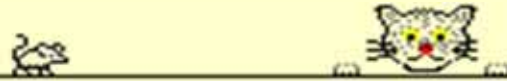


Hong Kong Police Force Crime Prevention Bureau:  
Advanced Crime Prevention Training Day  
20 Dec 2011 (Tue)  
香港警務處防止罪案科: 高級防止罪案訓練日  
2011年12月20日(星期二)



# Enhancing Crime Prevention via the Scope of Building Services Engineering 透過屋宇設備工程 提升防罪工作



1911-2011

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# Contents 內容



- What is BSE? 何謂《屋宇設備工程》?
- Why BSE is Important? 為何BSE是重要的?
- Building Security Design 樓宇保安設計
- Crime Prevention 防止罪案
- Safe Environment 安全的環境
- Conclusions 結論



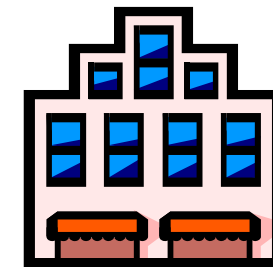
# What is Building Services Engineering (BSE)?

## 何謂《屋宇設備工程》？



# What is BSE?

## 何謂《屋宇設備工程》？

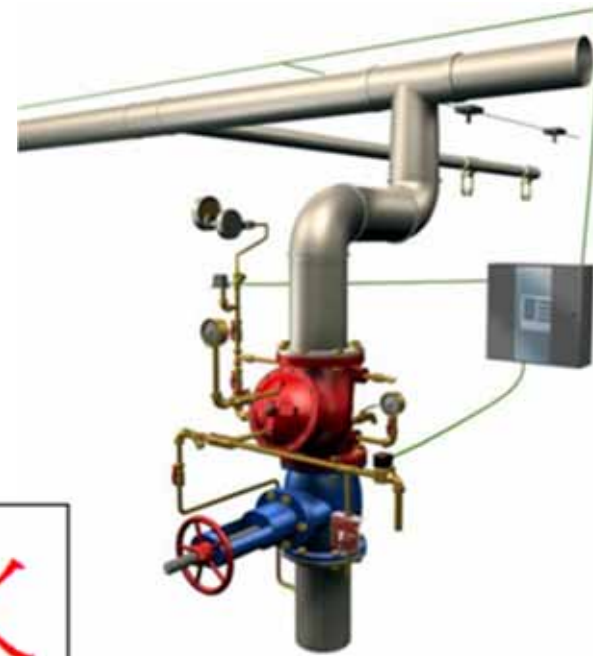


- Building Services Engineering (**BSE**)
  - It is about designing, installing & servicing everything that is needed to make buildings comfortable, safe & convenient
  - 這是有關設計、安裝和維修所需的一切保障建築物舒適、安全及便捷的設備



# Major Building Services Systems and Components

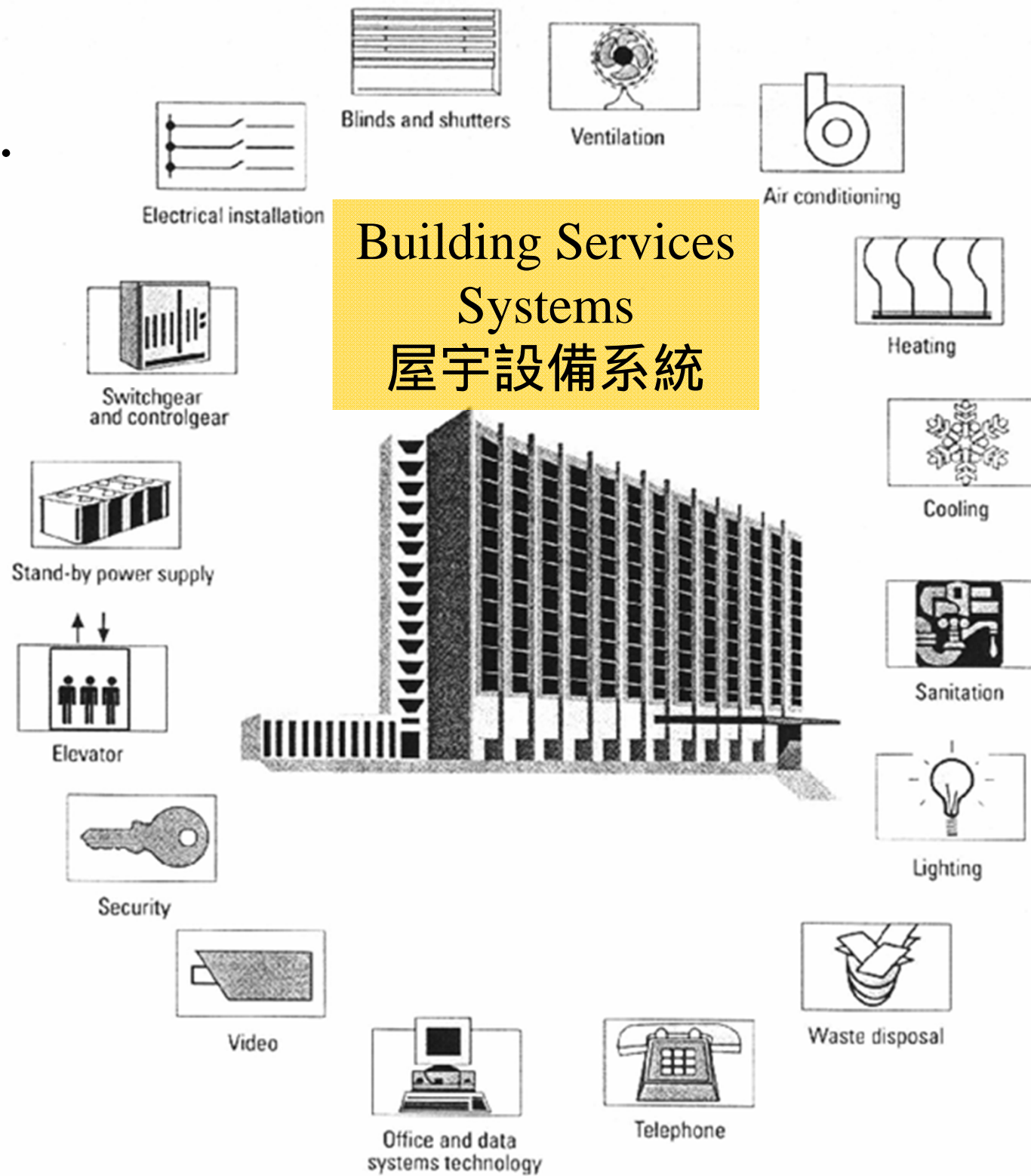
## 主要屋宇設備系統和組件



風 火  
水 電

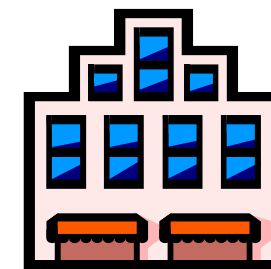


More ...  
更多...



# What is BSE?

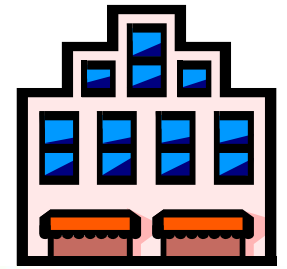
## 何謂《屋宇設備工程》？



- Related areas/disciplines 相關領域/學科
  - HVAC+R (heating, ventilating & air-conditioning + refrigeration) 空氣調節及製冷
  - Fire services 消防設備
  - Water supply & drainage 供水及排水
  - Electrical services 電力裝備
  - Lighting systems 照明系統
  - Security & communication 保安及通訊系統
  - Lifts & escalators 升降機及扶手梯

# What is BSE?

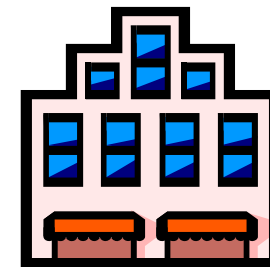
## 何謂《屋宇設備工程》？



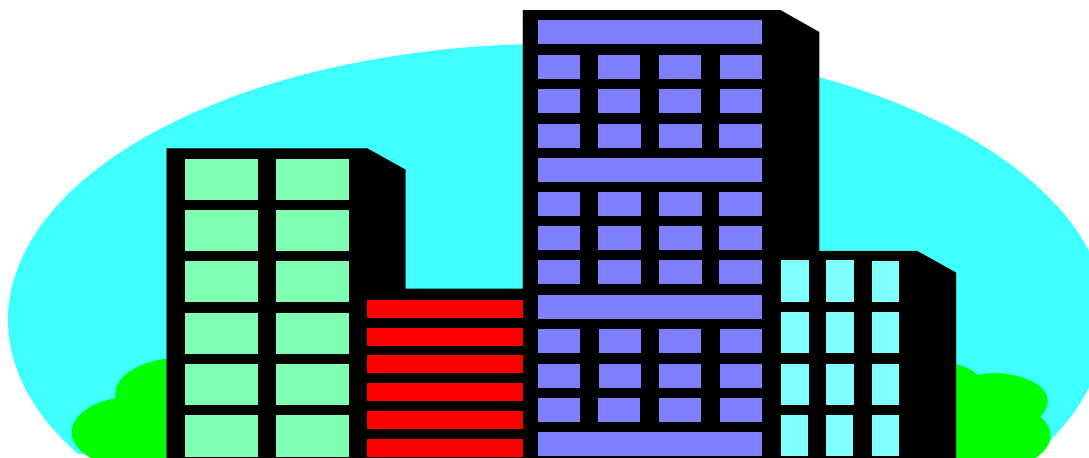
- Related areas/disciplines 相關領域/學科
  - Building management & control system 屋宇管理及控制系統
  - Gas & steam supply 燃氣及蒸汽供應
  - Acoustics 聲學
  - Facade engineering 幕牆工程
  - Refuse disposal system 垃圾處理系統
  - Building energy efficiency 建築節能
  - Sustainable building design 可持續發展建築設計

