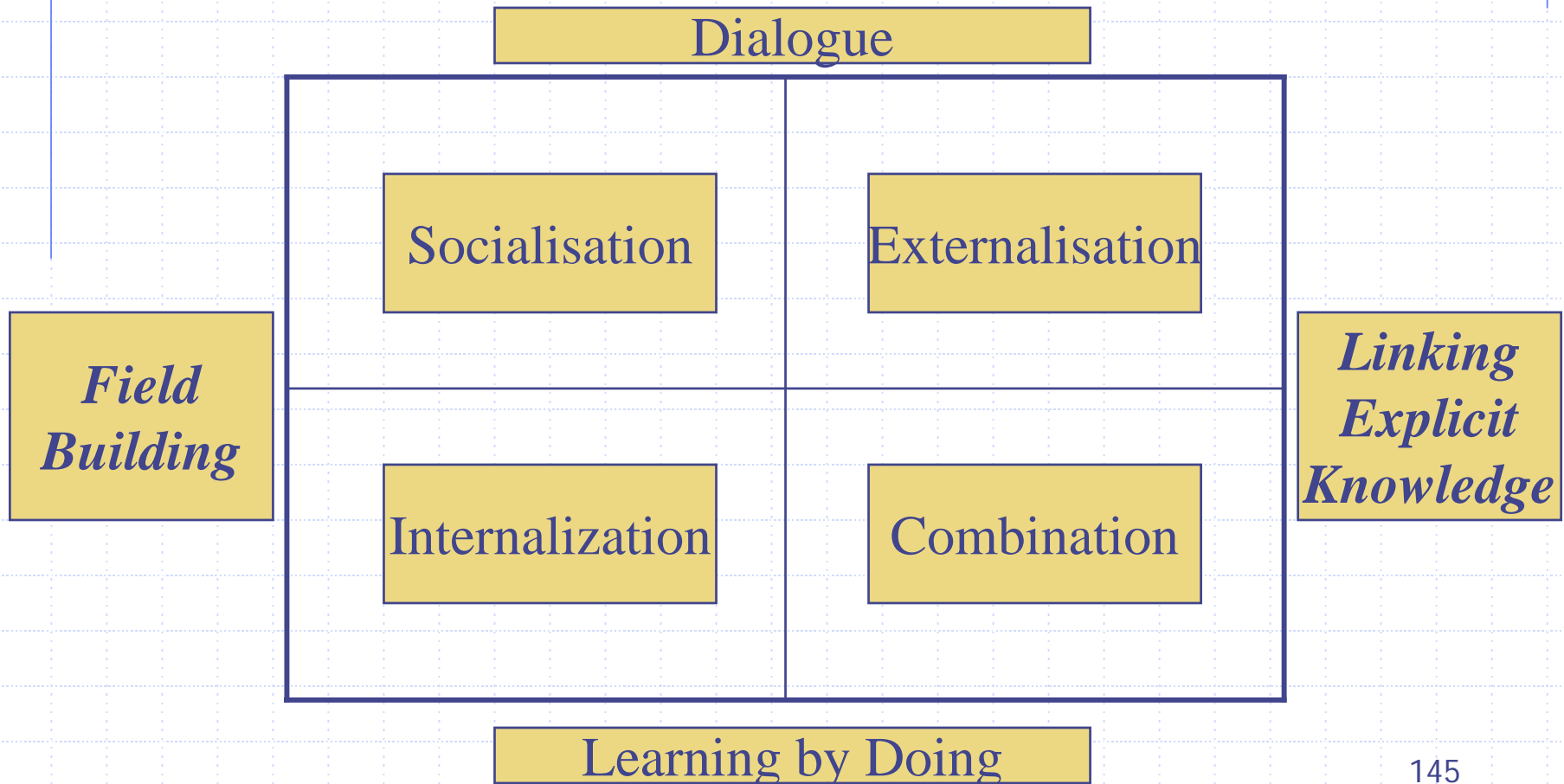## *Nonaka & Takeuchi's Knowledge Conversion Modes*

