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Managing Tacit Healthcare Knowledge Towards Higher Returns on Knowledge and Experience

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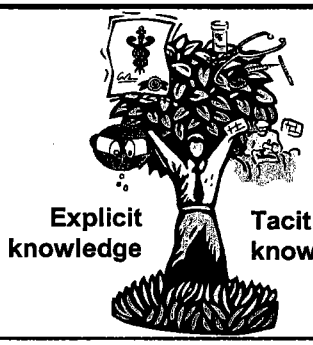
Outline

- Introduction
- Tacit knowledge explication
- Knowledge sharing and searching
- Building a holistic KM platform
- Measuring the value of healthcare knowledge

Introduction



Explicit and tacit healthcare knowledge

- Explicit knowledge
  - Canonical knowledge, i.e. knowledge formalised within healthcare databases, guidelines, rules, protocols, procedures, manuals, etc.
- Tacit knowledge
  - Non-canonical knowledge, i.e. knowledge that does not manifest as guidelines, rules, etc.
  - Exists as the healthcare experts' skills, experience, common sense and intuitive judgement whilst solving problems and treating patients.

Need to give prominence to tacit healthcare knowledge

- Explicit knowledge given prominence
  - May result in rigid healthcare policies and mindset.
  - Hinder use of experience, intuition and gut feelings in service delivery.
  - Experience (tacit knowledge) is lost when healthcare expert leave an organisation.
- Need to give prominence also to tacit knowledge
  - Can be a means to gain competitive advantage in the healthcare industry.

Practical applications of tacit healthcare knowledge

- Enhance healthcare decision support
  - To replace 'rigid' explicit knowledge-based DS
- Enhance healthcare problem based learning
  - PBL triggers that contain real-life and novel decision making situations potentially improves the effectiveness of PBL sessions.
- Promotes a continuously learning organisation (continued medical education)
  - Failure to do this results in a 'dead' organisation

Practical applications of tacit healthcare knowledge

- Performance evaluation based on tacit knowledge-based services
  - Rewards those who utilise and share their experience and intuition
- Paradigm shift in the way healthcare organisations compete
  - Tacit knowledge is considered value-added as it is harder to appreciate
- Prevent brain-drain
  - Healthcare enterprise memory

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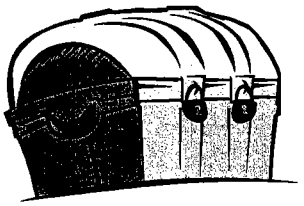
What's the essence?



It is all in the **CONTENT**

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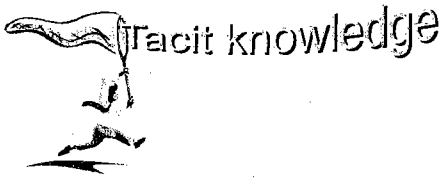
What's the essence?



A lot can be done only if we can capture and store tacit knowledge!

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Tacit knowledge explication

- We cannot really 'acquire' tacit knowledge because it will loose its tacit qualities
- Direct knowledge acquisition techniques are not ideal for tacit knowledge explication
- Possible tacit healthcare knowledge explication techniques:
  - Twenty questions
  - Card sorting
  - Tacit knowledge scenarios

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Twenty questions

- Knowledge engineer conjures up several healthcare situations/scenarios
- Expert (specialist) required to ask questions to better understand the situation to solve the situation
- Expert required to explain why a question was asked
- Knowledge engineer try to detect rules in expert's explanation

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Card sorting

- Requires stack of cards containing typical solutions/procedures to healthcare problems
- Expert required to sort cards based on certain criteria that need to be met to solve the problem
- Expert required to determine and specify sorting variable after each round of sorting
- Sorting process is repeated with another sorting variable

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Tacit knowledge scenarios

- In essence
  - Hypothetical situation encountered by expert with responses/actions
  - Can be described in episodes and events
  - Hypothetical nature of scenarios provokes experts to explore beyond their explicit knowledge for responses
- Examples of TK scenarios
  - Heart attack during pregnancy
  - Complications during surgery