# What is BSE?

## 何謂《屋宇設備工程》？



- Video: 影片
  - The Building Design Process and Teamwork: Building Services Engineer [ArchSD] (2:11)  
建築工程的幕後團隊: 屋宇裝備工程師
    - [www2.archsd.gov.hk/teachingkits/TK2/video4\\_en.html](http://www2.archsd.gov.hk/teachingkits/TK2/video4_en.html)



建築師

屋宇裝備工程師

土木工程師



Building design is a team work.

建築設計是一個團隊工作

# Why BSE is Important?

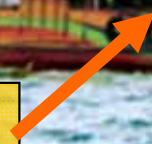
## 為何BSE是重要的？



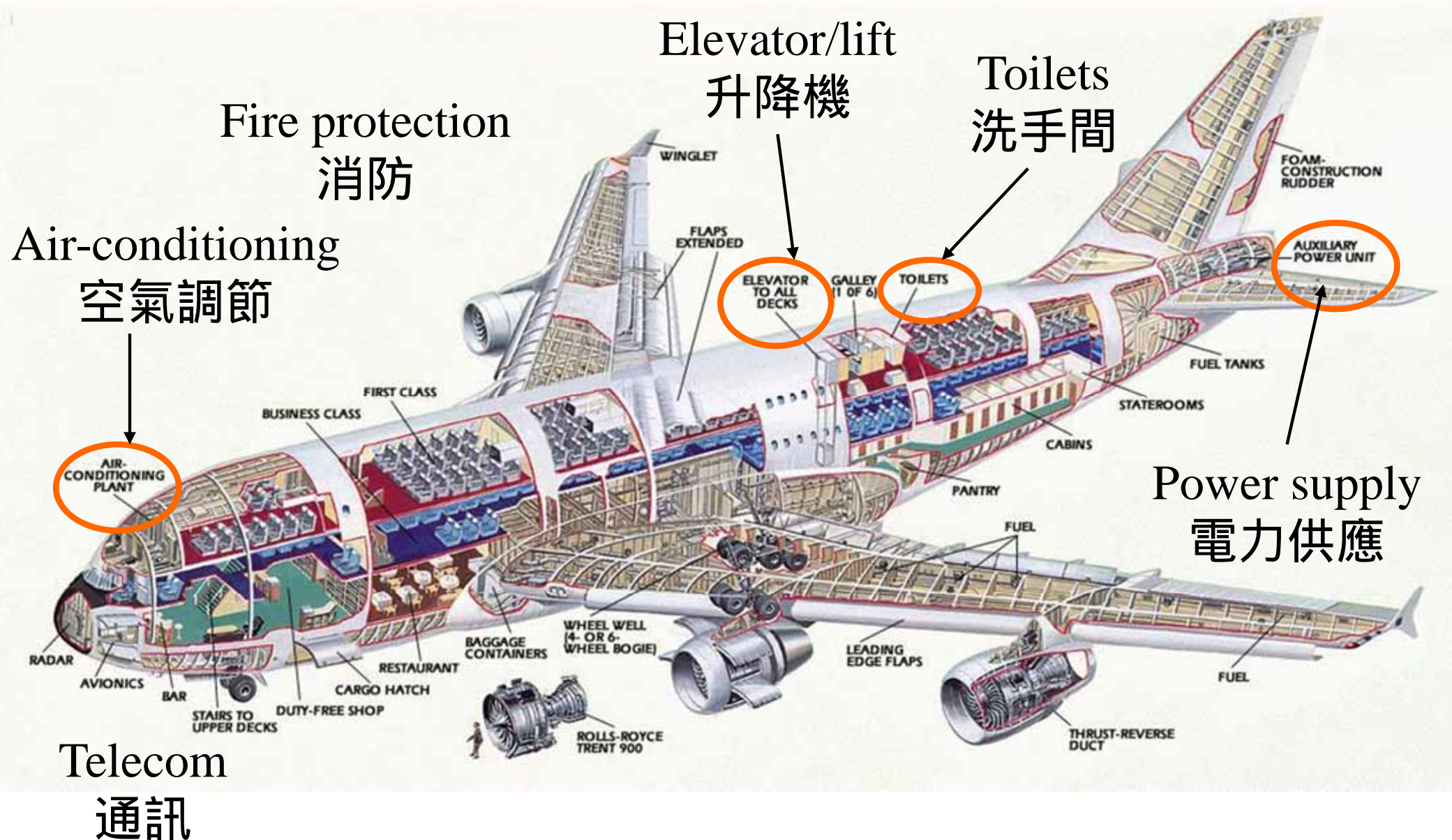
# Every building requires BSE

每座建築物都需要屋宇設備工程

A ferry boat also needs Building Services.  
渡輪也需要屋宇設備



Even an A380 aircraft also needs Building Services.  
即使A380飛機也需要屋宇設備



Telecom  
通訊

An aerial photograph of Hong Kong, showing a dense cluster of skyscrapers and residential buildings. The city is built on a hillside, with the sea visible on the right. The text 'HONG KONG 香港' is overlaid in a yellow box in the top right corner.

# HONG KONG 香港

What will happen if no electricity, no water, no air-conditioning?  
如果沒有電，沒有水，沒有空調，會發生什麼事？

# Why BSE is Important?

## 為何BSE是重要的？



- Main objectives of BSE design 屋宇設備工程設計的主要目標
  - Hygiene (prevent disease & ensure health) 衛生（預防疾病，確保健康）
  - Safety (protect against risks) 安全（防範風險）
  - Comfort (physio- & psycho- well-beings) 舒適（生理和心理，以及人類）
  - Convenience (efficiency & productivity) 方便（效率與生產力）

# Building Services Systems 屋宇設備 系統

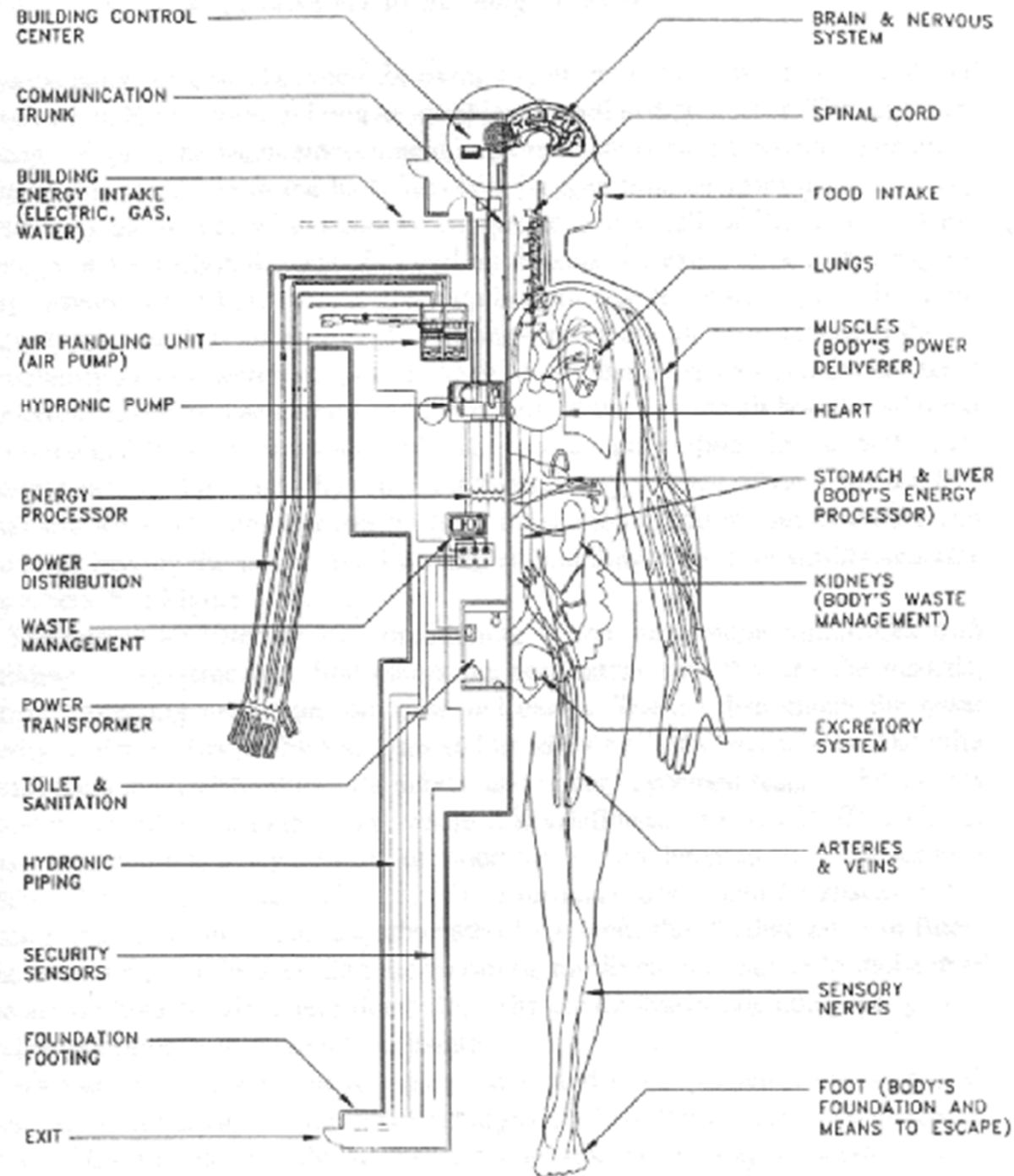


Figure 14.4 Body-building system integration.