### *Learning by doing*

When workers within and across disciplinary boundaries interact with each other:

• **the workers start linking knowledge which has been articulated and knowledge which they have created → networking;**

• **the workers start learning from doing and constructing their implicit knowledge to face the new situation**

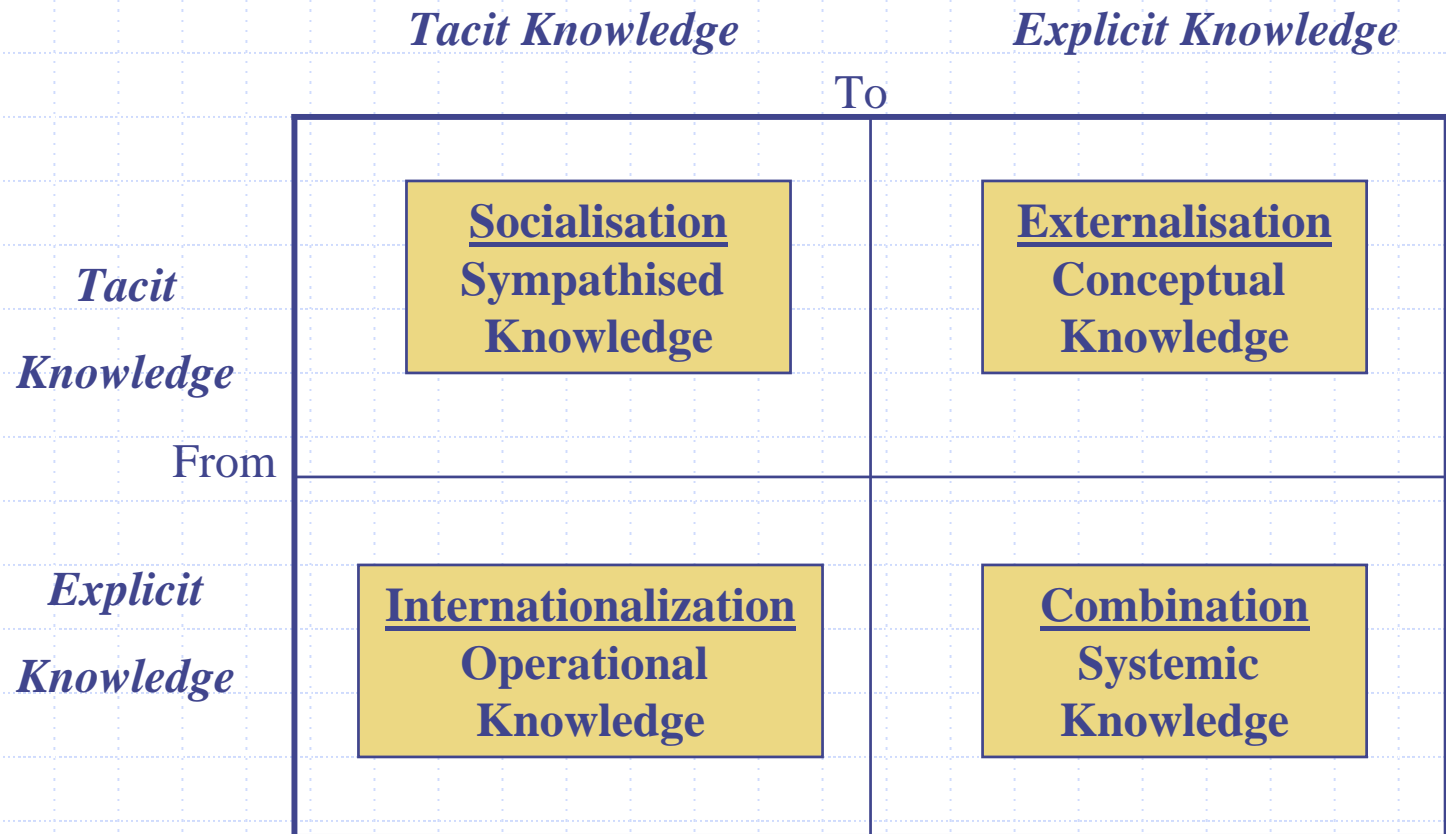# A MODEL FOR INNOVATION MANAGEMENT
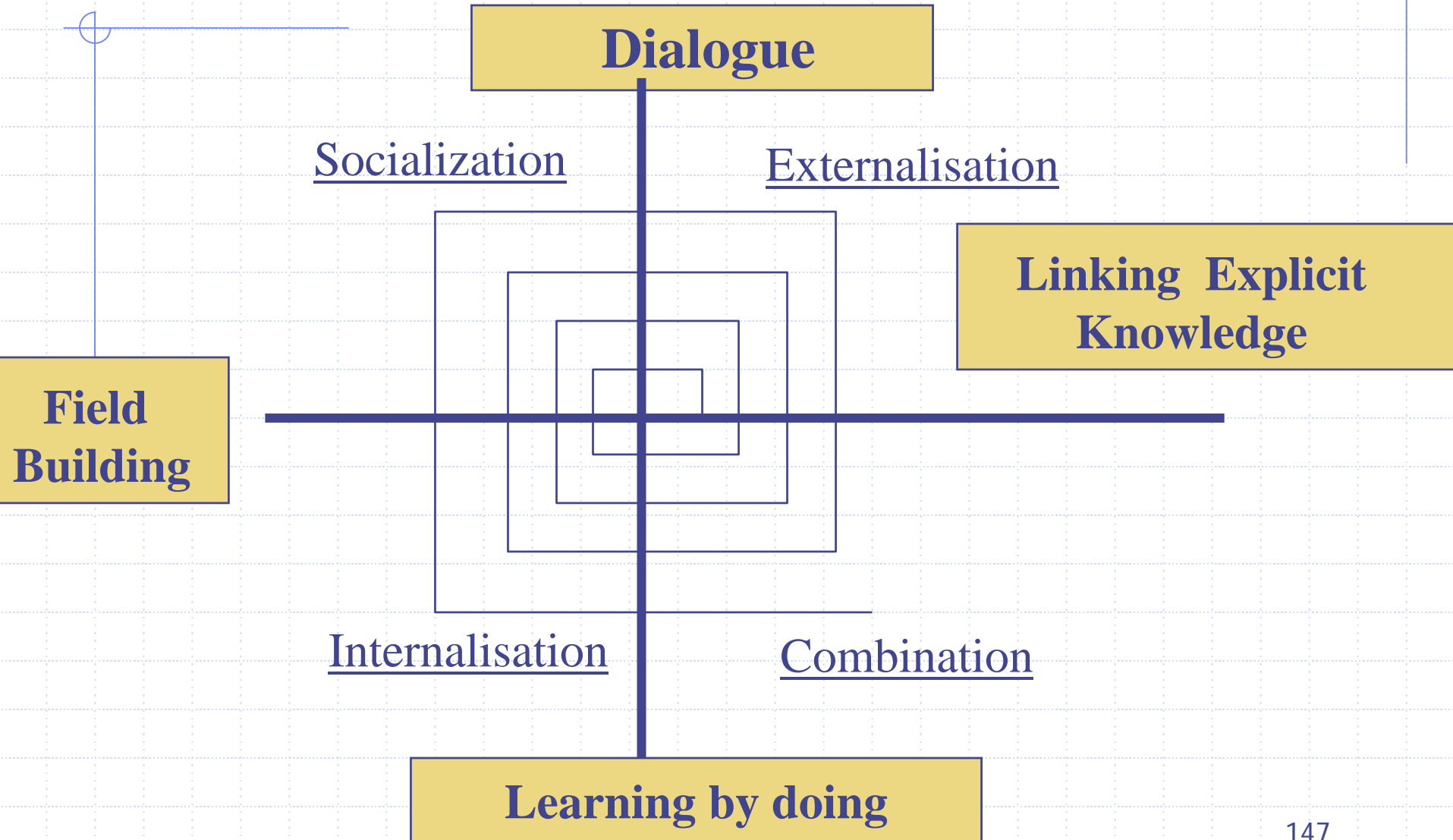
## *Nonaka & Takeuchi's Knowledge Conversion Modes*