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Tacit knowledge scenarios

- Why use TK scenarios?
  - Tacit knowledge best explicated when expert encounters novel problems
  - Only then expert needs tacit knowledge to derive solution
  - TK scenarios allow expert to
    - examine themselves
    - explore mental faculty
    - apply skills and decision-making capabilities
- Suitable paradigm for TK scenarios is healthcare procedures (not objects/concepts)

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Tacit knowledge scenario layout

- TK scenarios have a hierarchical representation
- Four layers
  - Meta-scenarios
  - Scenario-constructs
  - Episodes
  - Events
- Just like chapters in a book
- Stored in TK scenario-base

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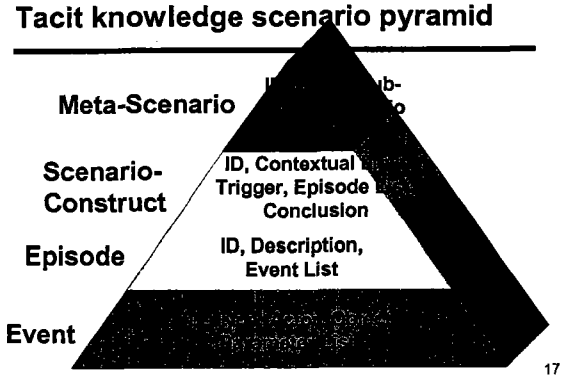
Tacit knowledge scenario pyramid



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Tacit knowledge scenario components

- Meta-scenario
  - Highest level of classification
  - Binds groups of TK scenarios together
  - Provides overview of TK scenario-base content
  - 2 levels of categorisation
    - class
    - sub-class

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Tacit knowledge scenario components

- Scenario-Construct
  - Second level
  - Backbone of TK scenario structure
  - Links constituent episodes and events at lower level
  - Contains 4 parts
    - identification/context
    - trigger event
    - episodes
    - concluding event

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Tacit knowledge scenario components

- Episode
  - Third level
  - In turn, links a number of events
  - Helps to group events to make event sequences more manageable and better understood
  - Helps event navigation

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Tacit knowledge scenario components

- Event
  - Lowest level
  - In turn, links a number of parameter-value list element
  - Provides details of a TK scenario
  - Event categories
    - normative: happen on normal basis
    - obstacle: hinders progress of the task
    - action: carried out by actor

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Meta-Scenario Representation

Class ID	CL0001
Class Name	CPR

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Scenario-Construct Representation

Scenario ID	S.19990713.1520
Scenario Description	First-aid CPR on adult male, 57 years of age. Bystander present. Location: Roadside.
Contextual Link	CPR, Elderly adult, First-aid.
Keywords	Breathing, Pulse, Hand, Neck, Medical
Start Timestamp	1520
End Timestamp	1538
Trigger Event	EV0001
Concluding Event	EV0016

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Episode Representation

Episode ID	EP0001
Episode Description	Assessment

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Event Representation

Event ID	EV0001
Event Type	Obstacle
(Actor)	-
(Object)	Patient

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Parameter-Value List Element Representation

Parameter-Value ID	PV0003
Parameter	Pain
Value	Centre of chest, lasting more than a few minutes, radiating to shoulders, neck and arms.

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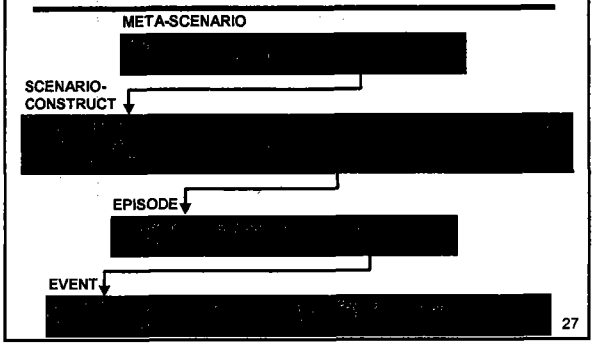
Scenario Relational Scheme



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Scenario-based tacit knowledge explication

- TK scenario representation comes with a scenario-based tacit knowledge explication method
- 3 types of TK scenarios
  - Solved-TK scenario
  - Challenge-TK scenario
  - Solved-challenge-TK scenario

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Types of TK scenarios

- Solved-TK scenario
  - Actual situations that have already been encountered and solved
  - Mimic problem-specific cases (case-based or evidence-based reasoning)
  - Needed to populate the TK scenario-base

