




從藥事執業的觀點看智慧型 手機軟體的應用與趨勢

彭子安 藥師

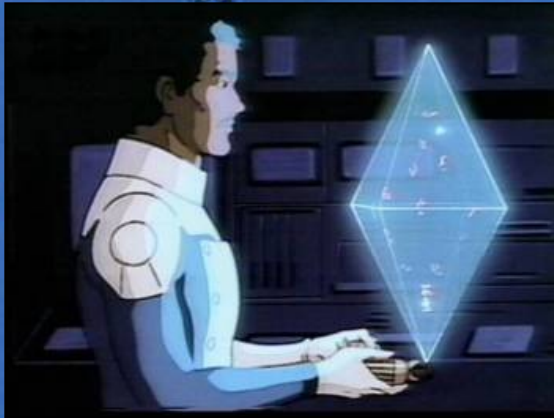
葉耿焦 藥師



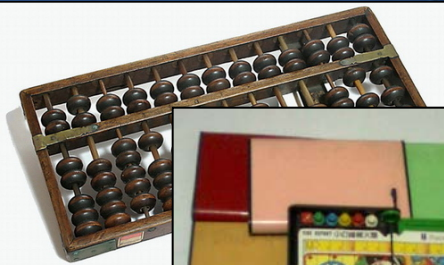
經由此次課程

- ◆ 了解手持式智慧型裝置的演進
- ◆ 了解藥事執業相關的APP應用類型

故事要從一部卡通說起…

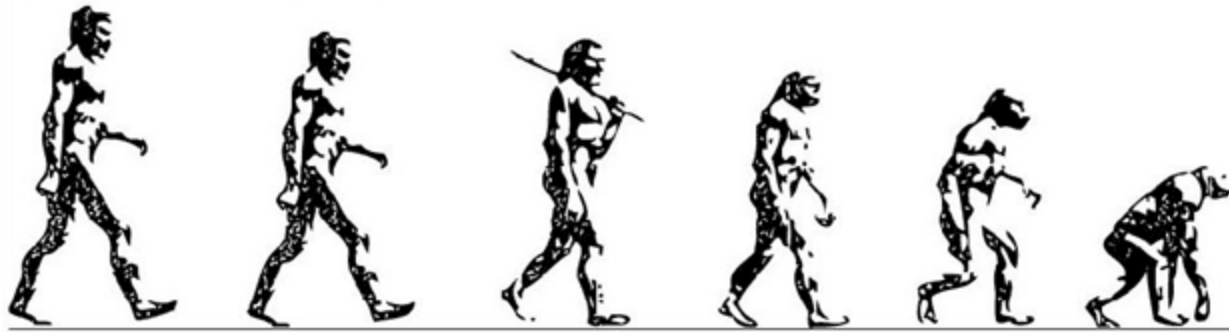


手持式智慧型裝置的演進



一步步過來?

nipic.com/mandymengmeng



現況一

- ◆ 行動裝置已經占據現代人一天中的2小時又38分鐘



The background of the slide is a blue-tinted image of the Eiffel Tower. At the top of the tower, there are several concentric white circles representing signal waves or a radio tower, symbolizing connectivity and technology.

現況二

- ◆ 2016年智慧型手機應用程式使用族群將達33億人
- ◆ 行動醫療市場規模將近110億美金，年複合成長率高達72%


Ref: 工研院產經中心IEK

現況三

◆ 2011年蘋果App Store上，mHealth相關App總下載次數達7.18億次

→其中醫療藥類別過去一年增加數量幾乎翻倍，成長率**97%**

目前市場營收來源以廣告與下載付費為主，預期未來透過App之交易收入、搭配特定感測器或醫材裝置、衍生服務營收比重將持續增加

- 
- The background of the slide is a blue-tinted image of the Eiffel Tower. At the top of the tower, there are several concentric white circles representing signal waves or a radio tower antenna, symbolizing connectivity and digital services.
- ◆ 後續透過App為樞紐而衍生的服務營收，將會成為市場最大比重來源，2016年服務營收預估可佔43%

點燈

- ◆ 電力公司為了要了解民眾對於用電方便性而作調查，訪問了一個住在偏鄉的老太太對於電燈使用的意見：

『你以前都要用油燈才能照明，那現在應該很方便了吧!』

『對啊！它的確方便，現在我都不用摸黑點亮油燈了!』



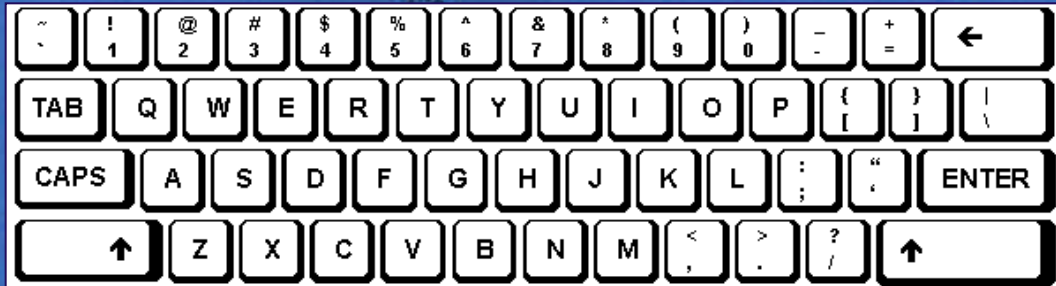
科技進步 但習慣(使用經驗)不一定會跟上腳步

使用者經驗

- ◆ 是使用者在接觸產品、系統、服務後，所產生的反應與變化，包含使用者的認知、情緒、偏好、知覺、生理與心理、行為，涵蓋產品、系統、服務使用的前、中、後期。



使用者經驗



試用Paper Keyboard情境

三大類型與藥事職業相關之APP使用經驗分享

1. 增進藥師管理能力的APP
2. 增進藥師表達能力的APP
3. 增進藥師學習能力的APP





APP的發展趨勢

水能載舟亦能覆舟

◆ 出處：

1. 荀子王制：『君者，舟也；庶人者，水也。水則載舟，水則覆舟。』
2. 荀子哀公篇：『孔子曰：『丘聞之：『君者，舟也；庶人者，水也；水則載舟，水則覆舟。』君以此思危，則危將焉而不至矣？』』

◆ 英文：Water is a boon in the desert, but the drowning man curses it.