# Human Body 人體 結構

# Why BSE is Important?

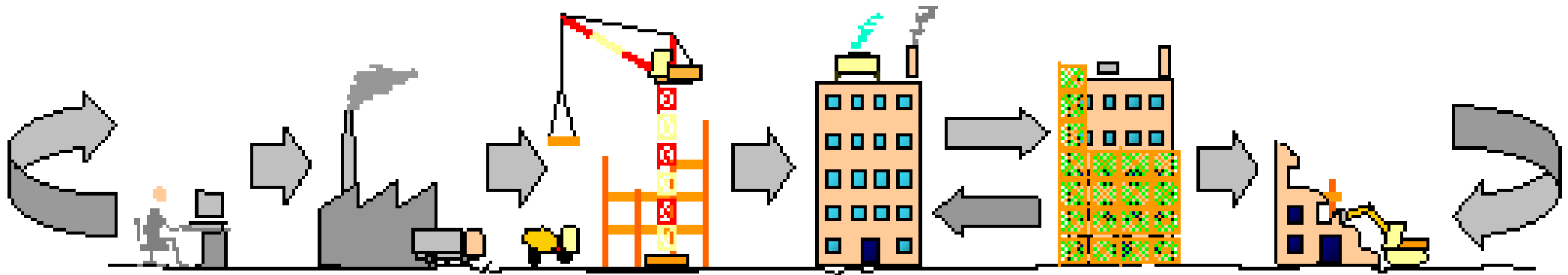
## 為何BSE是重要的？



- Scope of work 工作範圍
  - Planning of building projects 規劃建設項目
  - Building design 建築設計
  - Site construction & installation 工地施工及安裝
  - Testing & commissioning 測試和調試
  - Operation & maintenance 操作和維護
  - Refurbishment & renovation 翻新及裝修
  - Facility management 設施管理

# Building Services Engineers are involved in whole building life cycle

## 屋宇裝備工程師都參與了整個建築生命週期



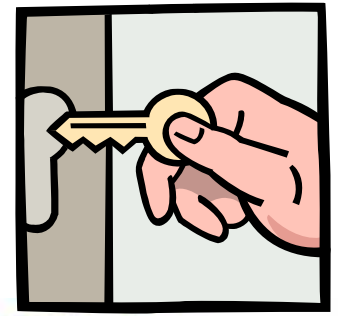
Plan & Design	Material production	Construct	In use	Refurbish	Demolish
規劃設計	物質生產	建造	使用	翻新	拆除



From cradle to grave  
從搖籃到墳墓

# Building Security Design

## 樓宇保安設計



- Security engineering 保安工程
  - Develop detailed engineering plans and designs for security features, controls and systems 保安功能、控制和系統的詳細工程計劃和設計
- Physical security 機械式保安
  - Deter attackers from accessing a facility, resource, or information stored on physical media 阻止攻擊者接近設施、資源或存儲信息
  - Guidance on how to design structures to resist various hostile acts 指導如何設計結構以抵禦各種敵對行為

# Highly secured premises 高度保安的場所



CCTV  
閉路電視

Security control centre  
保安控制中心



Access  
control  
通道管理

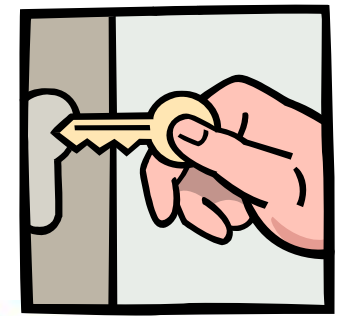


Blocks &  
fencing  
攔阻和圍柵



# Building Security Design

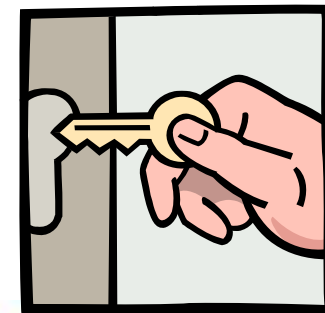
## 樓宇保安設計



- Four layers of physical security 機械式保安
  - Environmental design 環境設計 (to deter threats)
  - Mechanical and electronic access control 機械和電子通道管理 (e.g. locks and access cards)
  - Intrusion detection 入侵檢測 (monitors for attacks)
  - Video monitoring 視頻監控 (for incident verification and historical analysis)
- The goal is to convince potential attackers that the likely costs of attack exceed the value of making the attack 目標是說服潛在的攻擊者，攻擊的可能成本超過攻擊的價值

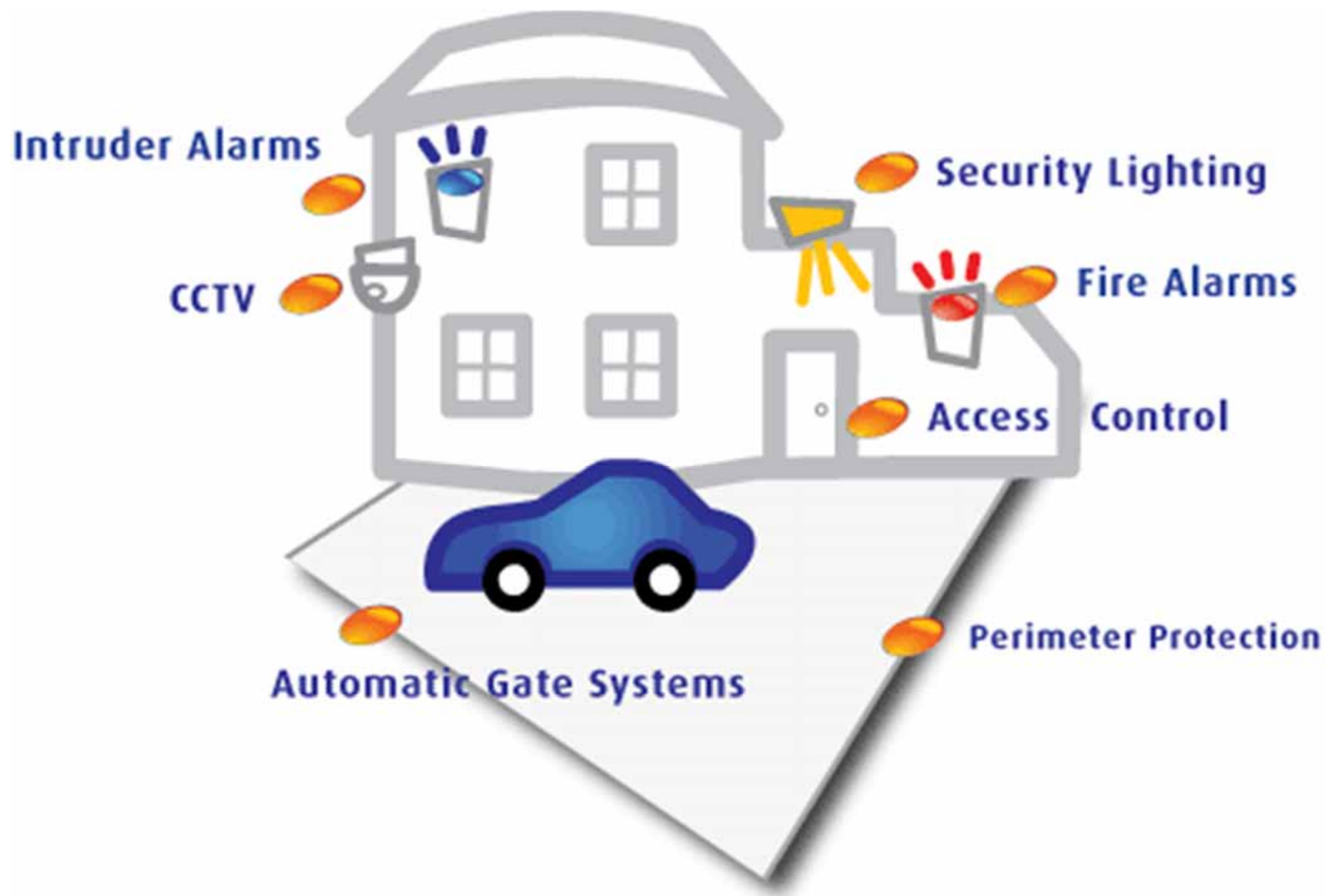
# Building Security Design

## 樓宇保安設計



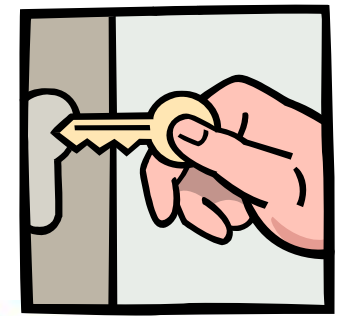
- Design considerations 設計注意事項
  - Evaluate the risk 評估風險
  - Physical protection 機械式保護
  - Detection 檢測
  - Alarms 警報
  - Response 回應
  - Maintenance & review 維護與審查
- Conflicts between security requirements and fire safety/escape 保安要求和消防安全/逃生之間的衝突