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Types of TK scenarios

- Challenge-TK scenario
  - Atypical situations posed to experts to challenge his/her expertise
  - Derived from existing solved-TK scenarios (and solved-challenge-TK scenarios) with novel connotations
  - Needed for tacit knowledge explication, in a defined context

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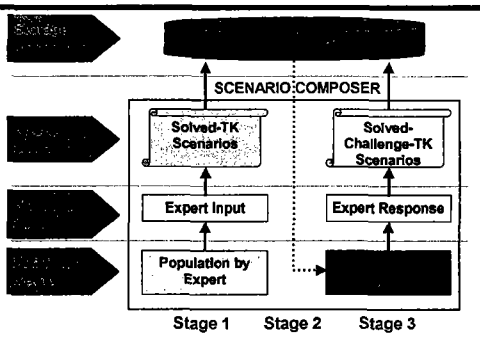
Types of TK scenarios

- *Solved-challenge-TK scenario*
  - Originate from challenge-TK scenarios that have been completed (solved)
  - Encapsulates expert's tacit knowledge

3 stages of TK scenario acquisition



Deriving a Challenge

- 3 steps
  - Select a solved-TK scenario (or solved-challenge-TK scenario)
  - Select a Point of Interrogation
    - *Point of Interrogation (POI) is a distinct point just after* an event of type Obstacle or Normative and before an event of type Action
  - Present the challenge-TK scenario to an expert

Selecting a Point of Interrogation

Episode EP0001 (Assessment)	EV0002	Action	First-aider shakes shoulder of patient gently and shouts to ask if patient is alright.	POI 1
	EV0003	Obstacle	Patient's state of consciousness is unresponsive.	POI 2
	EV0004	Action	First-aider shouts for help	
	EV0005	Action	First-aider requests bystander to call the Emergency Medical Services.	
⋮				
Concluding Event	EV0016	Normative	Patient's pulse is 78 beats per minute and breathing at 16 breaths per minute. Emergency Medical Service arrives 15 minutes after call by bystander	

Deriving a Challenge-TK Scenario

Scenario 990713.1520 First-aid CPR on adult male, 57 years of age. Bystander present.	Trigger Event	EV0001	Obstacle	Patient has pain at centre of chest, lasting more than a few minutes, *radiating* to shoulders, neck and arms.	Challenge
	Episode EP0001 (Assessment)	EV0002	Action	First-aider shakes shoulder of patient gently and shouts to ask if patient is alright.	
		EV0003	Obstacle	Patient's state of consciousness is unresponsive.	POI 2
	⋮				
	Concluding Event				

Solved-Challenge-TK Scenario

Episode EP0001 (Assessment)	EV0002	Action	First-aider shakes shoulder of patient gently and shouts to ask if patient is alright.	Challenge
	EV0003	Obstacle	Patient's state of consciousness is unresponsive.	POI 2
		Action	First-aider calls for help	
		Action	First-aider requests bystander to telephone Emergency Medical Services.	Expert's Response + 'Tacit Knowledge'
		Obstacle	Bystander reports that there are no telephones in the vicinity.	
		Action	First-aider requests bystander to stop a passing vehicle to assist in locating the nearest telephone.	
⋮				
Concluding Event		Normative	Patient's pulse is 83 beats per minute and breathing at 15 breaths per minute. Emergency Medical Service arrives 23 minutes after stopping passing vehicle.	

PBL-Online: A tool for tacit knowledge acquisition

- Intelligent web-based system
- Allows healthcare experts to systematically respond to atypical PBL-scenarios
  - presents knowledge elicitation forms
  - healthcare experts provide information/suggest values to various

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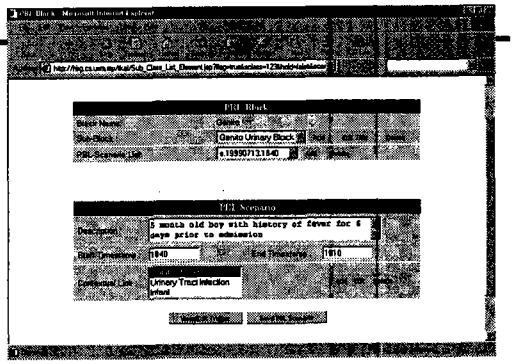
PBL-Online (Acquisition)



