



INTRODUCTION AND APPLICATIONS OF HUMAN FACTORS IN PATIENT SAFETY

人因工程概念與應用

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Department of Industrial Engineering & Management
Yuan Ze University

2018/09/21

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Content



- 1) Self Introduction
- 2) Introduction of Human Factors
- 3) Relevant Discussion

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1. Self Introduction

➤ 研究領域－人因工程 (Ergonomics/Human Factors)

瞭解人員在環境下使用工具的行為、能力與限制
用以設計工具、設備、環境與服務，
達到提升效率、確保安全、增加滿意度。



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(改善前)



(改善後)

(9) 提供無障礙空間，並巡查床旁及動線有無障礙物。

(10) 改善男廁小便斗台階高低差小便池，以壁式小便斗取代

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1. Self Introduction

➤ 研究方向

☐ 手控制移動之研究與應用

☐ 人因工程於醫療系統

☐ 觸覺認知能力之量測

☐ 眼睛狀態與疲勞評估方法

☐ 優使性工程/使用者經驗

☐ AI

1. Self Introduction

➤ Two-year experience with JCT

☐ 運用人因及風險觀點檢視「雙重核對作業」

❖ 「手術異物滯留－計數作業」

❖ 「高警訊藥品靜脈注射給作業」

❖ 「輸血作業」(5)

☐ 中小型醫院運用人因及風險概念檢視醫療作業輔導 (5)

☐ 運用人因及風險概念檢視「降血糖針劑給藥作業」(5)

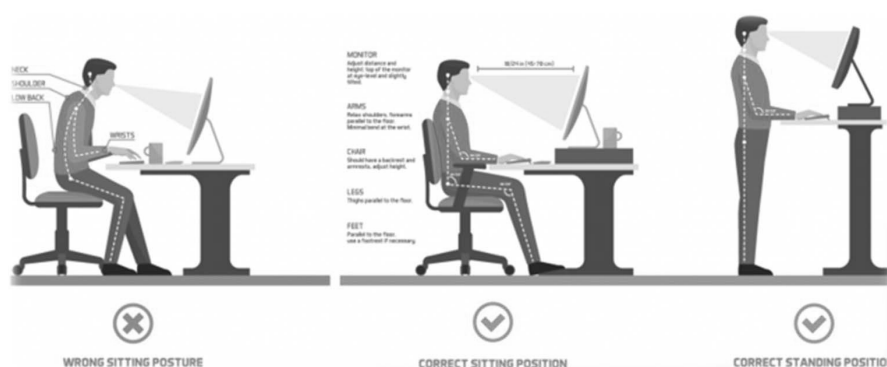
2. Introduction of Human Factors

➤ 人因工程 (Ergonomics/Human Factors)

瞭解人員在環境下使用工具的行為、能力與限制
用以設計工具、設備、環境與服務，
達到提升效率、確保安全、增加滿意度。

2. Introduction of Human Factors

➤ 人因工程 (Ergonomics/Human Factors)



<https://formaspace.com/articles/office-furniture/benefits-of-ergonomics-workplace/>



This rare hand axe was fashioned out of flint by Neanderthals over 40,000 years ago and discovered from a very important archeological site in Caen, France.

<http://www.paleodirect.com/pgset2/m210.htm>

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a finger rest on the outside edge



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2. Introduction of Human Factors

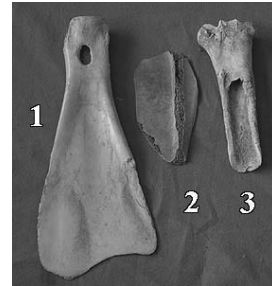
➤ 人因設計之演化



<http://www.paleodirect.com/pgset2/m210.htm>



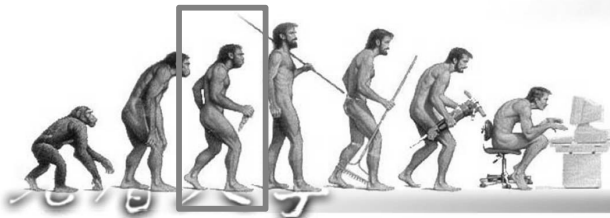
http://www.age-of-the-sage.org/archaeology/otzi_the_iceman.html