# Building Security Design

## 樓宇保安設計



- Common security systems 常見的保安系統
  - Burglar alarm system 防盜警報系統
  - Fire alarm & detection system 火災警報檢測系統
  - C.C.T.V. surveillance system 閉路電視監控系統
  - Intruder detection & access control 入侵檢測及通道管理
  - Intercom systems 對講系統 , Door-phone system & interlocking system 門電話系統及聯鎖系統
  - P.A. (panic attack) button system 驚恐按鈕系統
  - Security lighting 保安照明

# Typical security and alarm systems 典型的保安和警報系統



**Intrusion  
Alarms**



**Closed Circuit  
Television**



**Digital Video  
Surveillance**

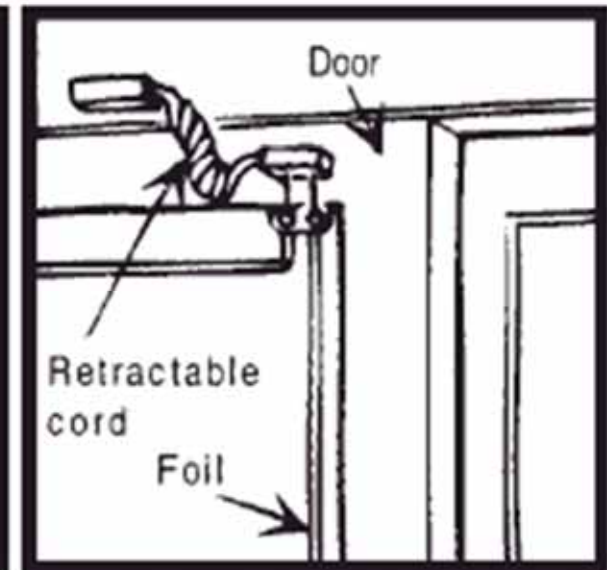
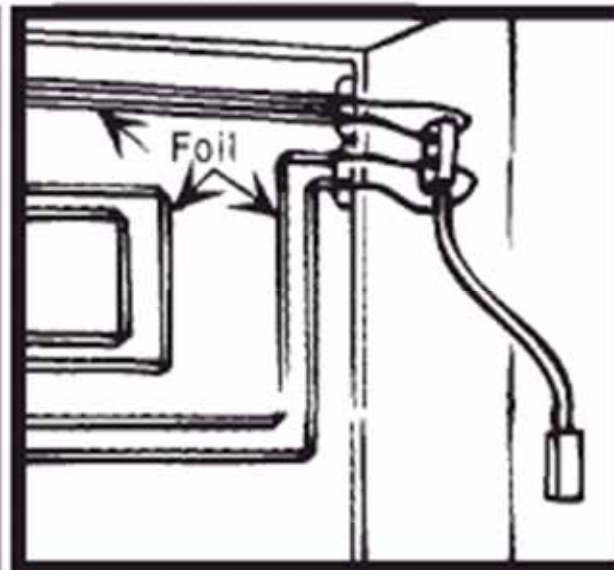
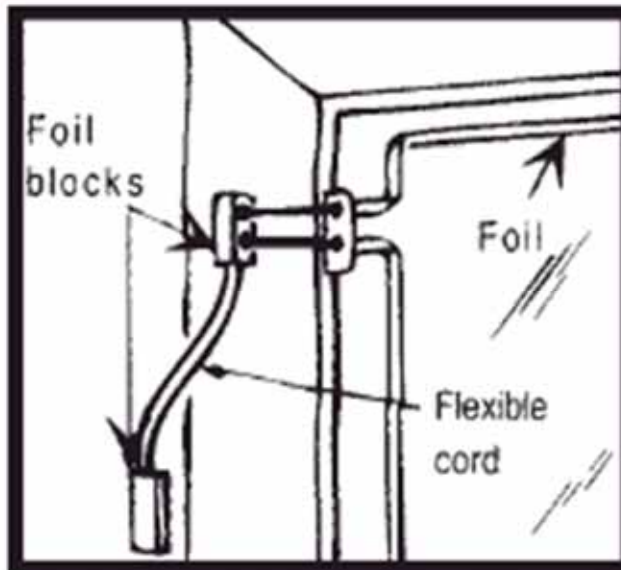
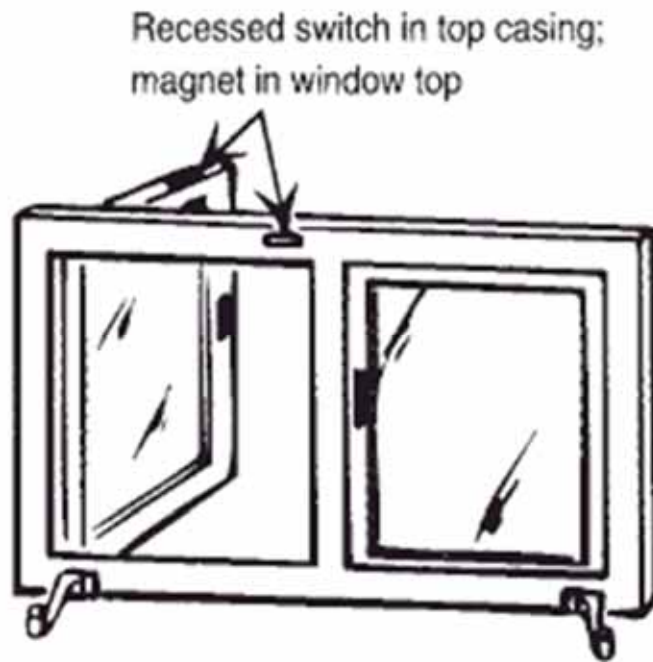


**Access  
Control**



**Critical Process  
Monitoring**

# Magnetic contacts on windows and doors 門窗磁接觸



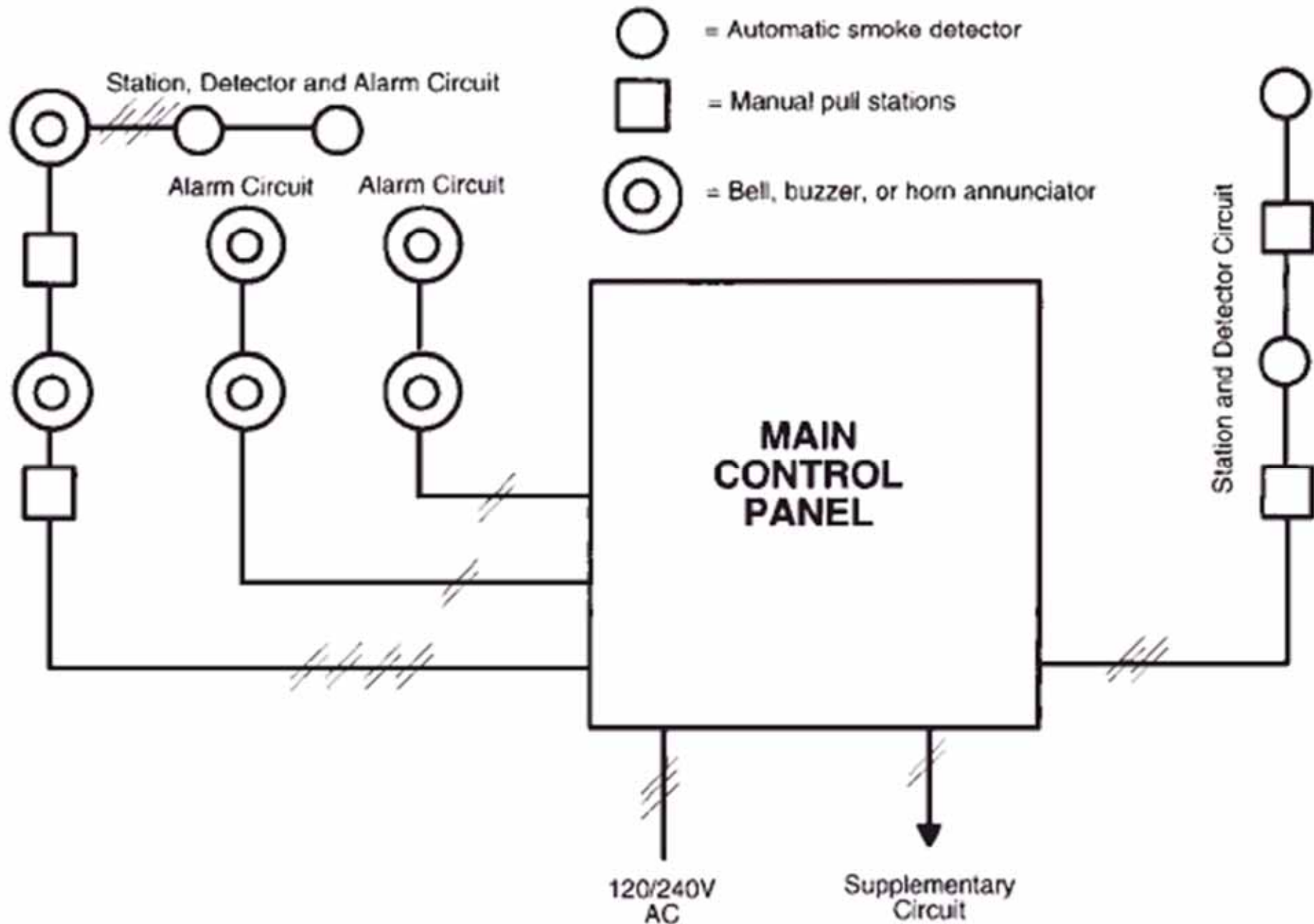
# Example of an intruder detection alarm system 入侵檢測警報系統