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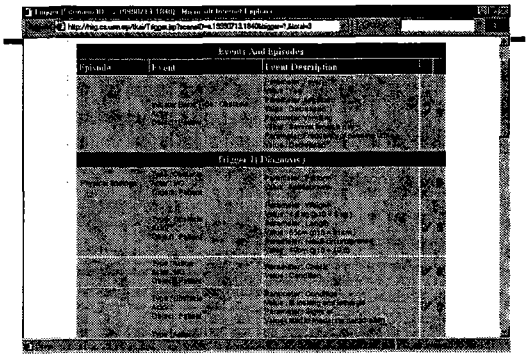
PBL-Online (Acquisition)



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PBL-Online: A tool for (tacit knowledge-based) PBL presentation

- Functions as PBL problem presentation system
  - facilitators and students can prescribe and view triggers

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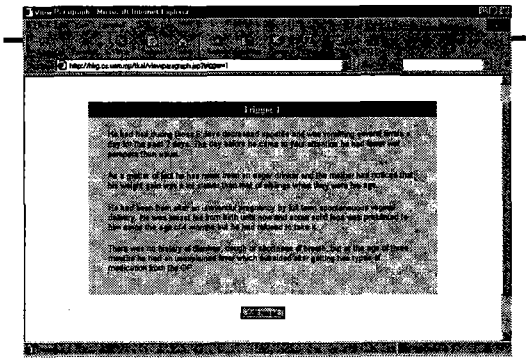
PBL-Online (Presentation)



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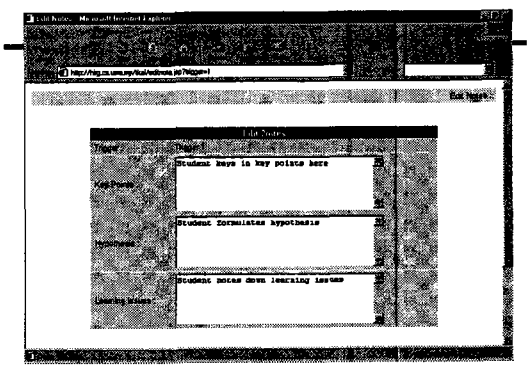
PBL-Online (Presentation)



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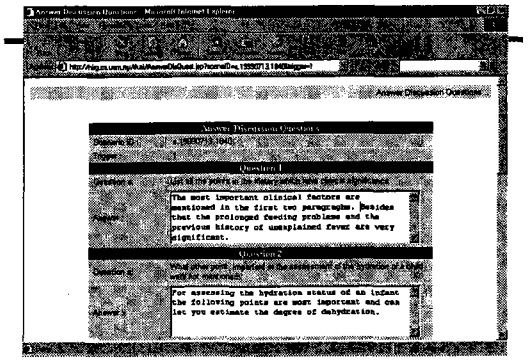
PBL-Online (Presentation)



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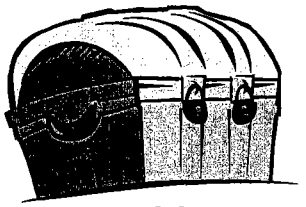
PBL-Online

- Nothing fancy?



It is all in the CONTENT

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What next?

- Solved-TK scenarios are stored
- To be managed further
- To be part of an organisation-wide healthcare service

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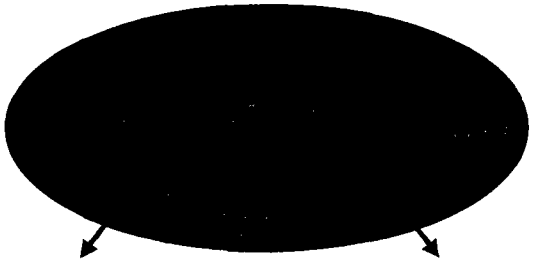
Knowledge management processes



KNOWLEDGE MANAGEMENT ENABLERS

KNOWLEDGE MANAGEMENT PROCESSES

C. O'Dell & C.J. Grayson *If We Only Knew What We Know: Identification and Transfer of Internal Best Practices.* Best Practices White Paper, American Productivity & Quality Center, 1997.