<http://bennauro.blogspot.com/2008/05/ancient-flint-tools-animal-remains.html>

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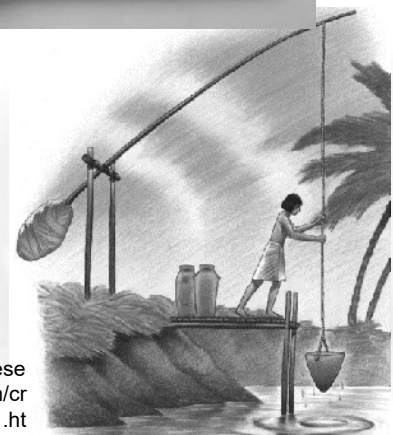
➤ 人因設計之演化



<http://www.verycd.com/topics/4111/>

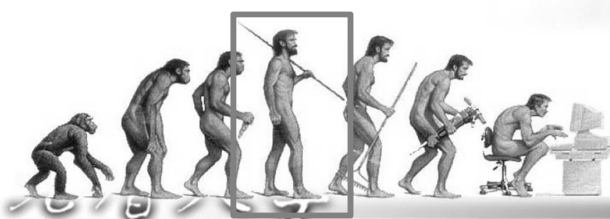


<http://listverse.com/2011/12/10/top-10-unusual-ancient-weapons/>



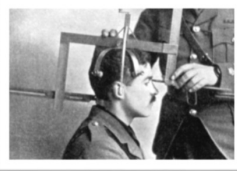
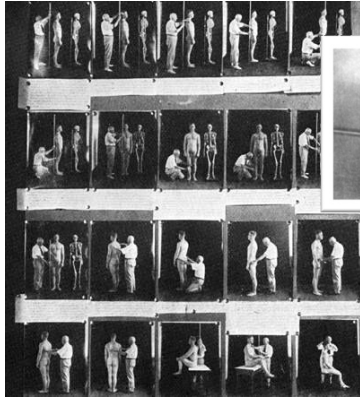
http://mcaleese.com.au/acm/crane_history1.htm

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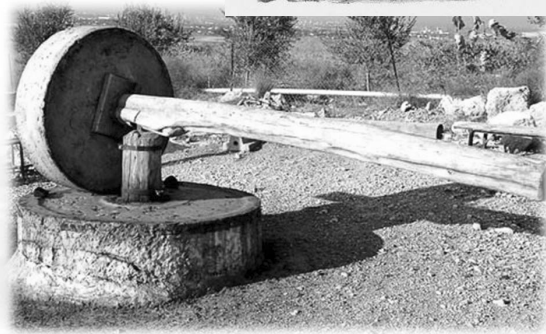
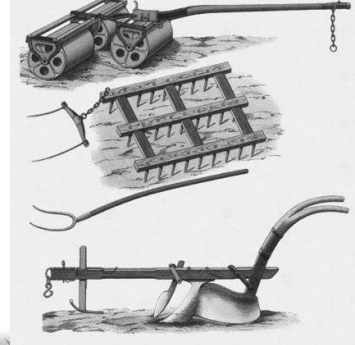
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➤ 人因設計之演化



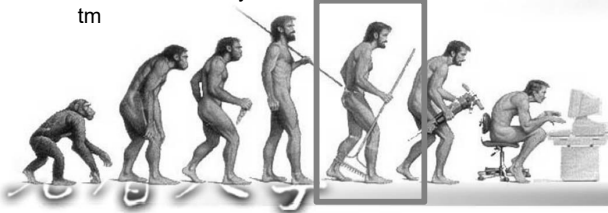
<http://writersforensicsblog.wordpress.com/category/general-forensics/page/2/>

<http://www.aitc.sk.ca/saskschools/tools.html>



<http://www.bible-archaeology.info/agriculture.htm>

<http://www.combat-diaries.co.uk/diary30/New%20Archive.htm>

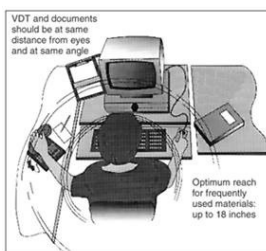


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➤ 人因設計之演化



<http://www.lbl.gov/ehs/pub3000/CH17.html>

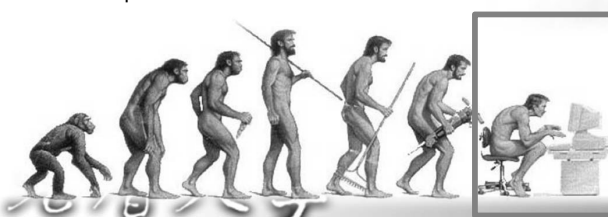
<http://www.amaltas.org/show/ergonomics-power-computer-users.html>