[Source: <http://www.xpertsecurity.com>]

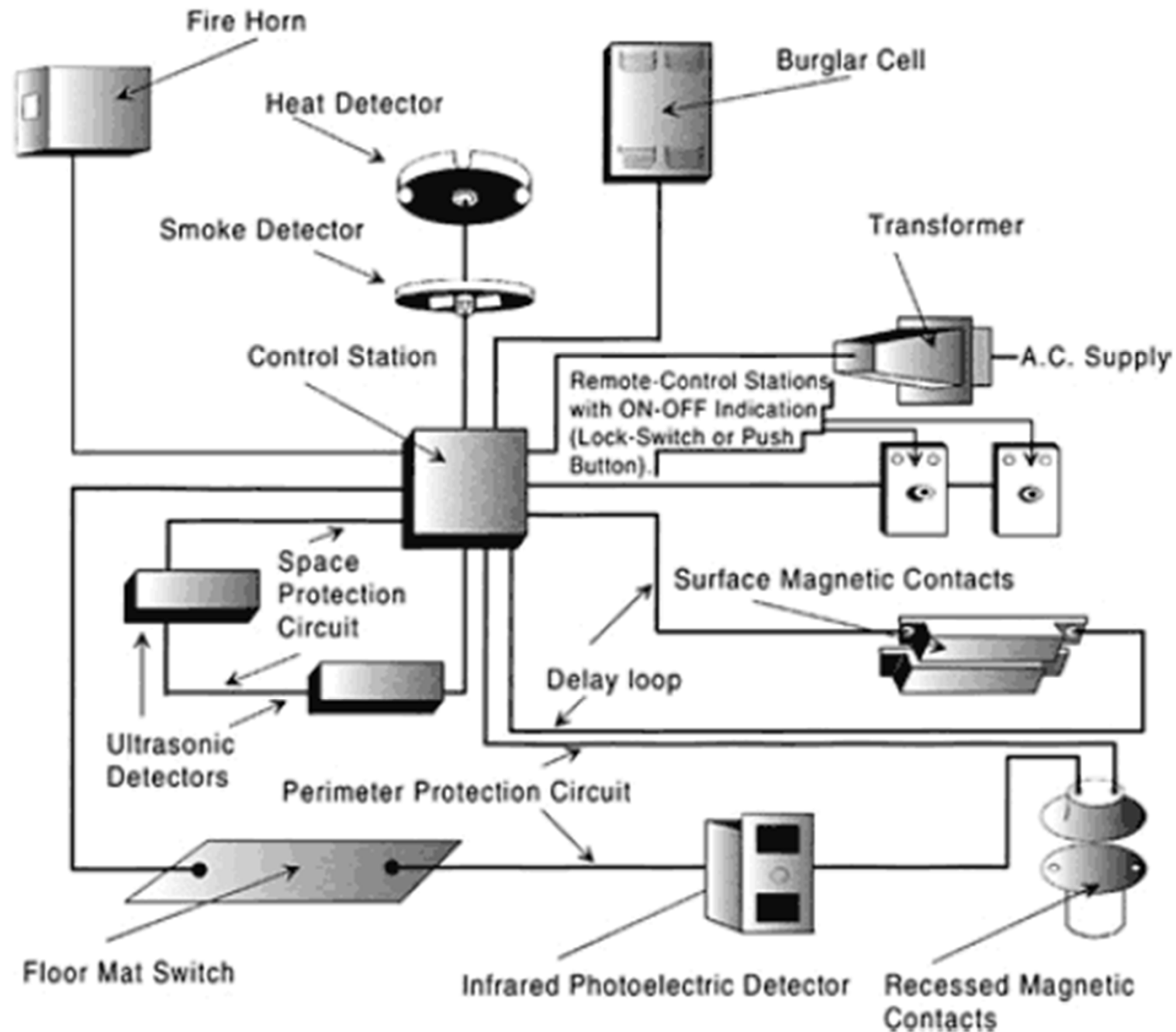
# Schematic diagram of a fire-alarm main control panel

## 主要火災警報控制板的示意圖



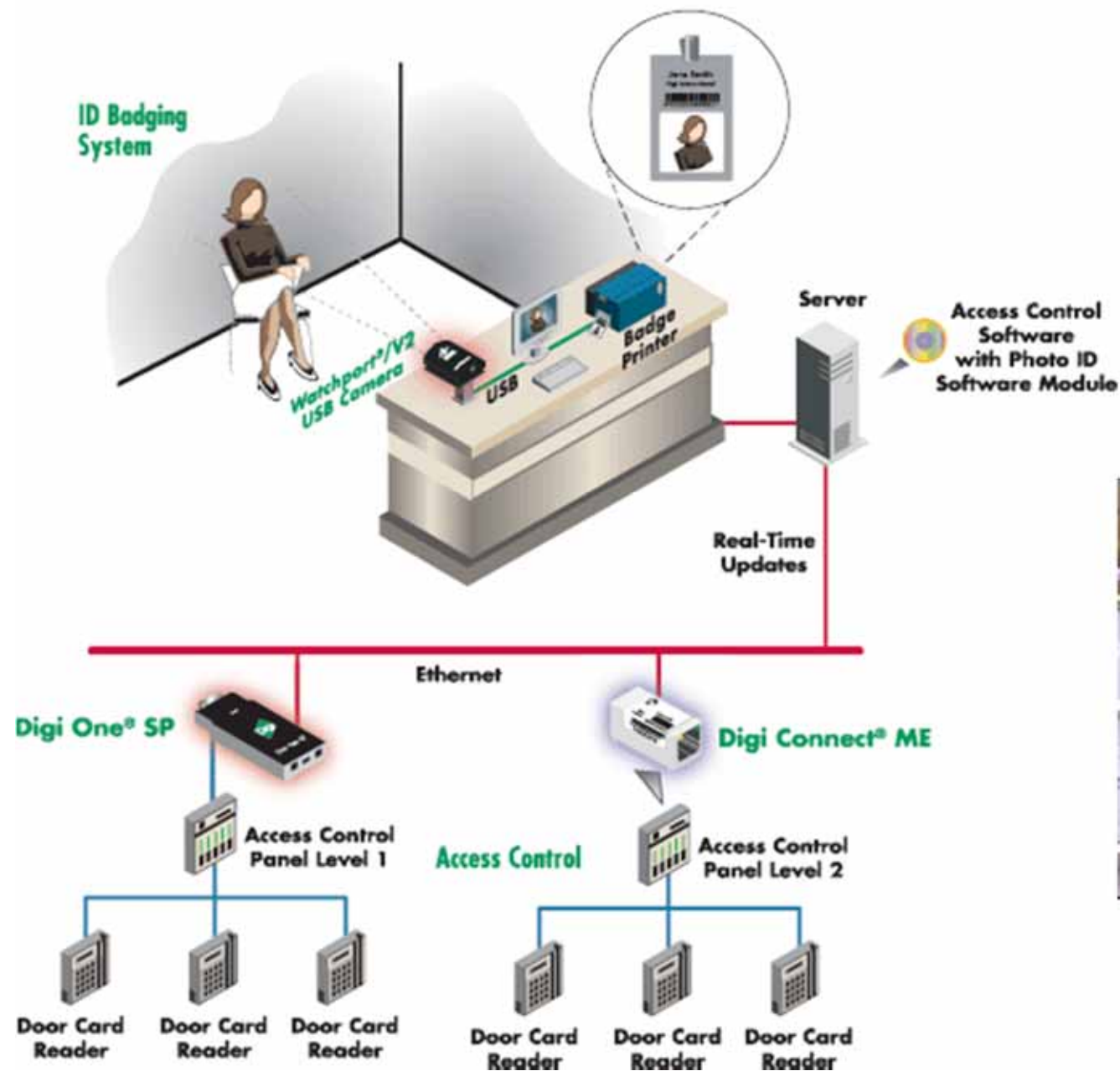
# Components for a typical security/fire-alarm system

