History and Mission of IA

CSH6 Chapter 1
with supplementary information

"Brief History and Mission of Information System Security"

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Topics in *CSH6* Chapter 1

➢ **Basic concepts**
  ❑ **Security**
  ❑ **Risks**
  ❑ **Risk management**
➢ **History**
  ❑ **Why bother with history**
  ❑ **Chronology**

Security

➢ **What do you think of when someone talks about security?**

❑ **What is special about *information* security?**

➢ **What are the threats to security?**

❑ **What are the special threats to information security?**

Risks

- ➤ **Probabilities**
  - ❑ **Injury**
  - ❑ **Damage**
  - ❑ **Loss**
- ➤ **Can we achieve perfect security? Why or why not?**

Risk management

➢ **What are the goals of risk management?**

➢ **Steps of risk management**

    ❑**Identification of risks**

    ❑**Mitigation**

    ❑**Evaluation / validation**

➢ **Can risk management achieve perfection? Why or why not?**

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# Why Bother with History?

➢ **Puts security into perspective**

➢ **Think about changing requirements**

  ❑ **Different threats and vulnerabilities**

➢ **Themes:**

  ❑ **Increasing accessibility to unauthorized people**

  ❑ **Increasing flexibility for automated attacks**

  ❑ **Information security assurance is a *process*, not a *state***
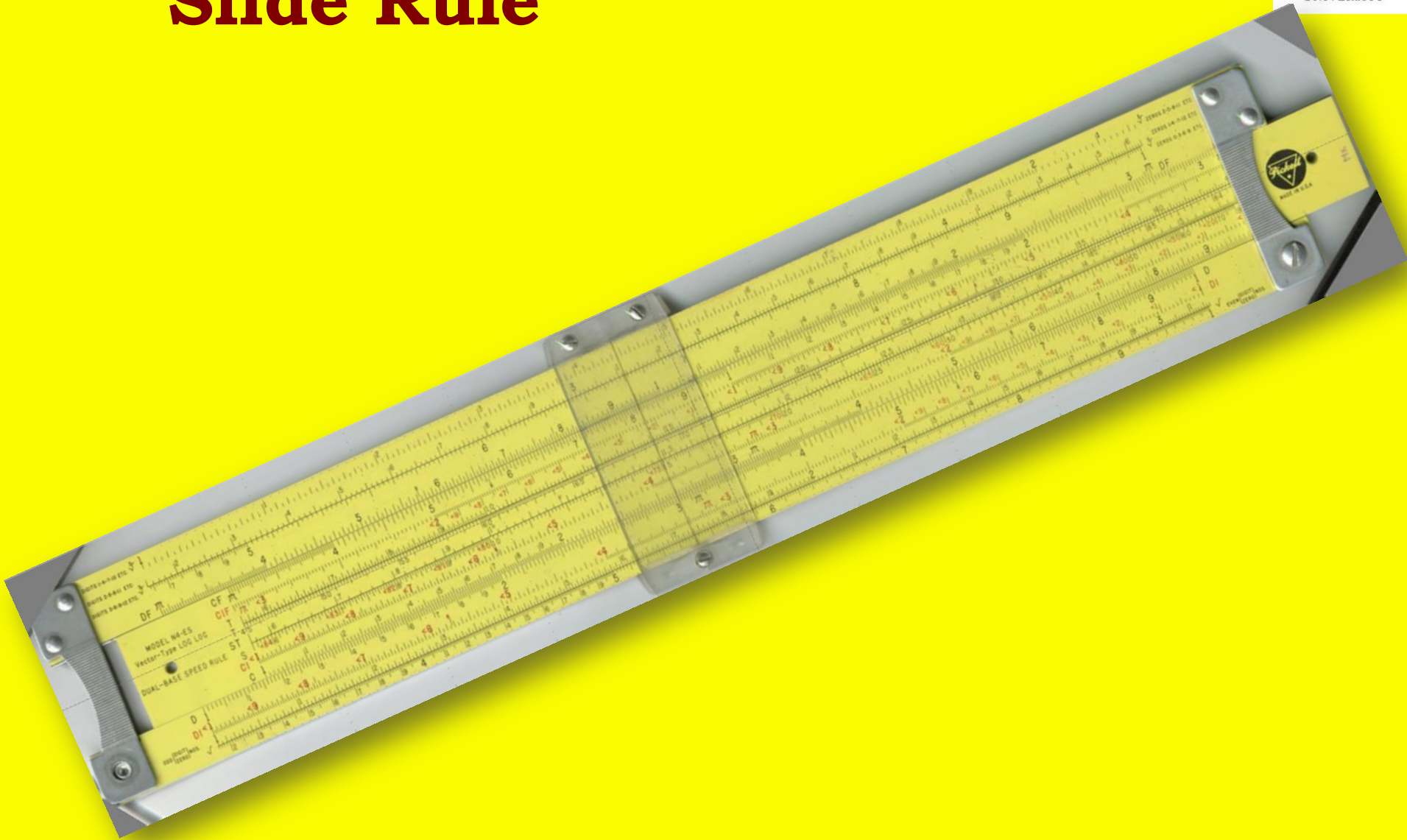
Pre-computer INFOSEC