Dialogue

| | |
|---|---|
| Socialisation | Externalisation |
| Internalization | Combination |

*Field Building*

*Linking Explicit Knowledge*

Learning by Doing

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## *Nonaka & Takeuchi's* *Knowledge Conversion Modes*

|  | *Tacit Knowledge* | *Explicit Knowledge* |
|---|---|---|
|  | To | |
| *Tacit Knowledge* | **Socialisation** Sympathised Knowledge | **Externalisation** Conceptual Knowledge |
| From *Explicit Knowledge* | **Internationalization** Operational Knowledge | **Combination** Systemic Knowledge |

# A MODEL FOR INNOVATION MANAGEMENT

**Dialogue**

Socialization

Externalisation

**Linking Explicit Knowledge**

**Field Building**

Internalisation

Combination

**Learning by doing**

# A MODEL FOR INNOVATION MANAGEMENT

## *Knowledge creation in organisations – A conveyer belt with external links?*

Sharing tacit knowledge → Creating concepts → Justifying concepts → Building archetypes → Cross Levelling Knowledge

# A MODEL FOR INNOVATION MANAGEMENT

## Customers & Performers and Knowledge Transformation

|  | **Performers** | **Customers** |
|---|---|---|
| **Performers** | Socialisation | Externalisation |
| **Customers** | Internalisation | Combination |