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Conditions for knowledge sharing

- Awareness
  - User must be aware that relevant knowledge is available
- Identification
  - User must be able to identify relevant knowledge
- Delivery
  - Knowledge must be delivered in timely manner
- *Right knowledge to right place at right time!*

Schwartz, D. and Te'eni, D. (2000). Tying Knowledge to Action with kMail. IEEE Intelligent Systems, May/June, 33-39.

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Internet and Intranets for knowledge sharing and searching

- Internet provides remarkable possibilities to access information and knowledge
  - HTTP dramatically changed enterprise knowledge management
- Intranet enables
  - Intra-organisational communication
  - Internal knowledge/information sharing and searching

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Internet knowledge sharing

- E-mail and web pages are effective and popular Internet services for knowledge sharing
  - Provide uniform knowledge sharing independent of storage format
  - Share a variety of information
    - documents (HTML, XML, etc.), databases, ontologies, knowledge bases, case bases, journal article, news, etc.

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Knowledge sharing and searching in communities of practice

- Healthcare practitioners may have the need for specialised (tacit) knowledge
- Requires effective sharing and searching mechanisms of explicated tacit knowledge
- But time is precious to healthcare practitioners
- How can these activities be carried out effortlessly within healthcare communities of practice?

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Agent-based KM for knowledge sharing and searching

- Generic software agents can be utilised to perform knowledge management tasks
- Knowledge search agent
  - For non-healthcare expert
  - Avoid intricacies of 'regular' search engines
- Knowledge sharing agent
  - For healthcare experts to publicise available explicated tacit knowledge (e.g. solved-challenge-TK scenario)
  - Avoid under-utilisation of expert knowledge

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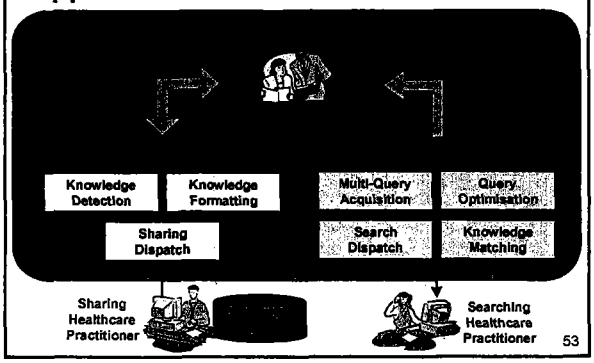
Knowledge sharing and searching application



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Some ideal features

- Knowledge detection
  - Uses language analysis to detect documents or e-mails that potentially contain experience-related (tacit) material
- Multi-query acquisition
  - Adapts to different ways a user may specify queries
- Query optimisation
  - Reformats queries into a concise and transmittable format

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Building a holistic KM platform for healthcare

- There is more to healthcare KM than knowledge sharing and searching!
- Capitalise on available infrastructure
  - Hospital information systems
  - E-mail
  - Web pages
  - Desktop applications, e.g. word (document) processors, spreadsheet programs, etc.
- *Interdependent components that manage* inputs and outputs

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Putting them together

- Hospital information system
  - Electronic medical record
  - Source of patient health profile
- *Knowledge-based e-mail*
  - Repository of evaluated experience and problem-related discussions
- Agent-based sharing and searching
- Web content management
  - Easy publication of web-based material
  - Personalised web pages

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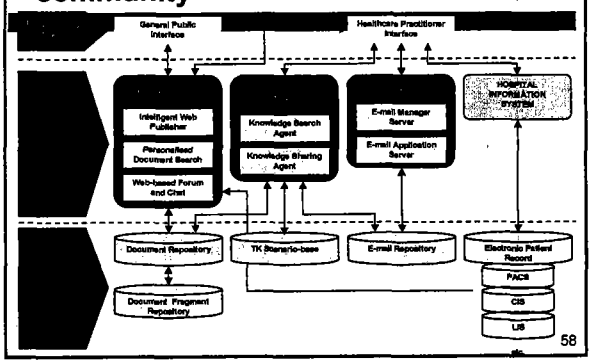
An enhanced electronic healthcare community



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Are these available?