◆ 日文：両刃の剣（諸刃の剣） *bolo holo can (sulumu)*



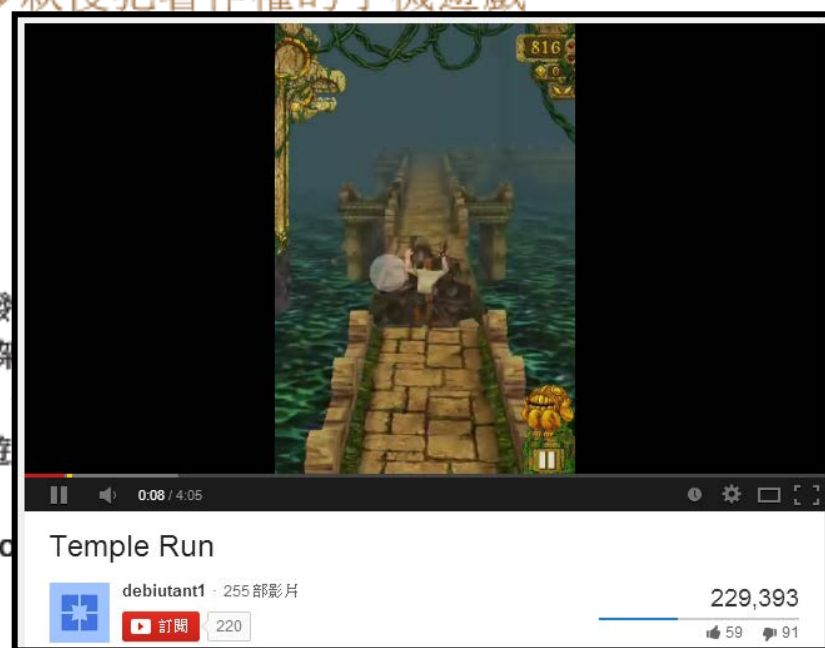
Temple Run v.s. Temple Jump

- ◆ 許多App都僅需1、2塊美金甚至免費，下載時還是要多看一眼：因為當你以為買了知名的古廟逃亡者(Temple Run) 遊戲時，其實可能是只有一字之差的仿冒遊戲(Temple Jump)
- ◆ 蘋果(App store)掃蕩並非是單純機制類似的應用，而是在外觀、名稱、甚至App圖標都明顯有混淆視聽意圖的投機取巧者



app上的侵權行為

Apple 大動作移除 App Store 上多款侵犯著作權的手機遊戲



town) 開發
體的遊戲下架
ombies))
un)) 等遊

開發者 Anto

其中涉嫌抄襲《Temple Run》的《Temple Jump》更曾在 App Store 創下還不錯的銷售成績，這使得《Temple Run》的開發者 Natalia Luckyanova 大為光火，並曾在先前與 Gamasutra 的訪談中公開發表：「《Temple Jump》的發行讓我們感到相當氣憤，這傷害了我們的遊戲及粉絲。我們不想因為《Temple Jump》的關係而讓消費者混淆，進而認為我們發行了一些垃圾遊戲來騙取他們付出的錢（編按：被下架的《Temple Jump》為付費軟體，《Temple Run》則為免費軟體）。」

apps的侵權行為

- ◆ 一款叫做Cut The Birds的遊戲，因為圖標以及內容使用了憤怒鳥角色製作，當然也以「侵權」論下架，不過在重新設計過後，Cut The Birds已經重新再出發
- ◆ Android也推出名為「保鏢」(Bouncer)的惡意應用過濾程序