## 一個典型的保安/火災警報系統的組成部分



# 綜合證件和通道管理系統

## Integrated Photo ID Badge and Access Control System



[Source: [http:// www.digi.com](http://www.digi.com)]

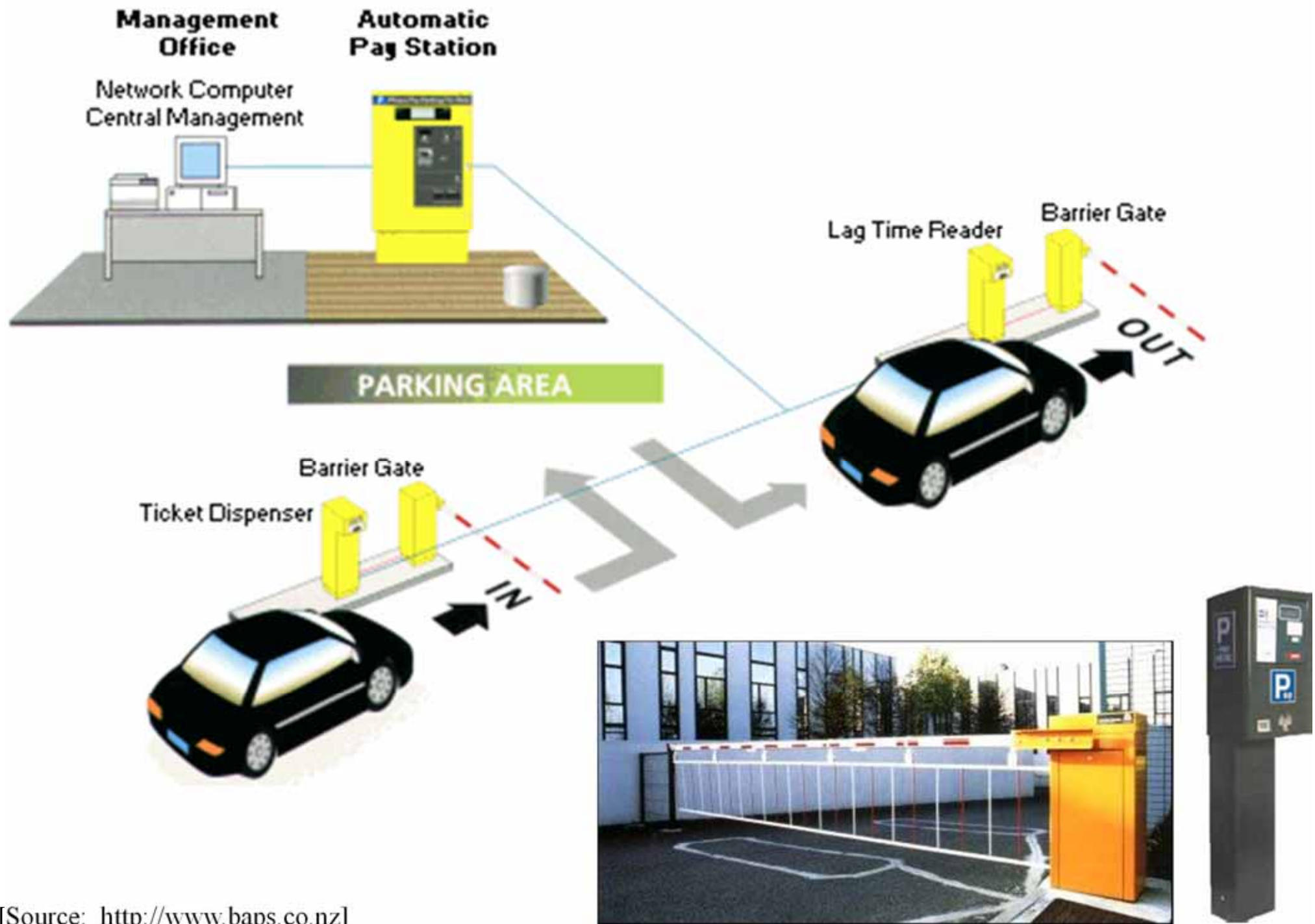
## Access control system 通道管理系統



## Pedestrian turnstiles 行人入閘機

[Source: <http://www.baps.co.nz>]

# Car park control system 停車場管理系統



# A typical building security & car park control system

## 一個典型的建築保安及停車場控制系統



- (1) Building entry access system with intercom system
- (2) Lift access control restricting tenants within floors
- (3) Secure alarmed areas within office complexes
- (4) Energy management & building service control systems (lighting and air conditioning)
- (5) Car park access control for entry and exit

[Source: <http://www.baps.co.nz>]



Does it need to look like a fortress?  
它需要看起來像一個堡壘嗎？

A world without thieves?!  
天下無賊?!

天下无贼  
*A world without Thieves*

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[illegible]

A world without thieves?!  
天下無賊?!

# 天下無賊

*A world without Thieves*

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主演：劉德華、周潤發、張靜初、李冰冰、王寶強、林嘉欣、張涵予、尤勇 本電影由：張敬平、徐威、范偉、邱明正 制片人：紀冬卿、劉建鵬、倪戈 發行制片人：陳國富 影片主理：王軍、張杰、劉國治、宋夫（天下無賊）小組成員 平面設計：華夏兄弟太合傳媒投資有限公司 網絡推廣推廣：中國電影集團數字電影製作有限公司 聯合發行：萬事達電影發行有限公司 中國電影集團公司 中國電影院線有限公司

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# Crime Prevention 防止罪案

- Elements necessary for a crime to occur:  
犯罪發生的必要元素
  - Desire or motivation on the part of the criminal  
罪犯的慾望或動機
  - The skills and tools needed to commit the crime  
所需的技能和作案工具
  - Opportunity 機遇
- Crime triangle 犯罪三角
  - Criminal, Victim, Opportunity
  - 罪犯，受害者，機遇