- Hospital information system
  - Widely available (Solutions Protocol Sdn. Bhd.: THIS)
- *Knowledge-based e-mail*
  - kMail (Schwartz, et al.)
  - Tacit Connectors (Tacit Knowledge Systems Inc.)
- Web content management
  - *Generic portals widely available*
  - Personalised web pages (Chong, et al.; Govt. of Malaysia: MCPHIE)
    - links to health profile in EMR/HIS

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Measuring the value of healthcare knowledge

- Characterisation of (healthcare) knowledge measurement approaches
  - Process of elimination
  - It's in here somewhere
  - Rorschach
  - Knowledge is proportionate to value

Housel, T. & Bell, A.H. (2001). Measuring and Managing Knowledge. McGraw-Hill. (Chapter 3)

Process of elimination

- Pioneered by Baruch Lev
- Estimates by subtracting expected income from tangible/financial assets (from past/expected earnings) = knowledge earnings
  - i.e. identify knowledge assets by subtracting effects of all other assets
- Assumption
  - Possible to separate tangible and intangible assets

It's in here somewhere

- Edvinsson and Malone
- Reporting model (like questionnaire, quantitative?)
- Model has 140 indicators of intelliectual capital and its derivatives (components)
- Assumption
  - If enough aspects of intellectual capital can be captured, we have complete understanding (measurement) of knowledge

It's in here somewhere

- Example of indicators
  - FINANCIAL
    - total assets
    - revenues/employee
    - investments in IT
  - HUMAN/STAFF
    - leadership index
    - motivation index
    - time in training/CME
    - annual turnover
    - specialist doctors
  - CUSTOMER/PATIENT
    - market share
    - number of customers
    - average customer size
  - RENEWAL & DEV
    - satisfied employee index
    - share of training hours
    - training expense/employee
    - patient base
    - average patient age

It's in here somewhere

- Needs complex mathematical algorithm to combine indicators
- Problem of finding out which indicators really matter to measure knowledge

Rorschach inkblot

- Assumes managers can derive contribution of knowledge assets by viewing a family of intuitively related performance measures
- Relationship among indicators differ among different individual managers
  - Requires a consensus-gaining process
  - Balanced Scorecard

Rorschach inkblot

- Balanced Scorecards help translate corporate strategy into a set of goals and objectives
  - *Learning and growth perspective*
    - attention to organisation's people and infrastructure
  - Internal perspective
    - performance of key internal processes
  - Customer perspective
    - looking through the eyes of the customer
  - Financial perspective
    - measures ultimate result

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Knowledge is proportionate to value

- Argue that knowledge is observable even with specific units
  - Common units of change within knowledge processes can be observed and measured
- Achieved by tracking transformation of knowledge into valued outputs
  - e.g. Microsoft has book value of approximately $13-20 billion but market capitalisation of $300-400 billion
    - value of knowledge embedded in processes, technology and people

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Knowledge is proportionate to value

- Knowledge value added (KVA)
  - Method to estimate value of knowledge in processes
  - Accomplished through a return ratio

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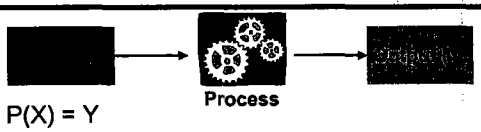
Measuring Returns on Knowledge



- P(X) = Y
- Assumptions
  - if X = Y, no value added
  - value ∝ change
  - change measured by amount of knowledge required
- value ∝ change ∝ amount of knowledge (tacit/explicit)

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Conclusion: Take home messages

- It's all in the content
  - Need to capitalise on tacit healthcare knowledge
- Tacit healthcare knowledge explicated indirectly
  - e.g. tacit knowledge scenarios
- Culture of sharing and searching for tacit healthcare knowledge
- Move towards knowledge-centric platforms to manage healthcare knowledge

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Recommended Reading

- J.H. van Bemmel & M.A. Musen (eds.), *Handbook of Medical Informatics*, Springer, 2000.
- T. Housel & A.H. Bell, *Measuring and Managing Knowledge*, McGraw Hill, 2001.
- E.M. Awad & H.M. Ghaziri, *Knowledge Management*, Prentice Hall, 2003.