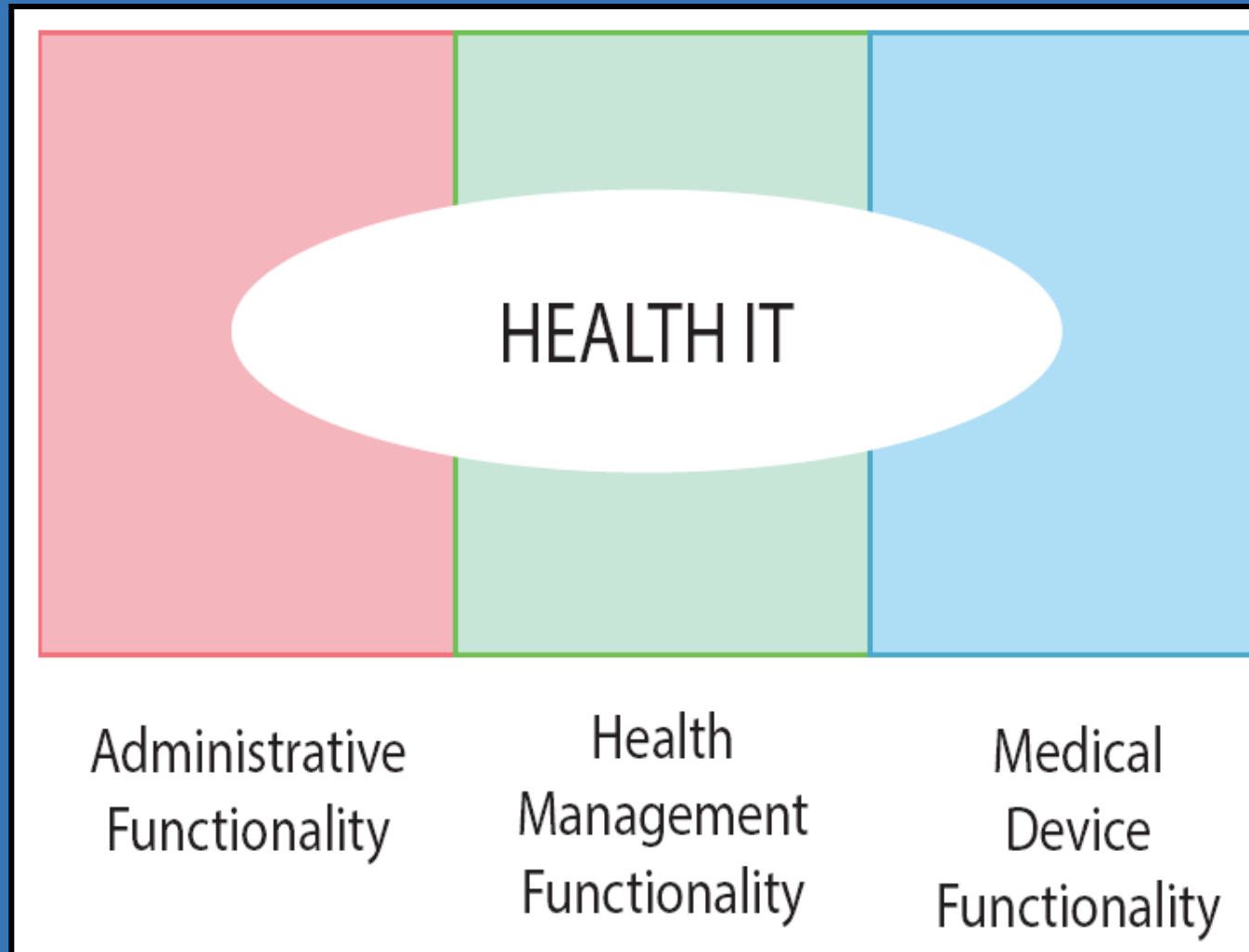
請您思考幾種可能性

- ◆ 某種標榜可促進健康的app，要求您的手機提供你的個資才能下載？
- ◆ 某種醫療用的app，它的內建資料是與臨床診斷相左的？
- ◆ 某種藥學app，引用的資料與micromedex等指標資料庫不相同時？

你該如何自處？



Health IT functionality can be broadly grouped into three categories:





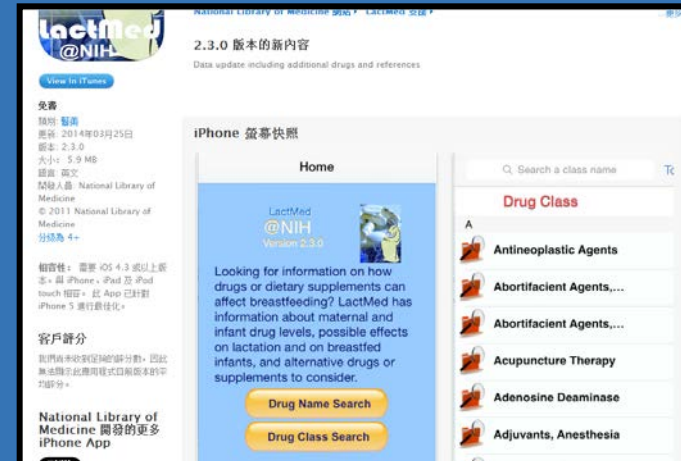
醫療APP的發展趨勢

- ◆ 移動醫療/健康應用正處於爆發式成長初期，根據市場研究機構Research2Guidance的評估，2017年移動醫療健康應用市場的規模將達**260億美元**

mobile medical apps(移動式醫療app)

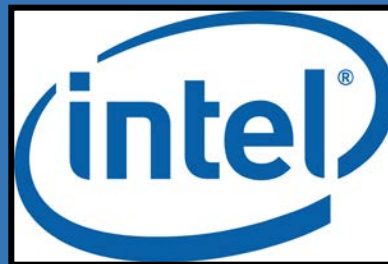
- ◆ Mobile medical apps: meet the definition of a medical device and are an accessory to a regulated medical device or transform a mobile platform into a regulated medical device
- ◆ 『移動App有可能改變現有的醫療服務模式，它允許醫生在傳統的醫療場所之外，對存在生命危險的病人進行診斷，幫助消費者管理自己的健康，而且無論何時何地均能獲得他們想要的資訊』

National Institutes of Health's LactMed app: provides nursing mothers with information about the effects of medicines on breast milk and nursing infants



IC開發商對行動醫療的產業動作

- ◆ 微軟(Microsoft)、英特爾(Intel)、三星(Samsung)和高通(Qualcomm)已共同加入Continua聯盟，積極推動產業通用標準，並於近期各自祭出新的產品發展策略
- ◆ 高通生命(Qualcomm Life)併購HealthyCircles，改善其2net平台的軟體即服務(SaaS)運作模式，微軟則計畫以Bing平台部署行動醫療資訊管理服務；至於英特爾和三星亦不斷加碼投資，並擴大與醫電設備廠合作，為行動醫療產業的發展挹注強勁動能



The Snapdragon 810 Chipset Enables Leading User Experiences

Superior Voice Quality
with HD voice, Fluence™
noise cancellation



Superior Camera
Better photos and camera
features, like UbiFocus and
ChromaFlash, and HDR video



Better Video
Ultra HD capture and
playback at low power

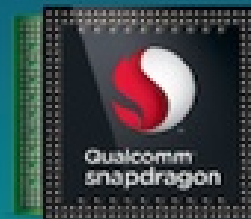


Higher Performance
Optimized ARMv8/64-bit
Adreno 430



New Ways To Interact
Voice Activation,
ultrasound pen, gestures

Longer Battery Life
20nm process
LPDDR4 Memory
Advanced Power Management
Advanced Packaging



Superior Modem
3x20MHz Carrier
Aggregation with CAT6 at
300Mbps

Faster WiFi Speeds
2-stream 802.11ac

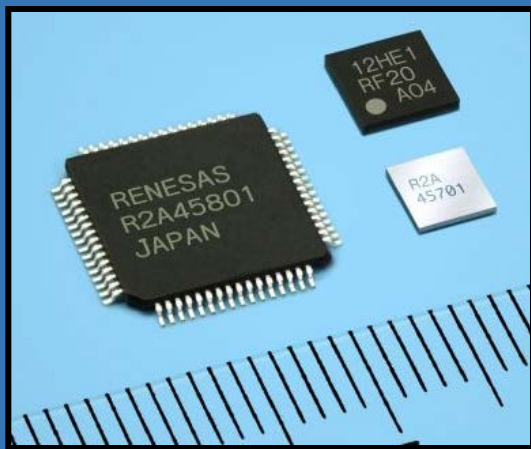


Better GPS
Low cost and low power
integration supporting
global constellations

The Snapdragon 808 and Snapdragon 808 processors are products of Qualcomm Technologies, Inc.
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目前行動醫療市場常見的無線傳輸技術