# A MODEL FOR INNOVATION MANAGEMENT

## Customers & Performers and Knowledge Transformation
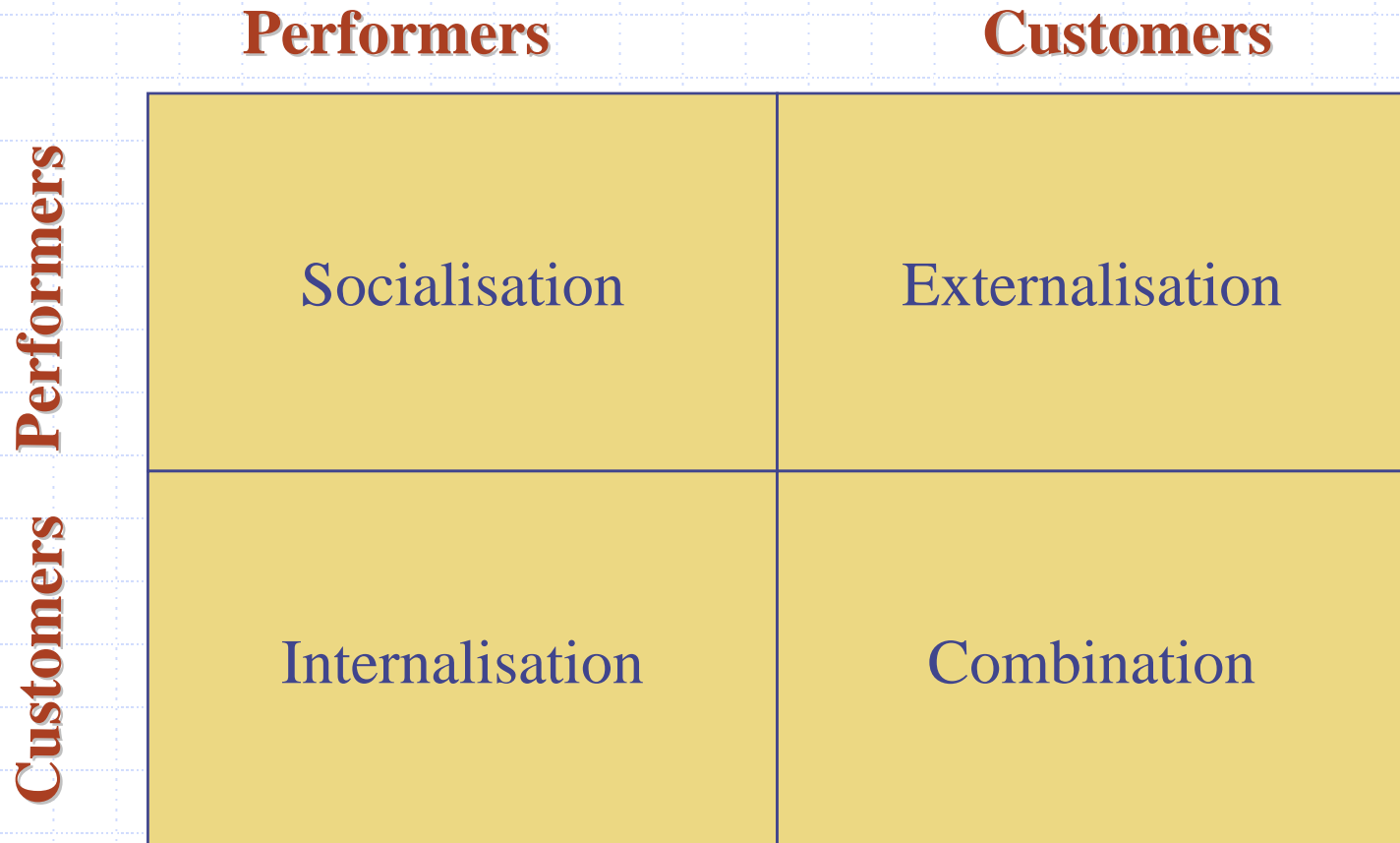
|  | Performers | Customers |
|---|---|---|
| **Performers** | Socialisation | Externalisation |
| **Customers** | Internalisation | Combination |
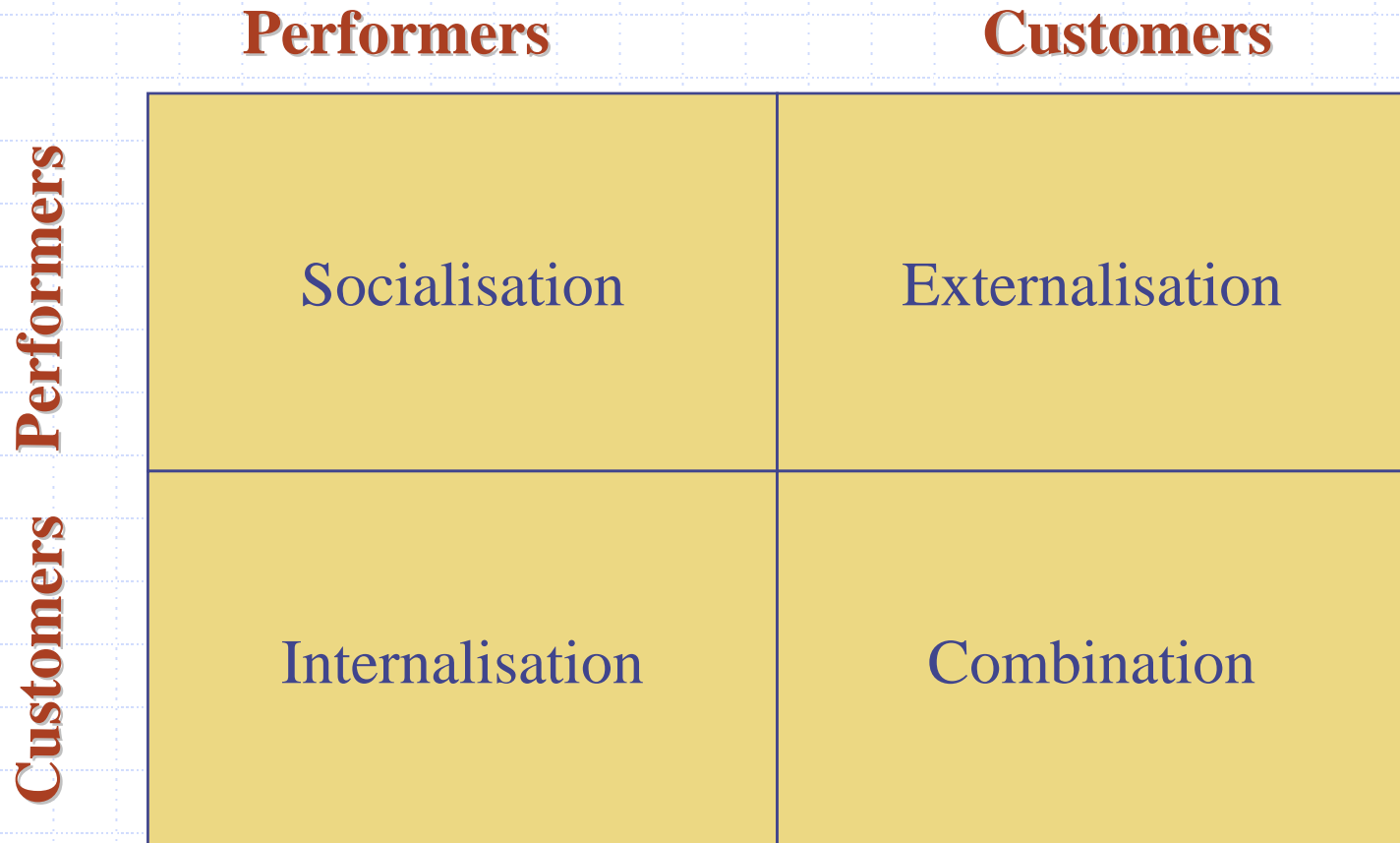
# INNOVATION MANAGEMENT