<http://www.workingwell.org/articles/laptop.html>



<http://edition.cnn.com/2011/TECH/innovation/03/09/nextgen.tech/index.html>



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<http://www.ise.ncsu.edu/partnersoutreach/research/ergonomics>

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2. Introduction of Human Factors

➤ 人因設計之演化



<http://blog.marketlab.com/2016/04/25/5-ways-better-manage-blood-draw-workload/#.Wi8saN-WZKM>



Ergonomics in Healthcare:
Preventing Phlebotomist Injuries

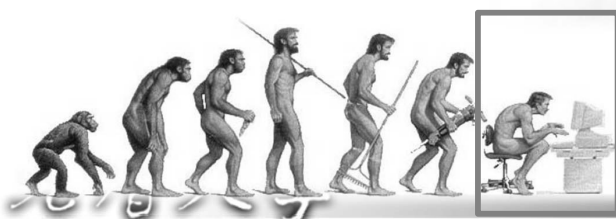
<http://blog.marketlab.com/2016/07/11/2016ergonomics-healthcare-preventing-phlebotomist-injuries/#.Wi8tEt-WZKM>



<https://www.osha.gov/SLTC/etools/hospital/hazards/ergo/ergoequipment/ergoequip.html>

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2. Introduction of Human Factors

➤ 人因工程相關名詞

□ 人性化

❖ 霹靂車，尖端科技的結晶，是一部人性化的萬能電腦車，出現在我們這個無奇不有的世界，刀槍不入、無所不能...



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<http://edgar.bitdevil.net/archives/000664.html>

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2. Introduction of Human Factors

➤ 人因工程相關名詞

- 科技始終來自於人性



NOKIA
Connecting People
科技始終來自於人性

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2. Introduction of Human Factors

➤ 人因工程相關名詞

- 人體工學



<http://big5.thethirdmedia.com/g2b.aspx/bbs.thethirdmedia.com/group/show109164t0p1.html>

http://www.savesafe.com.tw/Products/ProductView.aspx?s_id=68acfebefad90a7e14d94aa647413f02

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➤ 人因工程相關名詞

- ☐ 工適設計
- ☐ 貼心設計
- ☐ 優使性/可用性(usability)
- ☐ 使用者中心設計(user-centered design)
- ☐ 使用者經驗(user experience)

2. Introduction of Human Factors

➤ 人因工程 (Ergonomics/Human Factors)

瞭解人員在環境下使用工具的行為、能力與限制
用以設計工具、設備、環境與服務，
達到提升效率、確保安全、增加滿意度。



2. Introduction of Human Factors

➤ 人因工程的範疇

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11 Controls and Data Entry Devices 334