- ◆ 可攜式醫療設備製造商正積極開發具備無線通訊功能的新產品：藍牙4.0與NFC技術由於分別具備低耗電和高安全性的優點，因此已廣泛獲得業界採用



減少無線連線所需耗用的電能，並提升傳輸速率的裝置端應用

微控制器(MCU)和無線通訊模組

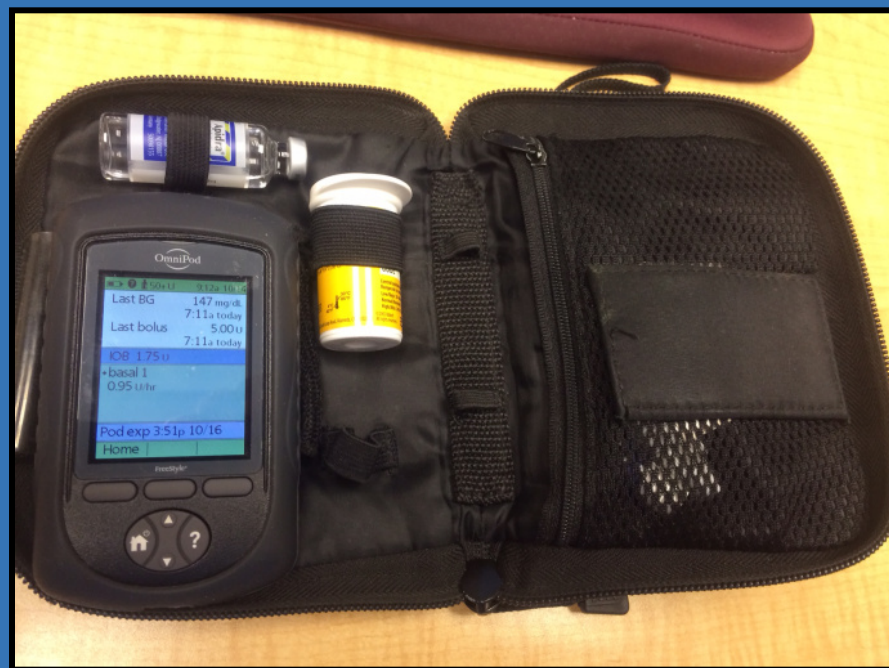
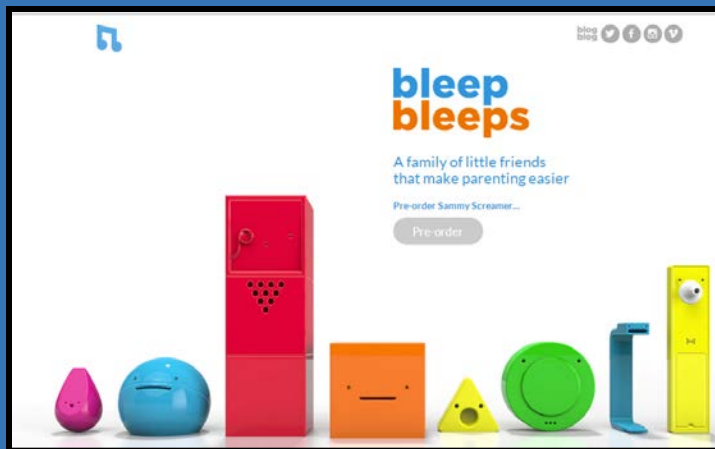
YAHOO搜尋的資料:無線傳輸

- ◆ 目前 NFC 的應用大多為:近距離檔案傳輸、器材配對
 - Sony 最新推出的智慧型手機相機鏡頭 QX100，就可以使用 NFC 進行配對，只要把鏡頭靠上手機就可以立刻連線而不需要等待「搜尋、連線」的過程
- ◆ 有一家廠商不但不支援 NFC，反而還在發表會上酸了 NFC 一頓，這家公司叫做「蘋果」：
 - NFC 比起藍牙，不僅連線麻煩（裝置必須緊靠著）、且傳輸速率極慢（約為無線網路傳輸的 1/15）
 - 蘋果 iPhone 不但不 在手機中內建 NFC，還推出以藍牙、無線網路傳檔的 AirDrop 服務來與 NFC 打對台
- ◆ 目前 NFC 唯一的優勢在於其連線、配對快速，透過 NFC 能大幅縮減手機與裝置連線的時間



目前市場上的移動醫療App可以實現很多功能

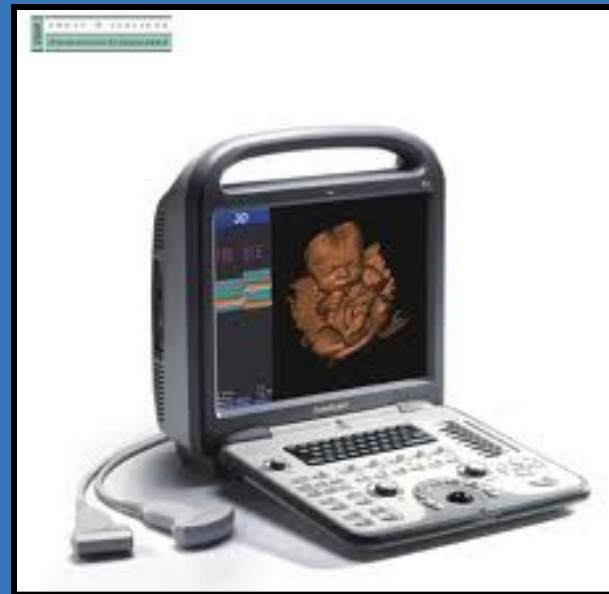
- ◆ 如診斷心律不整，將智慧手機變為移動超音波設備，或具有胰島素依賴型糖尿病病人應用的血糖儀的『中央命令器』功能



Omni Pod Central Command

可攜式超音波診斷設備

- ◆ 在行動醫療發展的帶動下，醫電業者正競相利用高效能且低功耗的ICT元件開發小型(Compact)可攜式超音波診斷設備



FDA對移動式醫療app的態度

『mobile apps span a wide range of health functions. While many mobile apps carry minimal risk, those that can pose a greater risk to patients will require FDA review』



『we encourage app developers to contact the FDA – as early as possible – if they have any questions about their mobile app, its level of risk, and whether a premarket application is required』

MobileCT – Medical Image Viewer [View More by This Developer](#)
By **neposity**
Open iTunes to buy and download apps.