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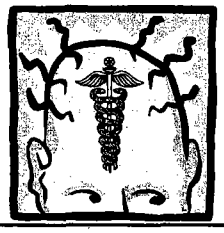
Thank you • 谢 谢 • Nandri



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25 – 27 May 2004
Grand Hyatt Singapore

Reducing healthcare costs with knowledge for optimised standard of care

Delivering Better Health Informatics with Knowledge Management

Healthcare provision is a **knowledge intensive business**, and the consequences of an organisation failing to make best use of the knowledge assets at its disposal can be SEVERE.

Health informatics, when used within the knowledge management framework, can help to facilitate integrated decision making, integrated business processes and this leads to lower overall costs, whilst providing an integrated experiences for patients.

Keynotes Speakers

Professor Tan Ser Kiat
Group CEO, SINGHEALTH

Dr Tikki Pang (Pangestu)
Director of Research Policy & Cooperation
World Health Organisation

Benefits of Knowledge Management to the healthcare industry:

- ✔ Reduce operations cost
- ✔ Reduce medical errors
- ✔ Reduce public liabilities and related risk cost
- ✔ Improved responsiveness to patient needs
- ✔ Provide focused and seamless care interventions
- ✔ Provide better patient experience
- ✔ Enable better collaboration working across boundaries

Major case studies

- Department of Health, UK
- SINGHEALTH
- National Healthcare Group
- Health Authority, Hong Kong
- Melbourne Health, Australia
- Canossa Hospital, Hong Kong
- Singapore General Hospital

PLUS

"The KM pilot: Rolling out KM for healthcare workers – The Department of Health experience" workshop

A Must Attend For:

- CEOs/COOs/CTOs/CIOs of Hospitals and Healthcare Groups
- Hospital Administrator/Managers
- Clinic Administrators
- Public Health Administrators
- Healthcare Consultants
- Directors of Nursing Administration
- Directors of Clinical Research/Medical Reseach
- Health Information Directors/Managers
- Head of Departments
- Directors of Public Health Departments (Government)

Organised by: asia arkgroup applied research & knowledge

Supported by: ASIA PACIFIC BIOTECH

Researched by: Knowledge Management

The healthcare sector is one of the most complex and fragmented organisations where the healthcare workers (clinicians, nurses, specialists and surgeons) work alongside with administrative and operational staff, in one of the most information-intensive environments.

KM in Healthcare

Health Informatics

Data Processing, Collection and Storage

At this conference, you will learn how health informatics system delivers better results through a knowledge management framework. Also, find out how your established health informatics system can support knowledge sharing, collaboration and management efforts. Hear from hospitals and leading healthcare clusters in Singapore, Hong Kong and Australia, on how they overcame the barriers to knowledge management implementation by extending the role of health informatics as its knowledge management foundation. The case studies profiled will also show, how having a knowledge infrastructure in place turned unstructured information into dynamic pieces of knowledge that helped hospitals reduce costs and manage crisis situations like SARs.

Don't miss this opportunity to learn from your peers how knowledge sharing with health informatics can create a breakthrough in your healthcare organisation, and how this will contribute to increased efficiency in healthcare resources and costs.

KM Success Story for the Healthcare Sector: Partners Healthcare, Boston

In 1992, it was discovered that there was an alarming level of medical errors at its hospitals and started a knowledge management project, linking "massive amounts of constantly updated clinical knowledge to the IT systems that supported doctors' work processes". In 2002, a post implementation study of this system was conducted and it found that system had reduced serious medical errors by 55% and its on-line order entry had also contributed to cost savings from the system's recommendation of cheaper and more effective drugs.

– Extracted and summarised from ***"Just-in-Time Delivery Comes to Knowledge Management"****, Harvard Business Review, Vol 80, No. 7, July 2002)*

Day One: 25 May 2004, Tuesday

8:00am **Registration**

9:00am **Opening remarks from the chair**
Steve Anderson, *Deputy CEO*, **Melbourne Health**, Australia

9:10am **Opening Keynote: Better healthcare quality at lower costs: Is this a reality for hospitals or just a dream?**
Professor Tan Ser Kiat, *Group CEO*, **SINGHEALTH**