12 Hand Tools and Devices 383

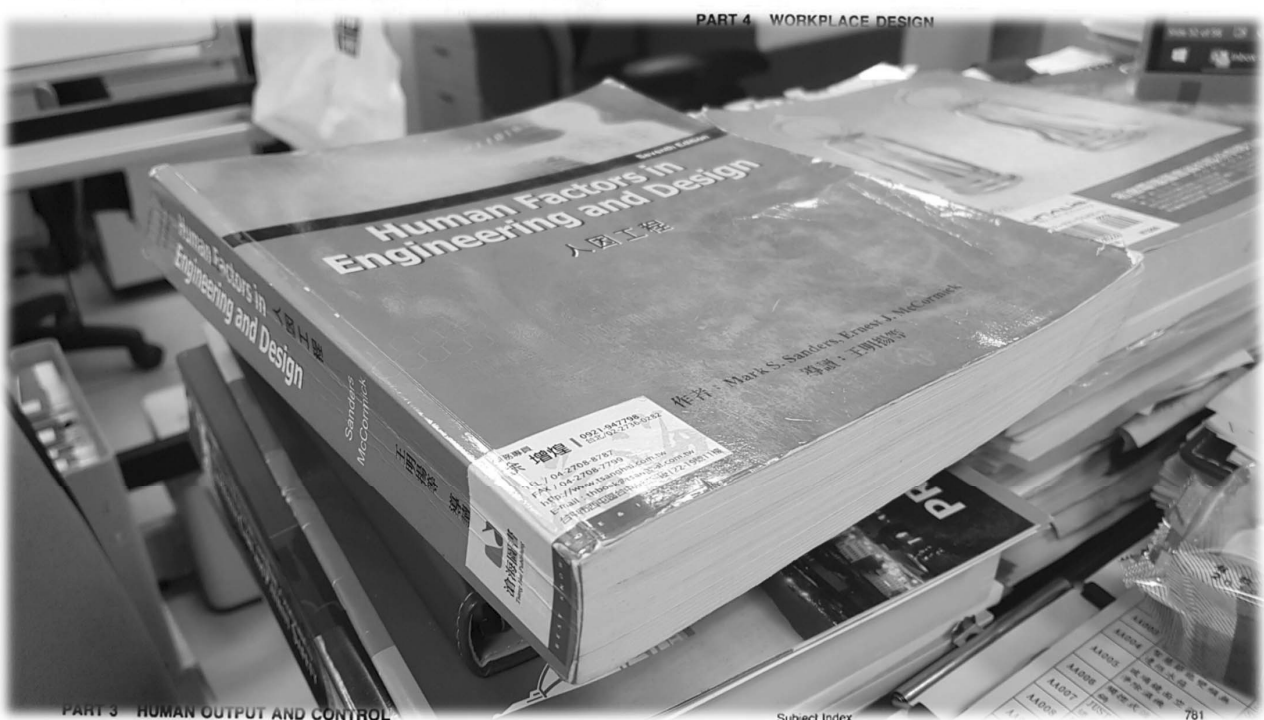
PART 4 WORKPLACE DESIGN

PART 3 HUMAN OUTPUT AND CONTROL

8 Physical Work and Manual Materials Handling 225

9 Motor Skills 273

10 Human Control of Systems 301



Subject Index 781

2. Introduction of Human Factors

➤ 人因工程的範疇

- ❑ 實體人因 (Physical Human Factors)
- ❑ 認知人因 (Cognitive Human Factors)
- ❑ 組織人因 (Organizational Human Factors)
- ❑ 感性人因 (*Kensai Engineering/Attractive Human Factors*)

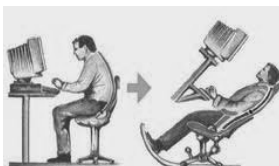
2. Introduction of Human Factors

➤ 人因工程的範疇

❑ 實體人因 (Physical Human Factors)

❖ 是研究或應用與實體活動有關的知識，如顯示器與控制器的設計安排、人體解剖、人體計測、人體生理以及生物力學等方面的特性。

❖ 而其相關議題包括：工作姿勢、物料搬運、重複性工作、工作所引起的肌肉骨骼問題、工作空間配置以及安全與健康...



<http://web1.nsc.gov.tw/ct.aspx?xItem=7935&ctNode=439&mp=1>



<http://web1.nsc.gov.tw/ct.aspx?xItem=7934&ctNode=994&mp=1>



<http://proportionedivina.blogspot.com/2009/06/nonergonomic-lateral-stability.html>

2. Introduction of Human Factors

➤ 人因工程的範疇

□ 實體人因 (Physical Human Factors)



<http://www.hospitalmanagement.net/contractors/general/linet/attachment/linet2/>

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This is a ~~killer~~ for your
back
but
in here
we're protected
by a
Supernatural
power

<https://www.imagekind.com/art/stunning/hospital-bed/artwork-on/fine-art-prints>



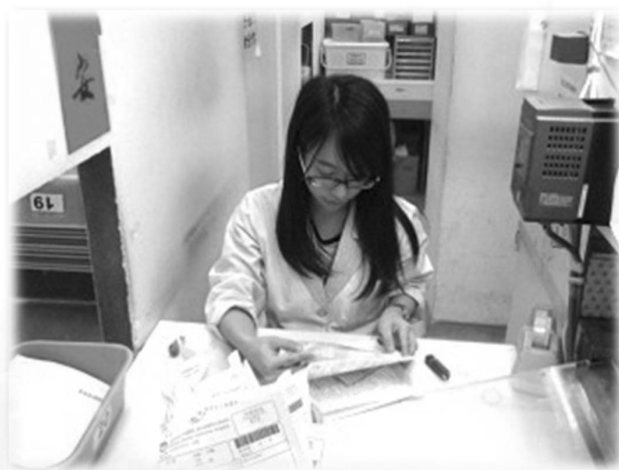
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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 實體人因 (Physical Human Factors)



http://www.kmhk.org.tw/Patient_Safety/st_1/p1-2.asp

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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 實體人因 (Physical Human Factors)