Description
MobileCT Viewer is a medical image viewer for the iPad that makes use of neposity's patent pending technology, is the latest in medical imaging innovation! It supports **MobileCT – Medical Image Viewer Support** ...More

What's New in Version 2.1.0
more fixes for iOS7

[View on iTunes](#)

\$9.99
Category: Medical
Updated: Apr 09, 2014
Version: 2.1.0
Size: 9.9 MB
Language: English
Seller: neposity, llc © 2011 - 2014, Neposity, Inc.
Rated 4+

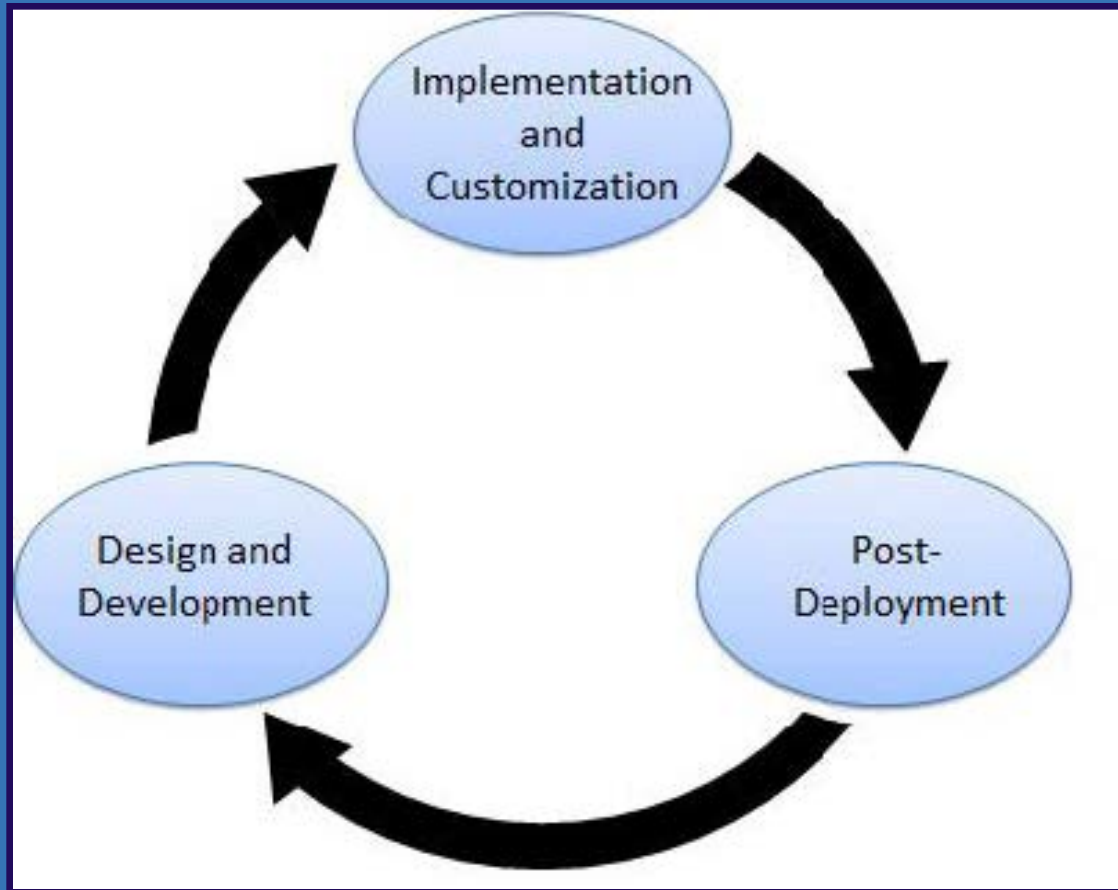
Compatibility:
Requires iOS 6.0 or later.
Compatible with iPad.

Customer Ratings
We have not received enough ratings to display an average for the current version of this application.

iPad Screenshots

Customers Also Bought

Health IT Product Lifecycle



The health IT product lifecycle is depicted. Each stage is characterized by its own distinct considerations for assuring the safe design, development, implementation, customization, integration, and post-deployment use by health care professionals and consumers

開發移動醫療App可能帶來的情形

- ◆ 一些移動醫療App對消費者或病人帶來的風險較小，但其他App如果它們運行不正常時，可能帶來巨大風險
- ◆ FDA宣稱：『針對移動醫療App發佈的相關政策在保護患者權益的同時，也鼓勵創新』

『監管政策將使移動醫療app開發商面臨更高的開發成本，阻滯app進入市場的步伐。』

American Thinker

但對於某些移動醫療app來說，如果它們的功用未達到廣告中的承諾，則可能給使用者帶來嚴重的健康風險

FDA對移動醫療App的監管

- ◆ 某個移動醫療app滿足了如下兩個條件的任意一條，它就有可能面臨來自FDA的監管(2012)：
 - (1) 被當做一種『已受監管的醫療設備』 配件如:安裝在病床邊、可遠端呈現數據的顯示器
 - (2) 將移動平臺轉變成一種『已受監管的醫療設備』 如:可當做聽診器來用的iPhone
- ◆ 移動醫療app還包括那些能『載入患者資訊、應用特定醫療公式並輸出醫療健康解決方案』的app:
 - 能自動測算格拉斯哥昏迷等級（Glasgow Coma Scale）、疼痛指數（pain index）、阿普伽新生兒健康狀態分數（Apgar score）或NIH中風等級（NIH stroke scale）的app

過度監管？

FDA擬行使執法自由裁量權

- ◆ 對於那些風險較小的絕大多數移動醫療App，FDA擬行使執法自由裁量權(2013)
 - 若某移動醫療app被認定為低風險，則美國FDA有權利根據實際情況，選擇是否對其進行入市前的審查批准
 - 它不會強制按照聯邦藥品與化粧品法案執行
 - FDA將其監管主要集中於那些『非正常運行時會對病人存在較大安全隱患』的移動醫療App