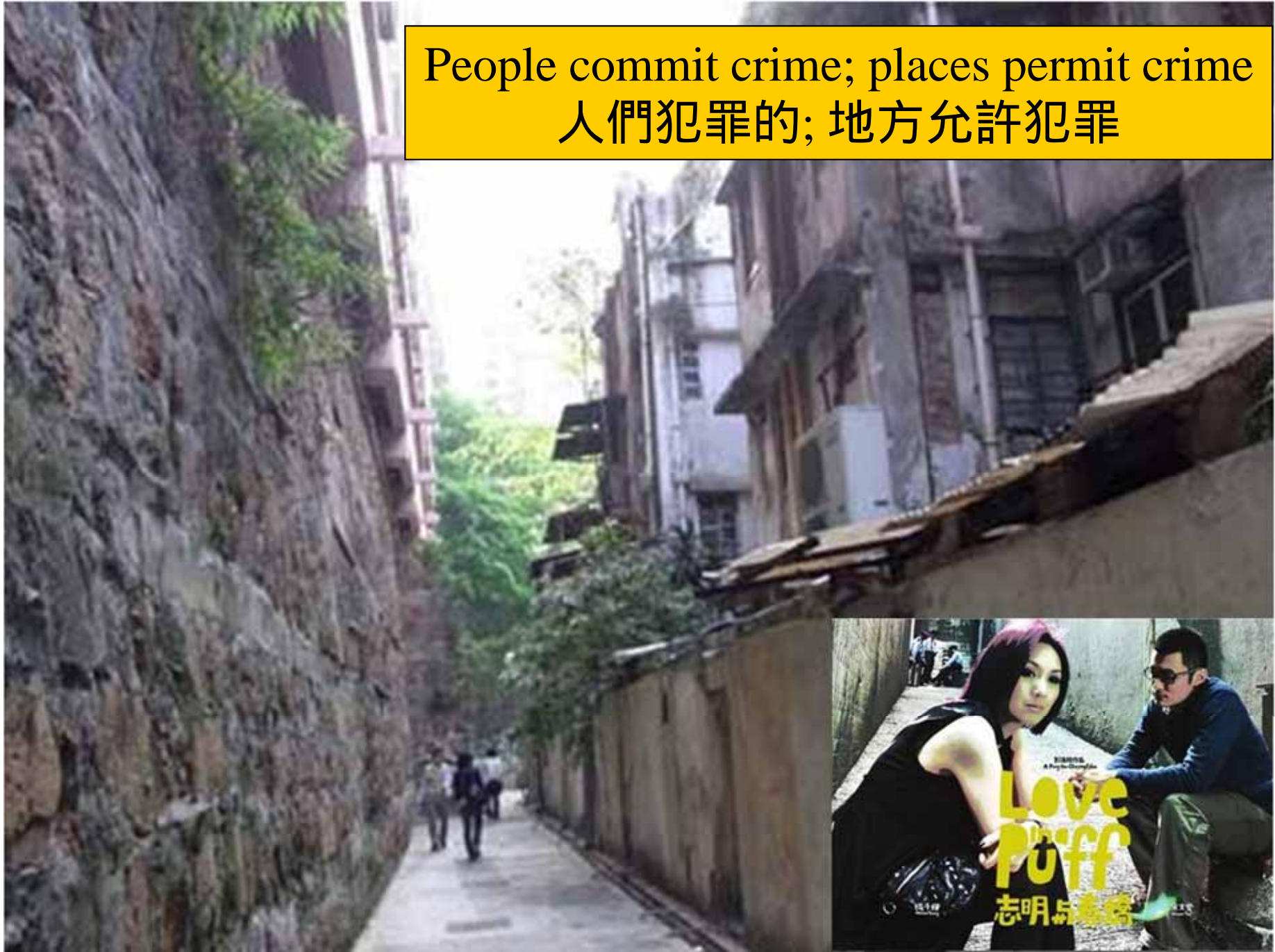


# Crime Prevention 防止罪案

- Types of crimes 犯罪的種類:
  - Major crimes, such as drug offences, burglary, robbery, indecent assault, thefts 主要犯罪，如毒品犯罪，爆竊，搶劫，非禮，盜竊
  - Minor crimes, such as graffiti, vandalism, littering, criminal damage 次要犯罪，如塗鴉，破壞，亂拋垃圾，和刑事毀壞
- Crime and loss prevention 預防犯罪和損失
  - Affected by the environment 受環境影響
  - High value assets (cable/lead) 高價值的資產 (電線/鉛)

Unattended back lane might attract crime  
無人值守後巷可能會吸引犯罪

People commit crime; places permit crime  
人們犯罪的; 地方允許犯罪





# Crime Prevention 防止罪案

- Situational crime prevention techniques: 情境犯罪預防技術
  - Increase the difficulty of crime 增加犯罪的難度
  - Increase the risk of crime 增加犯罪的風險
  - Reduce the rewards of crime 減少犯罪的獎勵
- Impact of built environment 建築環境的影響
  - Barriers and access control 障礙和通道管理
  - Detection and alarm 檢測及警報
  - Avoid/protect valuables 避免/保護貴重物品

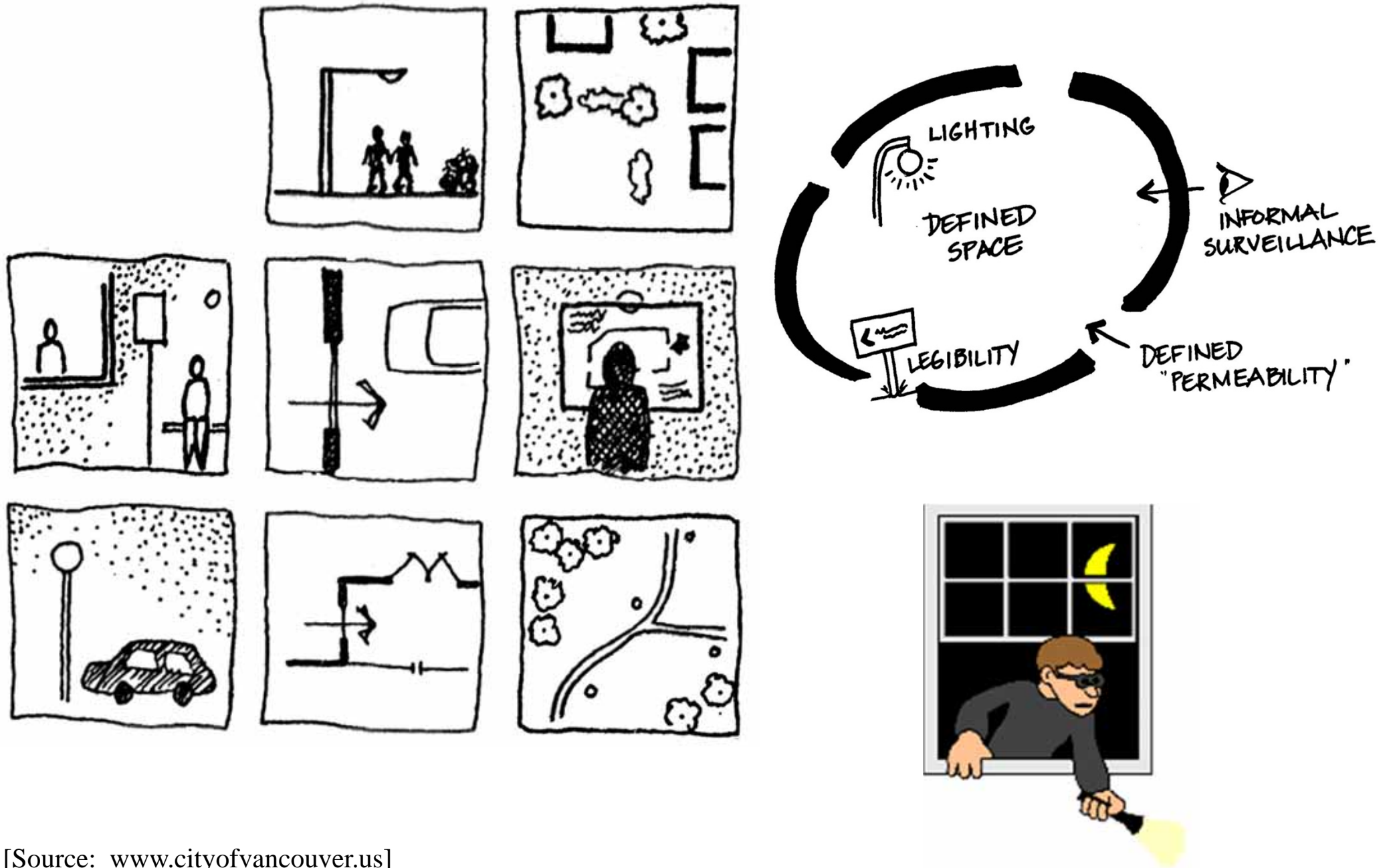


# Crime Prevention 防止罪案

- Crime prevention through environmental design (**CPTED**) 通過環境設計預防犯罪
  - Proper design & effective use of the built environment can lead to a reduction in the incidence and fear of crime 適當的設計和有效的建築環境可以降低犯罪率和增加對犯罪的恐懼
  - Deter criminal behaviour and influence offender decisions that precede criminal acts 震懾犯罪行為和影響罪犯的犯罪行為決定
  - Relationship between the built environment and criminal behaviour 建築環境和犯罪行為之關係