❖ e.g., 排班與疏失



2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)

❖ 是研究或應用與人類心智活動有關的知識或技巧，這些知識或技巧會影響人類之間或人與其他組件間的交互作用，如知覺、記憶、推理及決策。

❖ 而其相關議題包括：工作的心智負荷、技術之養成、人與電腦交互作用、人類可靠性以及工作壓力與訓練...



http://www.exponent.com/visibility/attention_memory/

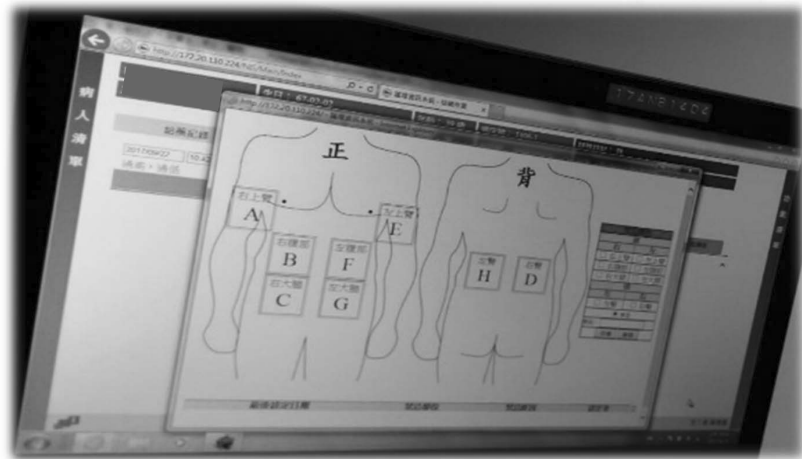


<http://archlab.gmu.edu/People/rparasur/Research.shtml>

2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)



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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)



<http://blog.marketlab.com/2016/04/25/5-ways-better-manage-blood-draw-workload/#.Wi8saN-WZKM>

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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)



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<http://m.168xd.com/news/70.html>

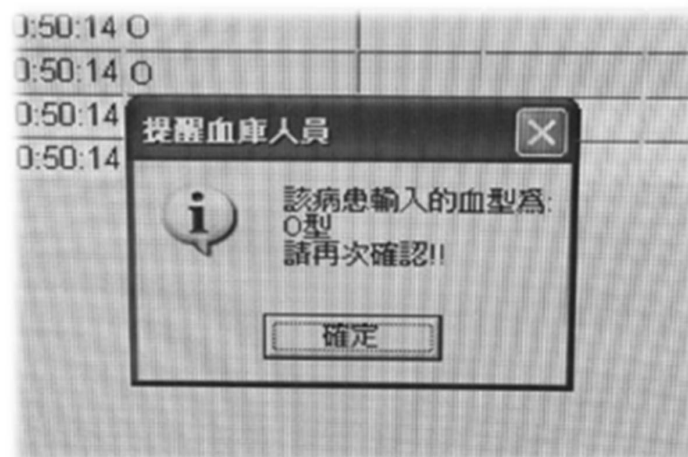
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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)



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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 認知人因 (Cognitive Human Factors)



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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 組織人因 (Organizational Human Factors)

- ❖ 是研究或應用社會技術系統的最佳化(optimization of sociotechnical systems)之知識與技術，如組織結構、政策及歷程(從研究個人推廣至多人)。

2. Introduction of Human Factors

➤ 人因工程的範疇

□ 組織人因 (Organizational Human Factors)

❖ 而其相關議題包括：溝通、飛航組員資源管理、工作設計，工作時間安排、團隊工作、參與式設計、社區人因工程、合作式工作、新工作典範、組織文化以及虛擬組織...