FDA擬行使執法自由裁量權

- ◆ FDA對移動醫療App的監管主要集中於以下兩方面：
 - (1) 擬作為受管制醫療設備的附件：如允許醫療保健專業人員通過查看儲存在智慧手機或移動平板電腦上的圖片歸檔和通訊系統（PACS）上的醫療圖片而做出具體診斷的應用程式
 - (2) 將移動平臺變成受管制的醫療設備：若病人心臟病發作，應用程式可將智慧手機變成心電圖機，以檢測病人的心律不整

美國FDA審查的移動醫療應用

- ◆ 對於接受美國FDA審查的移動醫療應用，將使用FDA適用其它醫療器械相同監管標準和基於風險的方法對其進行評估
- ◆ 但FDA並沒有對智慧手機或平板電腦的銷售及普通消費者的使用進行監管，也沒對移動醫療App分銷商如『iTunes App』或『Google Play』等進行監管



迄今，美國FDA已經接受了100個移動醫療應用的審查申請，其中40個已獲批准

美國除了FDA的其他單位

- ◆ 美國國家醫療IT協調辦公室(The Office of the National Coordinator for Health Information Technology, ONC For Health IT)
- ◆ 美國聯邦傳播委員會 The Federal Communications Commission (FCC)

The logo for the Office of the National Coordinator for Health Information Technology (ONC), featuring a red star with a blue and red swoosh above it.

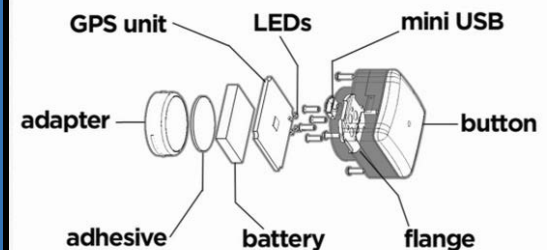
The Office of the National Coordinator for
Health Information Technology

Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that *help patients with diagnosed psychiatric conditions* (e.g., post-traumatic stress disorder (PTSD), depression, anxiety, obsessive compulsive disorder) maintain their behavioral coping skills by providing a “*Skill of the Day*” *behavioral technique* or *audio messages* that the user can access when experiencing increased anxiety;
- ◆ Mobile apps that provide *periodic educational information, reminders, or motivational guidance* to smokers trying to quit, patients recovering from addiction, or pregnant women;

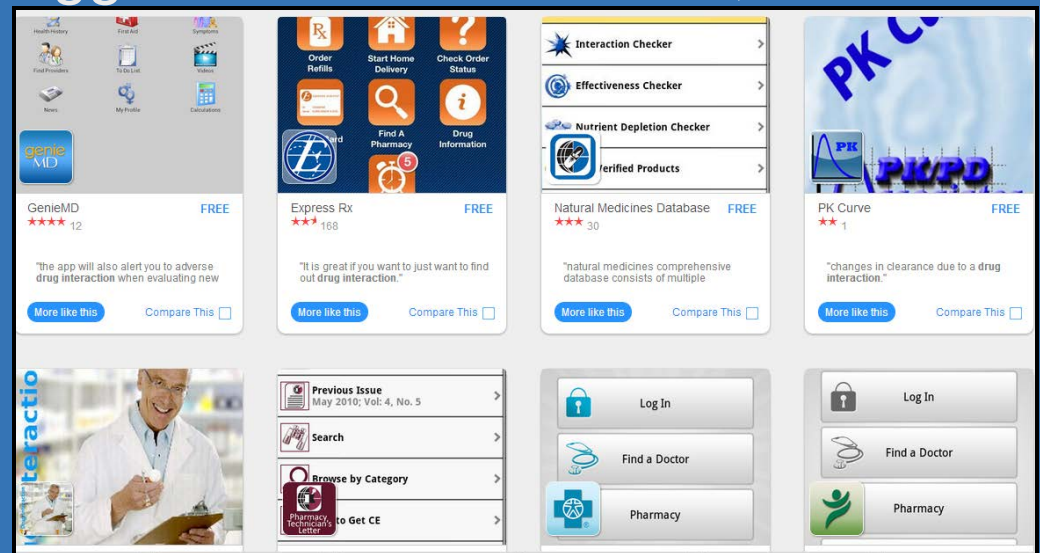
Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that *use GPS location information to alert asthmatics of environmental conditions that may cause asthma symptoms* or alert an addiction patient (substance abusers) when near a pre-identified, high-risk location;
- ◆ Mobile apps that *use video and video games to motivate patients to do their physical therapy exercises at home*;



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that *prompt a user to enter which herb and drug they would like to take concurrently and provide information about whether interactions have been seen in the literature and a summary of what type of interaction was reported;*
- ◆ Mobile apps that help *asthmatics track inhaler usage, asthma episodes experienced, location of user at the time of an attack, or environmental triggers of asthma attacks;*



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that prompt the user to *manually enter symptomatic, behavioral or environmental information*, the specifics of which are pre-defined by a health care provider, and store the information for later review;





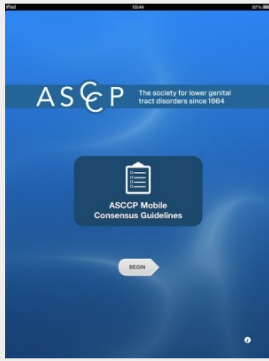
Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that use patient *characteristics such as age, sex, and behavioral risk factors to provide patient-specific screening, counseling and preventive recommendations from well-known and established authorities*
- ◆ Mobile apps that use a *checklist of common signs and symptoms to provide a list of possible medical conditions and advice on when to consult a health care provider*

Cervical cancer screening medical app by ASCCP provides guidance to OBGYN physicians

Apr 29, 2013 by Kelli Barbour MD Tweet 15 Like 5 4

App Review  



Purpose of App Review

- evaluation of the robustness of the ASCCP app for pap smear result guidance
- assessment of the interface for the ASCCP app

Introduction

Just before I started residency, the pap smear guidelines changed.

In my second year, they changed again and now in my third year, the joint guidelines from the American College of Obstetricians and Gynecologists (ACOG) and the American Society for Colposcopy and Cervical Pathology (ASCCP) have once again changed.