## *Knowledge creation in organisations- A 5 Phase Model*

| Phase | Requirement |
|---|---|
| **Sharing Tacit Knowledge** | **Self-organizing** team; **Creative chaos** injected by the management |
| **Creating Concepts** | **Autonomy** for the workers; Fluctuation and chaos may help |
| **Justifying Concepts** | Top management to formulate justification criteria; Redundancy of information. |
| **Building an Archetype** | Dynamic co-operation across organisations and amongst workers. |
| **Cross-levelling knowledge** | Intra-organizationally: autonomy; chaos. Inter-organizationally: dynamic interaction. |

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**Combination Knowledge:**
**Two disparate, very different and apparently sharing nothing in common technologies or sciences when put together lead to an entirely new technology/science.**

| Biology + Chemistry Biology + Physics | Biochemistry; Biophysics; |
|---|---|
| | Molecular Biology |
| Thermodynamics+ Rotary/Linear Motion | Automobile technology; |
| Computing + Communications | Information Technology |

# A MODEL FOR INNOVATION MANAGEMENT

Modern Management: Distinguishes between management and ownership → Asset/Labour Management.

Post-industrial society: Distinguishes between the ownership of knowledge and the management of knowledge

# A MODEL FOR INNOVATION MANAGEMENT

## *Nonaka & Takeuchi's Knowledge Conversion Modes*

| Process | Task | Methods/Techniques |
|---|---|---|
| **Socialisation** <br> **Tacit → Tacit** | Share experience; Transfer skills; Explain models | Brain storming; suggestion boxes; best employees |
| **Externalisation** <br> **Tacit → Explicit** | Articulate knowledge; concepts, hypotheses | Dialogue; collective reflection |
| **Internalisation** <br> **Explicit → Tacit** | Transfer/acquire knowledge: by 'doing'; by teaching; project work | Experience documentation; oral stories |
| **Combination** <br> **Explicit → Explicit** | Systematise knowledge; Evaluation; Testing | Document Management; creating, revising, archiving and pruning learned papers, technical reports, design documents |