9:55am **World preview: Turning knowledge into actions to improve healthcare**
WORLD Preview
WHO will be releasing, later this year, a World Report on "Knowledge for Better Health". The Report highlights contemporary issues in health research with a particular emphasis on the need to turn knowledge into actions to improve people's health, and to promote the equitable access and sharing of knowledge as a foundation for health improvement.
- Bridging the gulf between the mismatch of knowledge creation, consumption and utilisation
- Presenting knowledge in a format that is accessible for policy makers, practitioners and consumers/patients
- Putting the ideas into operation: Planning for action

Dr Tikki Pang (Pangestu), *Director of Research Policy & Cooperation*
World Health Organisation

"It is important for everyone to have access to the same core information in an easy-to-use, consistent format, rather than a tangled web of threads leading to mixed messages and confusion." – KM Magazine

10:40am Morning tea

11:10am **Leading a knowledge sharing project across Hong Kong's private hospitals**
CASE STUDY
- Benchmarking all private hospitals in Hong Kong
- Experience sharing on the hurdles, process, and results on the first benchmarking and knowledge sharing project
- Identifying some best practices and "how to do it" guidelines
- Conviction and leadership concepts behind the way forward: "Adverse incident" and "near miss" reporting

Dr Sammy Sou, *Senior Hospital Executive*, **Canossa Hospital**, Hong Kong

11:55am **Knowledge management in action: Casemix and utilisation management – the NHG experience**
CASE STUDY
Casemix was introduced to the healthcare industry in 1999 under the Ministry of Health's directive to manage healthcare costs and to keep healthcare affordable in view of the forecasted increase in demand from the ageing population and changing disease trends. By focusing on efficient allocation of resources and planning, casemix provides for a comprehensive classification system that facilitates improved healthcare quality whilst managing costs. In this presentation, you will learn from National Healthcare Group's experience with casemix and the extent of its benefits:
- Establishing clinical pathways to help clinicians better determine appropriate patient care and discharge planning
- Challenges in keeping accurate clinical records to facilitate accurate coding of the casemix information
- Application of utilisation management framework to improve the cost effectiveness and appropriateness of care in hospitals

Dr Jason Cheah, *Chief Projects Officer*, **National Healthcare Group**

12:40pm Lunch

2:00pm **Successfully defining the knowledge needs and wants of healthcare workers: Drawing parallels from the lessons learnt in a local hospital in Singapore**
- Identifying what is needed and what is wanted
- Leveraging your knowledge assets via a knowledge portal
- Establishing a knowledge strategy

F T Liu, *Editor* , **iKMS**

3:15pm Afternoon tea

3:45pm **Exclusive: How Hong Kong fought the war on SARS with clinical information systems**
CASE STUDY
With the SARS outbreak a web-based system called eSARS was developed on top of the Clinical Medical Systems framework to capture information about confirmed and suspected SARS patients. Learn how this system helped Hong Kong hospitals to overcome the medical crisis and how the system can be geared for future epidemic outbreaks.
- Capturing, managing and making use of patient information on a massive scale
- Leveraging existing information structures to meet new demands
- How to move forward

Dr NT Cheung, *Executive Manager-Health Informatics*, **Hospital Authority**, Hong Kong

4:30pm **Panel discussion: Why managing knowledge in the healthcare sector is more challenging than in the commercial sector?**
Like most industries, the healthcare industry is a knowledge-intensive one. However, unlike the commercial sector, the healthcare sector's uptake of knowledge management has been very slow. The issues that will be covered are:
- What are the prohibitive factors to knowledge sharing and management in the healthcare industry, and why is it so?
- Can the healthcare sector sustain a long term commitment to knowledge sharing?
- Can typical knowledge management tools such as, Communities of Practice, Collaboration, Knowledge Bases, Narratives and Organisational Memory, be relevant for the healthcare industry?

Moderator: **Steve Anderson**, *Deputy CEO*, **Melbourne Health**, Australia

Panellists:
Dr NT Cheung, *Executive Manager- Health Informatics*, **Hospital Authority**, Hong Kong
Dr Sammy Sou, *Senior Hospital Executive*, **Canossa Hospital**, Hong Kong
Dr Tikki Pang (Pangestu), *Director of Research Policy and Cooperation*
World Health Organisation
F T Liu, *Editor*, **iKMS**

5:00pm **End of Day one conference**