Even a recent editorial in the Green Journal acknowledges that mastering the guidelines for pap smear evaluation and followup is challenging. To this end, the ASCCP developed the ASCCP Mobile app that

Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

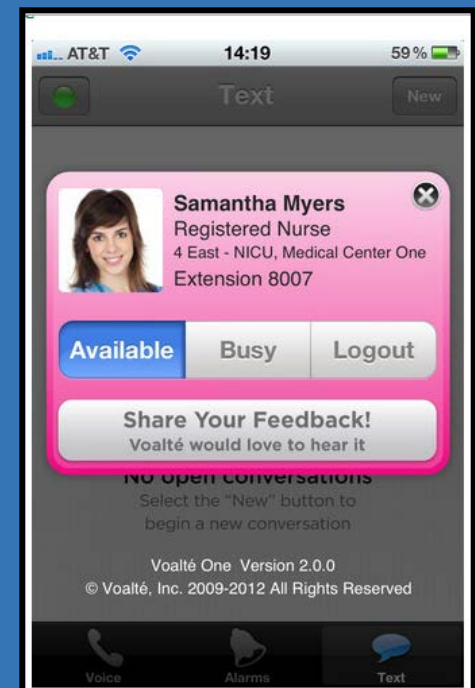
- ◆ Mobile apps that guide a user through a *questionnaire of signs and symptoms to provide a recommendation for the type of health care facility* most appropriate to their needs
- ◆ Mobile apps that *record the clinical conversation a clinician has with a patient and sends it* (or a link) to the patient to access after the visit



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that are intended to *allow a user to initiate a pre-specified nurse call or emergency call using broadband or cellular phone technology*
- ◆ Mobile apps that *enable a patient or caregiver to create and send an alert or general emergency notification to first responders*

<http://mobihealthnews.com/>



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that *keep track of medications and provide user-configured reminders for improved medication adherence*
- ◆ Mobile apps that provide patients a portal into their own health information, such as access to information captured during a previous clinical visit or historical trending and comparison of vital signs (e.g., body temperature, heart rate, blood pressure, or respiratory rate)

AMA offers medication adherence app for patients

By Chris Gulle | Nov 14, 2011 [Tweet](#) 178 [Share](#) 62 [Share](#) 30

Tags: AMA | consumer health apps | medical billing codes app | medical professional apps | medication adherence apps | My Medications |

The American Medical Association's (AMA) first consumer app, My Medications, hit Apple's AppStore late last week. The app allows patients to manage their medications, immunizations, allergies, and to access their medical team's contact information. The app costs just under a dollar: \$0.99.

In March, the AMA released CPT E/M QuickRef, a reference guide that helps physicians determine the appropriate CPT (Current Procedural Terminology) code to use for billing. That marked the first high profile app launch for the association.

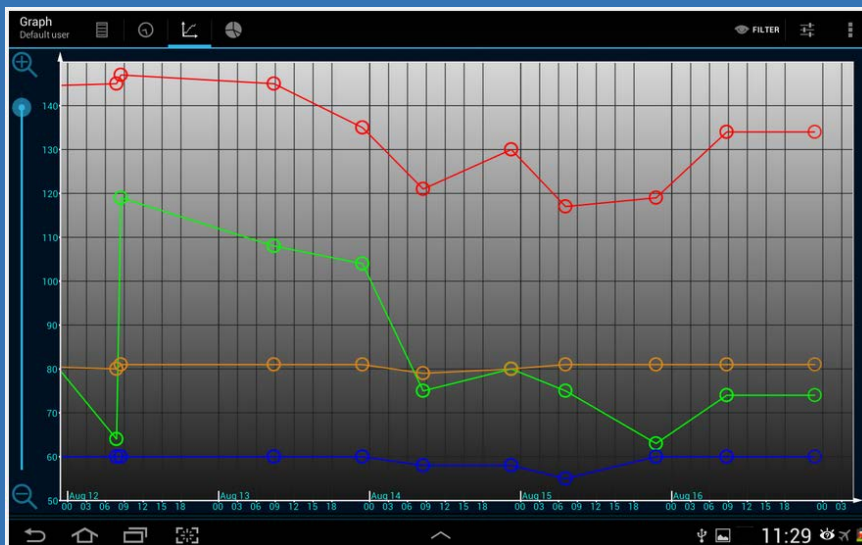
Also, last week the AMA announced the winners of its 2011 App Challenge, which sourced ideas for apps from physicians, medical students and residents, which the AMA would then "bring to life." Winners included the Rounder app, in the physician category, and the JAMA Clinical Challenge app in the resident/fellow/medical student category. The Rounder app "would provide a data capture point for information on hospital patients, allowing physicians to easily keep track of their patients' progress. The JAMA Clinical Challenge app would "present clinical vignettes and images along with medical case information, serving as a learning tool." The winners received \$2,500 (cash and prizes) and a ticket to New Orleans to watch the "musilino" of their app at the AMA's annual gathering this month.

MY MEDICATIONS

- My Emergency Information >
- My Healthcare Team >
- My Medications >
- My Immunizations >
- My Allergies >
- My Other Health Info >

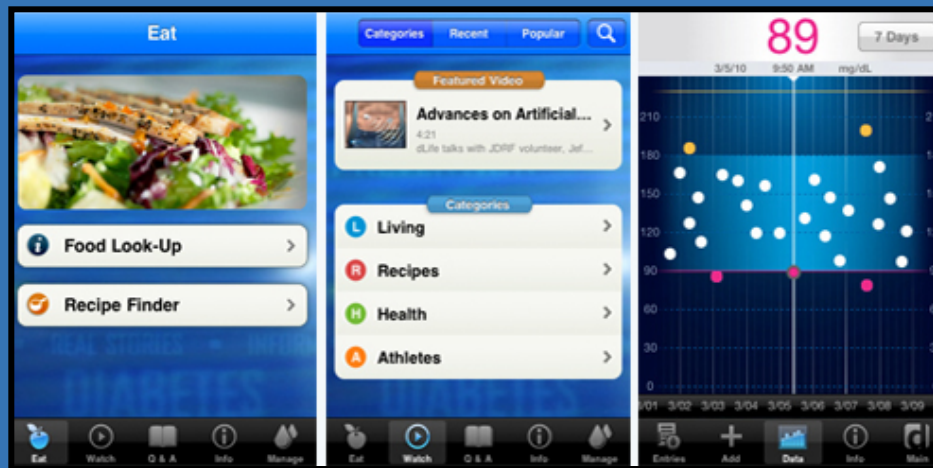
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- ◆ Mobile apps that *aggregate and display trends in personal health incidents* (e.g., hospitalization rates or alert notification rates)
- ◆ Mobile apps that *allow a user to collect (electronically or manually entered) blood pressure data and share this data through email, track and trend it, or upload it to a personal or electronic health record*