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## *Knowledge Creation Crew: Practitioners*

| Practitioner Type | Task | Focus | Exemplars |
|---|---|---|---|
| *Operators* | Gather & accumulate knowledge | Tacit Knowledge | Auto-test drivers, Sales Force, Technicians |
| *Specialists* | Gather, accumulate & create knowledge | Explicit Knowledge | R&D scientists, software/design engineers, planners, market researchers[155] |

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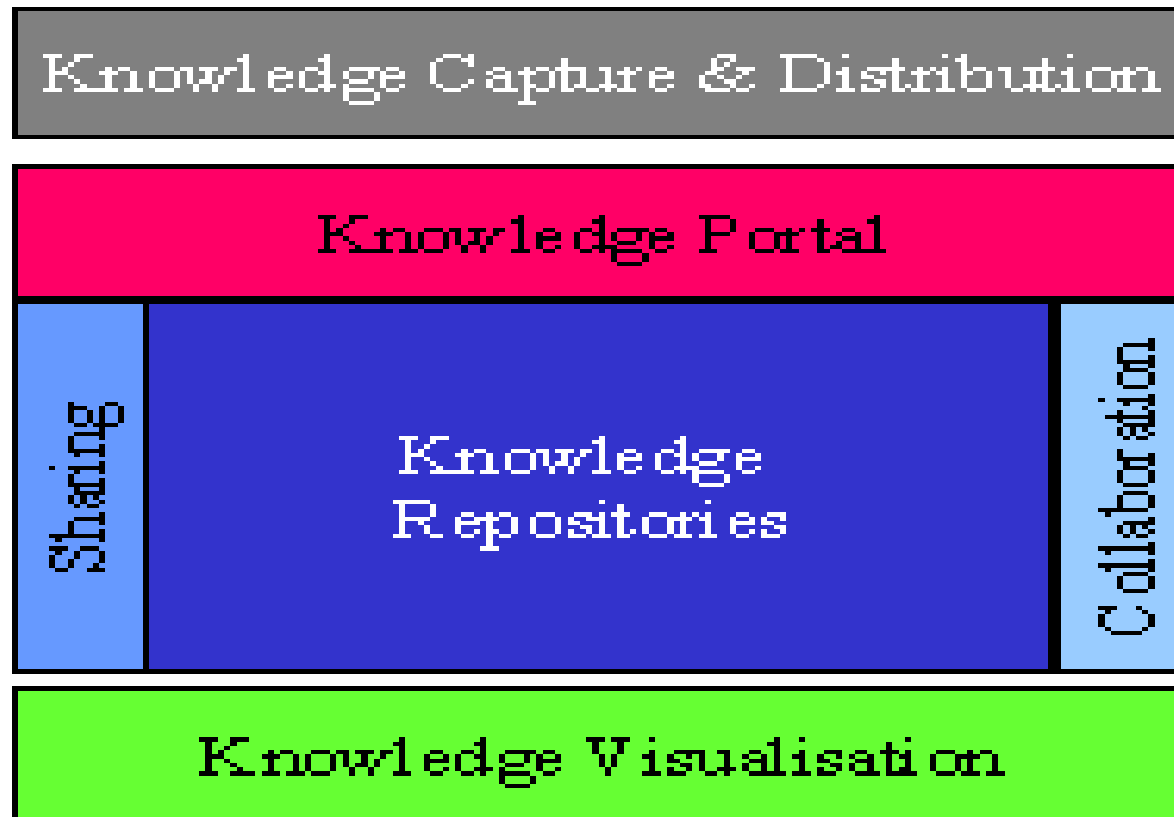
## *Knowledge Creation Crew: Engineers*

| Engineer Type | Task | Focus | Exemplars |
|---|---|---|---|
| *Middle Managers/ Consultants* | Convert knowledge (explicit↔ tacit), synthesise | Explicit/ Implicit | Innovators; Facilitator |