# Crime prevention through environmental design (CPTED)

## 通過環境設計預防犯罪



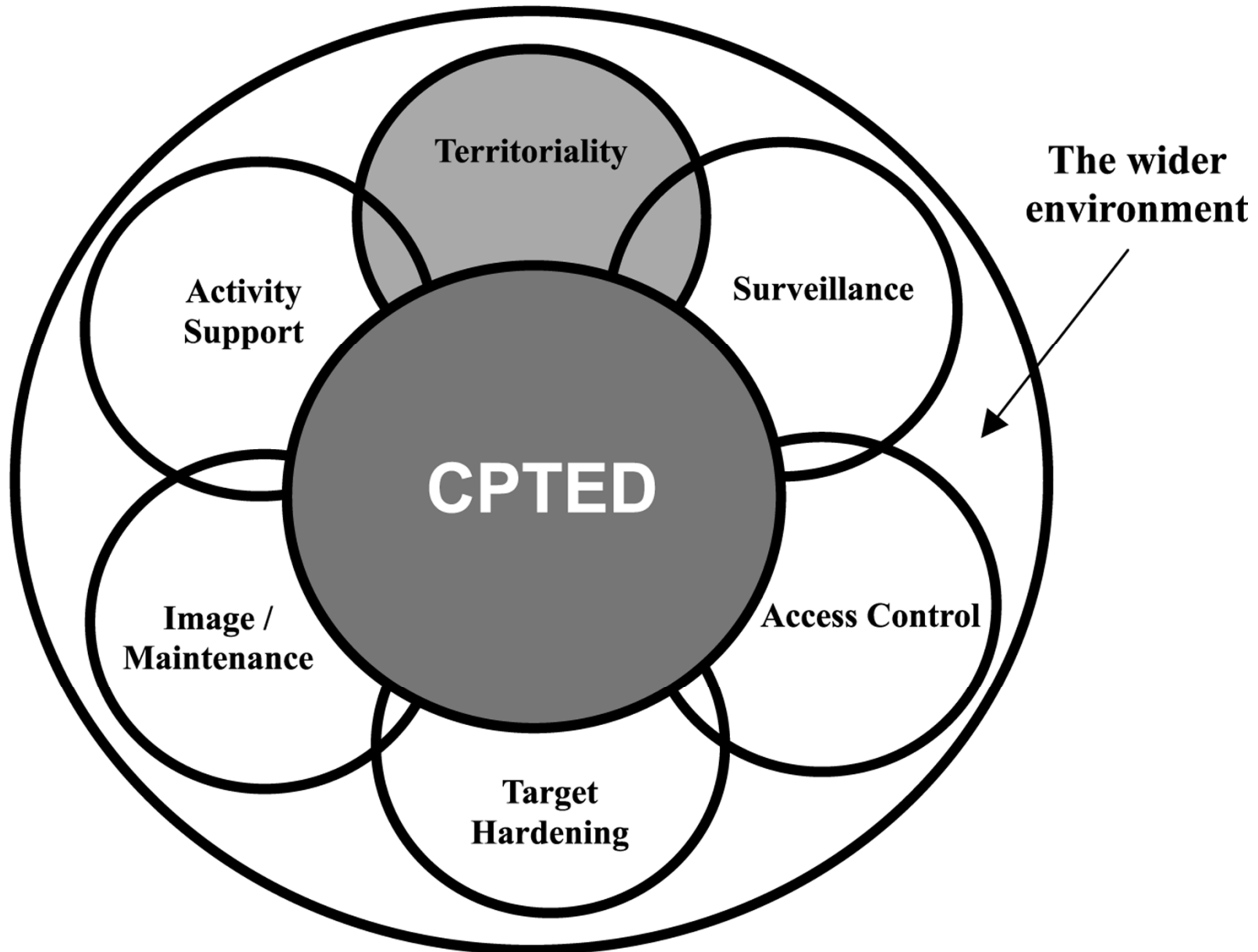


# Crime Prevention 防止罪案

- Use of light and colour: Blue lighting 光與色的使用: 藍色燈光
  - For areas used by drug addicts to inject drugs. The blue lighting makes it impossible to identify veins, thus discouraging the addicts from using that location to "shoot up" and then discard needles 對於被吸毒者用於注射毒品的地方。藍色燈光使得它無法識別靜脈，從而阻礙使用該位置注射毒品，然後丟棄針頭



# Key concepts of crime prevention through environmental design (CPTED) 通過環境設計預防犯罪的關鍵概念



**Source:** Adapted from Moffat (1983, p. 23)

[Source: Cozens, Saville and Hillier (2005)]



# Crime Prevention 防止罪案

- Key concepts of CPTED 通過環境設計預防犯罪的關鍵概念
  - 1. Territoriality 屬地
  - 2. Surveillance 監控
  - 3. Access control 通道管理
  - 4. Activity support 活動的支持
  - 5. Image/maintenance 形象/維護
  - 6. Target hardening 目標硬化



# Crime Prevention 防止罪案

- 1. Territoriality 屬地
  - Defensible space 防禦空間
  - Reinforce a sense of ownership 強化主人翁意識
- 2. Surveillance 監控
  - Natural/CCTV 自然/閉路電視
- 3. Access control 通道管理
  - Regulated access 管制通道
- 4. Activity support 活動的支持
  - Encourage “safe” activities 鼓勵 “安全” 活動



# Crime Prevention 防止罪案

- 5. Image/maintenance 形象/維護
  - Promote a positive image and proper maintenance 促進積極的形象和妥善保養
- 6. Target hardening 目標硬化
  - Use of physical barriers 使用物理屏障
- Architect, BSE and Criminologist must work together 建築師，屋宇裝備工程師，和犯罪學家必須共同努力



# Safe living environment 安全的生活環境



# Safe Environment 安全的環境



- Environmental quality 環境質量
  - Well-designed 精心設計
  - Attractive 有吸引力
  - Clearly defined 明確界定
  - Well maintained 保持良好
- Secured by design 通過設計保護安全
  - Designing out crime 設計預防犯罪
  - To encourage people to adopt measures to assist in crime prevention 為了鼓勵人們採取措施，以協助預防犯罪

# Safe Environment 安全的環境

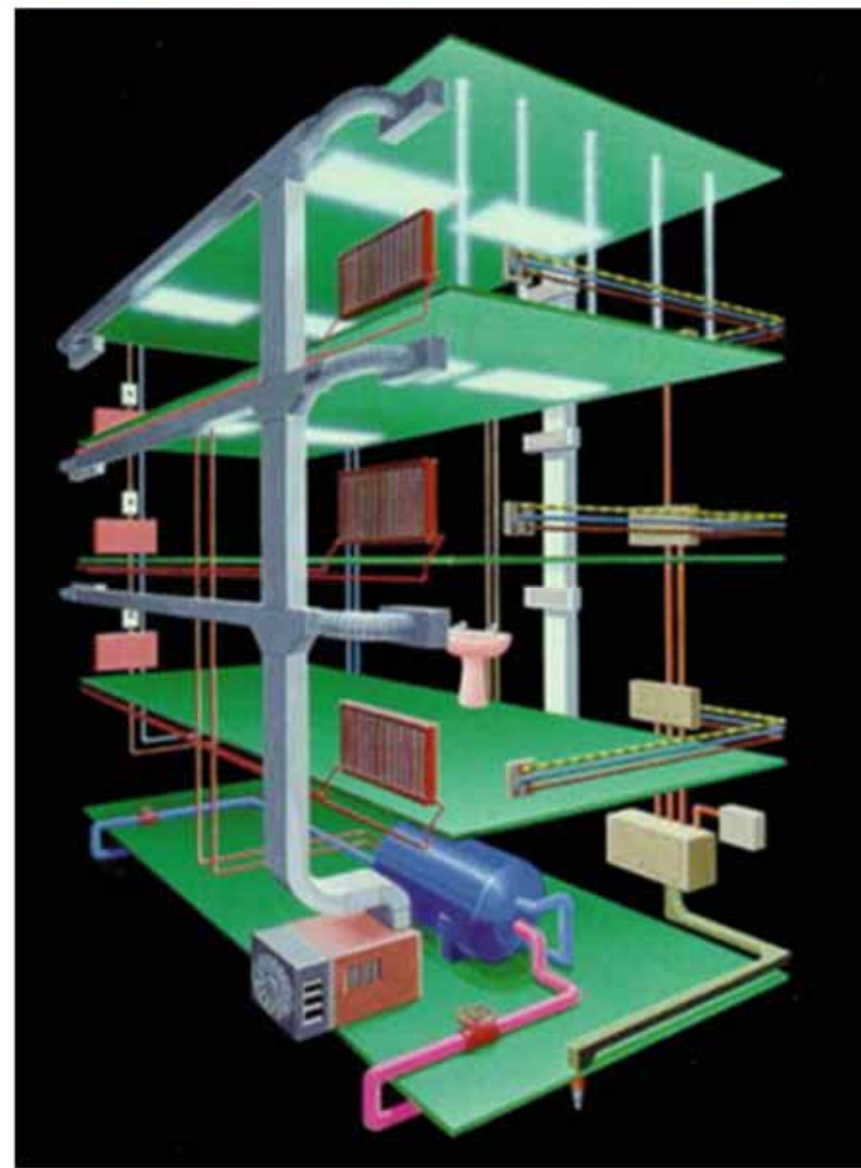


- The role of BSE 屋宇裝備工程師的作用
  - Planning & design 規劃與設計
    - Assess the risk 評估風險
    - Consider suitable measures 考慮採取適當的措施
  - Construction process 建造過程
    - Take precautions and attention 採取預防措施及注意
    - Coordinate with contractors 與承建商協調
  - Facility management 設施管理
    - Analyse and evaluate the problems 分析和評估問題
    - Recommend remedial measures 建議採取補救措施

# Safe Environment 安全的環境



- Components 組件
  - Air duct 風管
  - Pipework 管道工程
  - Trunking 電工線槽
  - Lighting 照明
  - Appliance 家電
  - Equipment 設備
  - Plant 機組
  - Controls 控制



# Safe Environment 安全的環境



- The law of unintended consequences 意想不到的後果的定律
  - Unintended outcomes 意外結果
  - Unexpected benefits (+ve) 意想不到的好處(正)
  - Unexpected drawbacks (-ve) 意外的弊端(負)
  - Perverse results 有害的結果
- BSE often face such 屋宇裝備工程師經常面對這樣的結果:
  - Need to understand/promote benefits and avoid drawbacks 需要了解/促進效益和避免弊端

# Conclusions



- Key points discussed: 討論過的重點
  - What is BSE? 何謂《屋宇設備工程》?
  - Why BSE is Important? 為何BSE是重要的?
  - Building Security Design 樓宇保安設計
  - Crime Prevention 防止罪案
  - Safe Environment 安全的環境
- Crime and loss prevention 預防犯罪和損失
  - Integrated approach is needed 需要一種綜合辦法
  - Affected by the environment 受環境影響



# Conclusions

- Crime prevention through environmental design (CPTED) 通過環境設計預防犯罪
  - Should be considered first 應首先考慮
- Need the cooperation of Architect, BSE and Criminologist 需要建築師，屋宇裝備工程師和犯罪學家的合作
  - Shall understand the true crime in Hong Kong to promote benefits and avoid drawbacks 需要了解香港的真正的犯罪，促進防罪效益和避免弊端

# True Crime: Hong Kong? 真實犯罪：香港?



# THANK YOU 謝謝



**Merry Christmas**

(More information: [www.hku.hk/bse/](http://www.hku.hk/bse/))