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that *provide oral health reminders or tracking tools for users with gum disease*
- ◆ Mobile apps that *provide pre-diabetes patients with guidance or tools to help them develop better eating habits or increase physical activity*



Examples of Mobile Apps For Which the FDA Will Exercise Enforcement Discretion

- ◆ Mobile apps that display, at opportune times, images or other messages for a substance abuser who wants to stop addictive behavior;



The screenshot shows a Healthline article page. At the top, there is a red navigation bar with the Healthline logo, a dropdown menu for "Addiction", and another for "Topics & Tools". Below the navigation bar, the article title "The 19 Best Apps for Recovering Alcoholics" is displayed. To the left of the main text is a vertical stack of social media sharing icons for Facebook, Twitter, Google+, and Pinterest. The main text begins with a paragraph about alcoholism as a serious disease. To the right of the text is a graphic featuring a pair of hands holding a heart made of small red icons, with a red ribbon at the top that says "2013" and a red banner at the bottom that says "THE BEST ALCOHOLISM APPS". The Healthline logo is at the bottom of the graphic.

Healthline

Addiction ▼ Topics & Tools ▼

Written by Erica Roth, winners selected by Tracy Rosecrans | Published on August 9, 2013

The 19 Best Apps for Recovering Alcoholics

Alcoholism is a serious disease that can endanger your health and personal relationships. According to the [National Institute on Alcohol Abuse and Alcoholism](#), approximately 18 million American adults struggle with alcoholism.

If you have made the brave decision to quit drinking, you'll want all the help you can get. Our "Best of Alcoholism" apps roundup offers aid and encouragement at the swipe of a finger. Use these highly rated, inexpensive programs along with conventional alcohol abuse treatment to make staying sober a little easier.

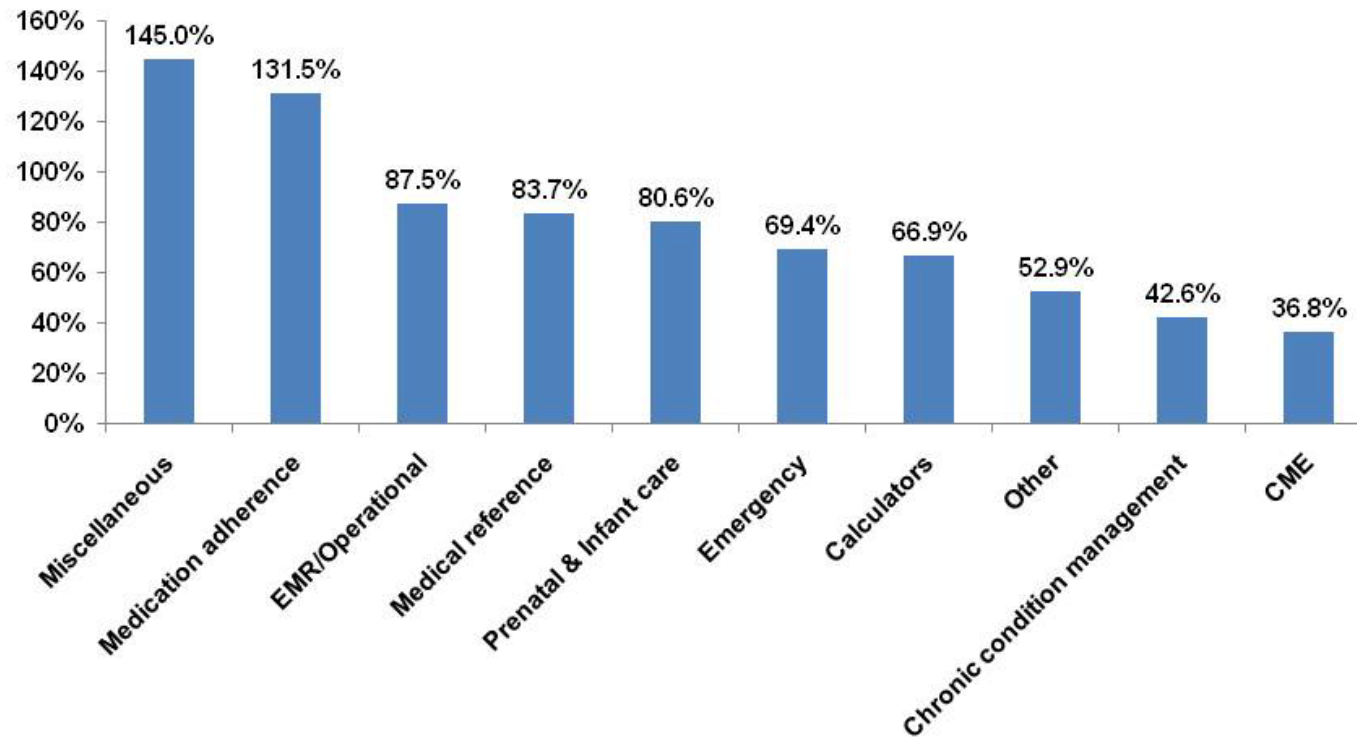
2013

THE BEST ALCOHOLISM APPS

Healthline
Connect to Better Health

Medication Adherence Apps Grew Quickly in 2010; EMR, Reference & Babies Also Fast-Growing

% Growth of iPhone Medical Subcategories



Source: *The Fastest Growing and Most Successful Health and Medical Apps*, MobiHealthNews, November 2010

謝謝聆聽 敬請指教



The top of the slide features a dark blue horizontal band. On the left side of this band, there is a faint, light-colored image of the Eiffel Tower. To the right of the tower, there are several faint, light-colored images of petri dishes arranged in a row.

參考資料

- ◆ <http://www.fda.gov/medicaldevices/productsandmedicalprocedures/connectedhealth/mobilemedicalapplications/default.htm>