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## *Knowledge Creation Crew: Officer*

| Officer Type | Task | Focus | Exemplars |
|---|---|---|---|
| Top-line managers/ Investors | Create knowledge; envision | Explicit | CEOs, Venture Capitalists |

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Knowledge Capture & Distribution

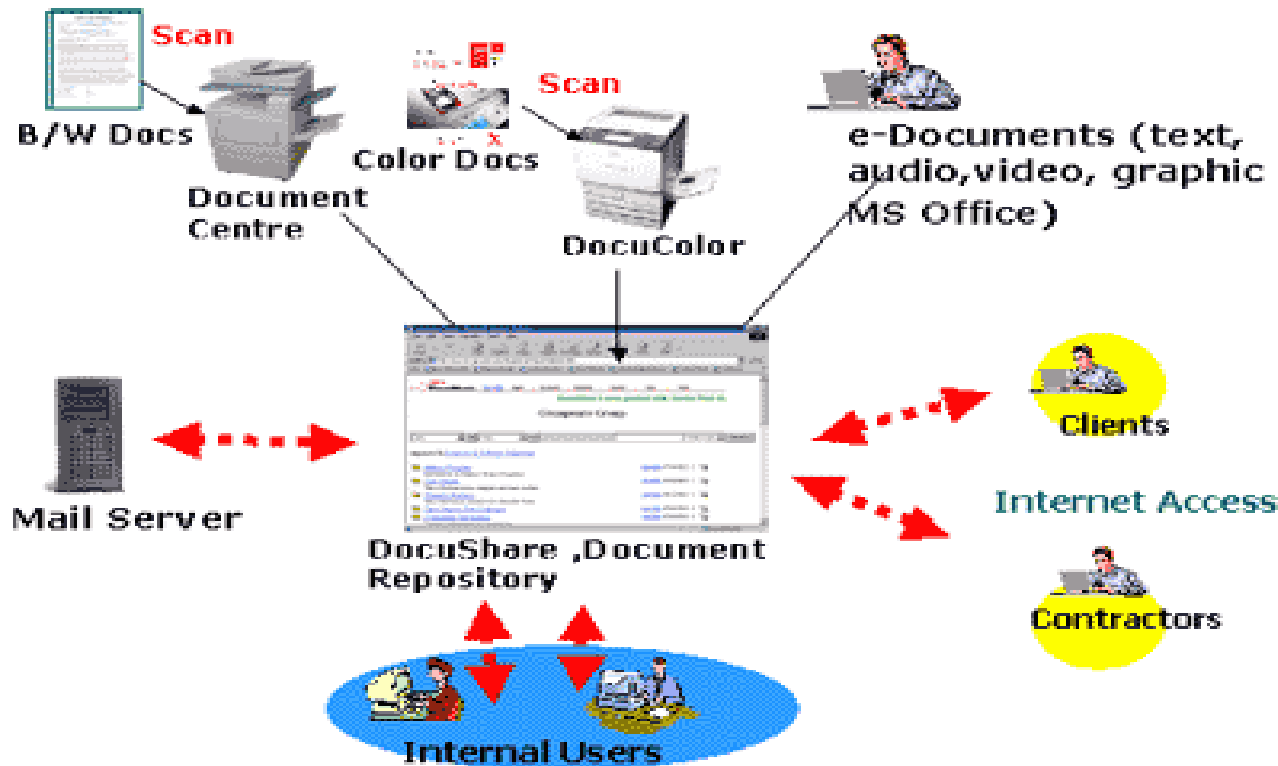Knowledge Portal

Sharing

Knowledge Repositories

Collaboration

Knowledge Visualisation

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Document Management & Collaborative Solution (DocuShare)

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