<http://healthwise-everythinghealth.blogspot.com/2010/04/surprises-about-emergency-room-use.html>

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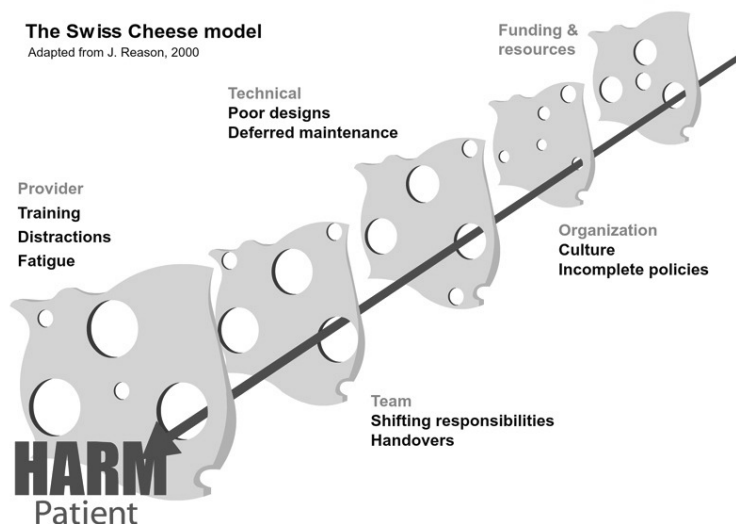
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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 組織人因 (Organizational Human Factors)

The Swiss Cheese model
Adapted from J. Reason, 2000



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https://www.cmpa-acpm.ca/serve/docs/ela/goodpracticesguide/pages/adverse_events/Quality_improvement/systems_thinking-e.html

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2. Introduction of Human Factors

➤ 人因工程的範疇

□ 感性人因 (Kensai Engineering/Attractive Human Factors)

❖ 感性工學是探討產品與消費者感受相關議題的一門學問。



http://www.qfdi.org/workshop_kansei.html



<http://newvaluestreams.com/wordpress/?p=151>

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2. Introduction of Human Factors

➤ 人因工程的範疇

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❖ 感性工學是探討產品與消費者感受相關議題的一門學問。



<https://www.pinterest.com/marketlabinc/the-phleboto-my-shop/>

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2. Introduction of Human Factors

➤ 人因工程的範疇

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<https://www.gvm.com.tw/article.html?id=20482>

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2. Introduction of Human Factors

➤ 人因工程的範疇

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❖ 感性工學是探討產品與消費者感受相關議題的一門學問。



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<http://www.twwiki.com/wiki/%E9%86%AB%E6%82%A3%E7%B3%BE%E7%B4%9B>

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3. Relevant Discussion

➤ 議題

- ☐ 跌倒 (6組)
- ☐ 給藥錯誤(3組)
- ☐ 鼻胃管(1組)
- ☐ 疫苗管理(1組)

3. Relevant Discussion

1. The need to identify patients at risk of falls including those admitted because of a fall.
2. The need to improve the management of patients following a fall.
3. The need to improve equipment standards.
4. The need to reduce environmental risk.
5. The need to raise organizational and staff awareness of falls.

Table 2. Intrinsic and extrinsic factors.

Intrinsic/Endogenous (patient)	Extrinsic/Exogenous (environment)
Age (older than 65 years) ^{§, **}	Bed rails [‡]
Functional and mobility issues e.g. strength, balance, gait and mobility problems ^{‡, §, ¶, , **, ††}	Improper bed height [‡]
Visual and/or hearing impairment ^{‡, §, ¶, **}	Attachment to equipment: catheter, ECG leads, IVs, oxygen, chest tubes ^{**}
Cognitive impairment, confusion ^{‡, §, ¶, **, ††}	Ill-fitting footwear ^{*, †, ¶}
Medicine use: taking four or more medications ^{‡, §, ¶, , **, ††}	Slippery/wet floors ^{*, ‡, §, ¶, ††}
Postural hypotension, dizziness, vertigo ^{‡, §, ¶, **}	Poor lighting ^{*, †, ‡, §, ¶, ††}
Urinary incontinence or frequency [§]	Lack of safety equipment ^{§, ¶, ††}
Fear of falling [§]	Environmental markings [*]
	Equipment mobility [*]
	Doorway and furniture design [*]

*Leighbody *et al.* 1985.

†Anon 1996.

‡Rubenstein *et al.* 1996.

§Accidental Injury Task Force 2001.

¶Department of Health 2001.

||National Institute for Clinical Excellence 2004.

**Joint Commission on Accreditation of Healthcare Organizations 2004a.

††American Geriatrics Society 2001.

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Hignett S, Masud T (2006) A review of environmental hazards associated with in-patient falls. *Ergonomics* **49**, 605-16.

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2. Introduction of Human Factors

➤ 人因工程 (Ergonomics/Human Factors)

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達到提升效率、確保安全、增加滿意度。



<http://en.wikipedia.org/wiki/File:Human.svg>

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Thank you for your attention!

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Questions & Answers

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