What was the focus of INFOSEC in . . .

➢ **Babylon, 500 BCE: abacus**

➢ **England, 1614 CE: logarithms**

➢ **1620: Oughtred's slide rule**

➢ **1642: Pascal's adding machine**

➢ **1671: Liebniz' Stepped Reckoner for multiplications**

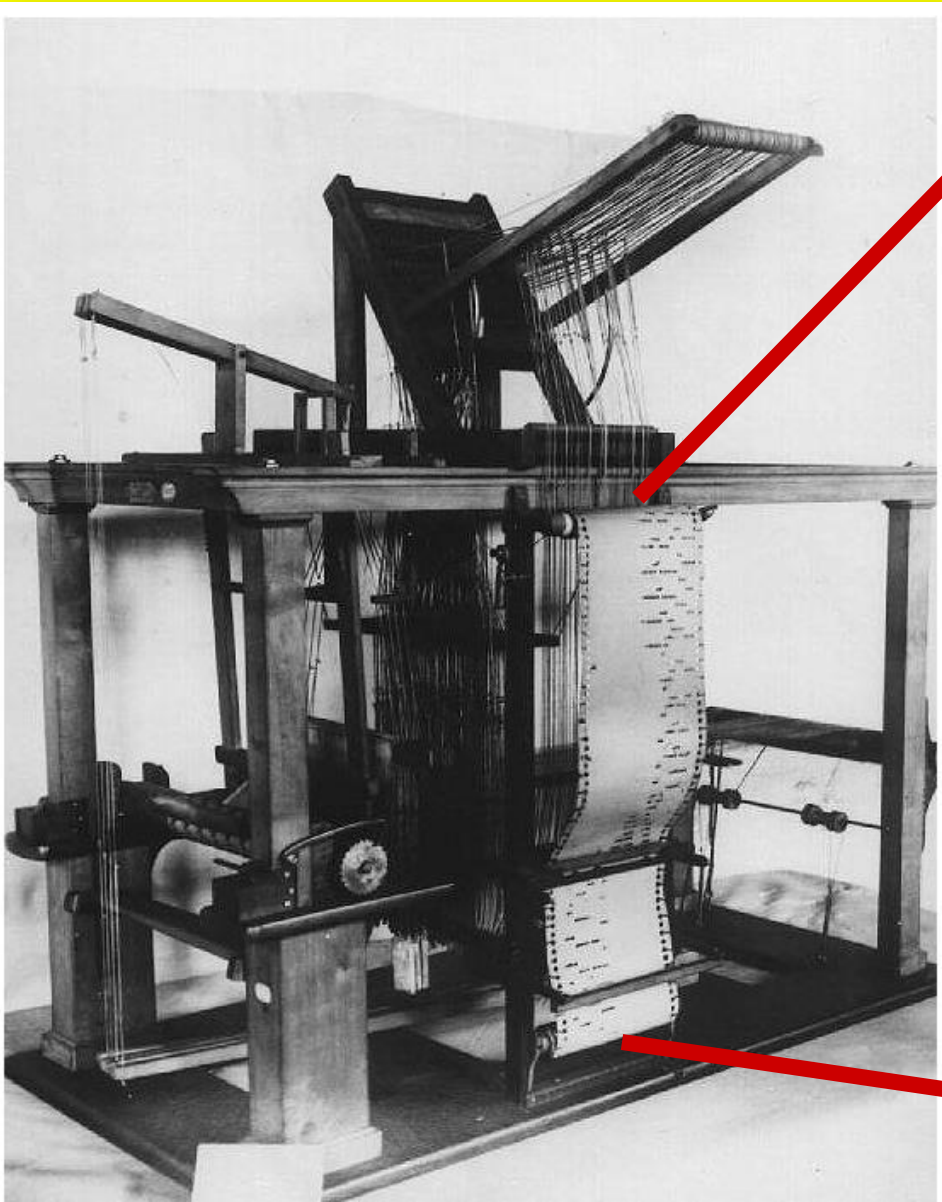➢ **1801: Jacquard loom (programmable)**

Abacus
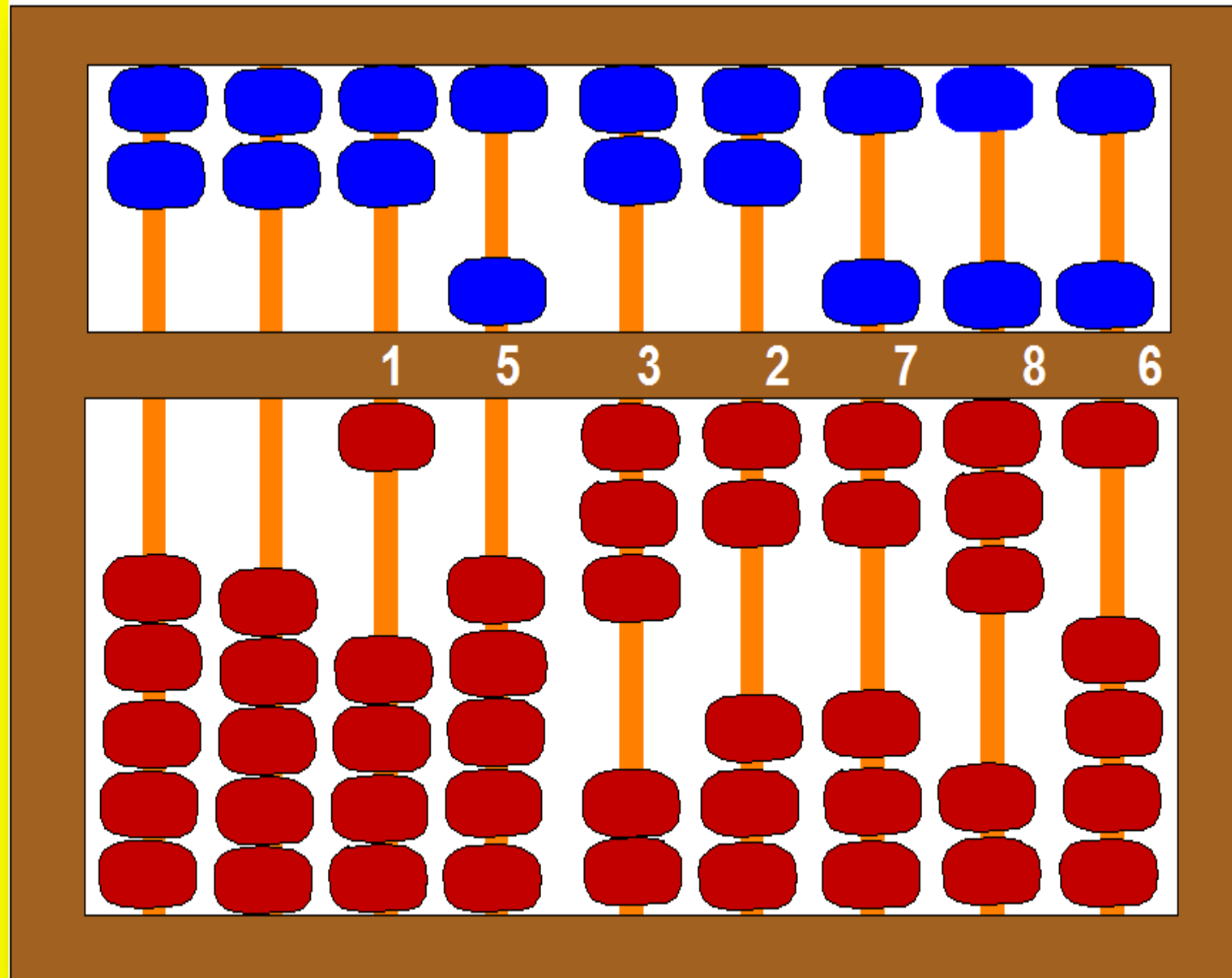
Slide Rule

Jacquard Loom

Mechanical Computers

> **General Purpose Programmable Calculators)**

> **1832: Babbage prototype Difference Engine**

> **1834: Babbage designs Analytical Engine**

> **1889: Felt's printing desk calculator**

> **1890: First use of Hollerith's punched cards and tabulating machines**

> **1896: Hollerith founds Tabulating Machine Company (later IBM)**
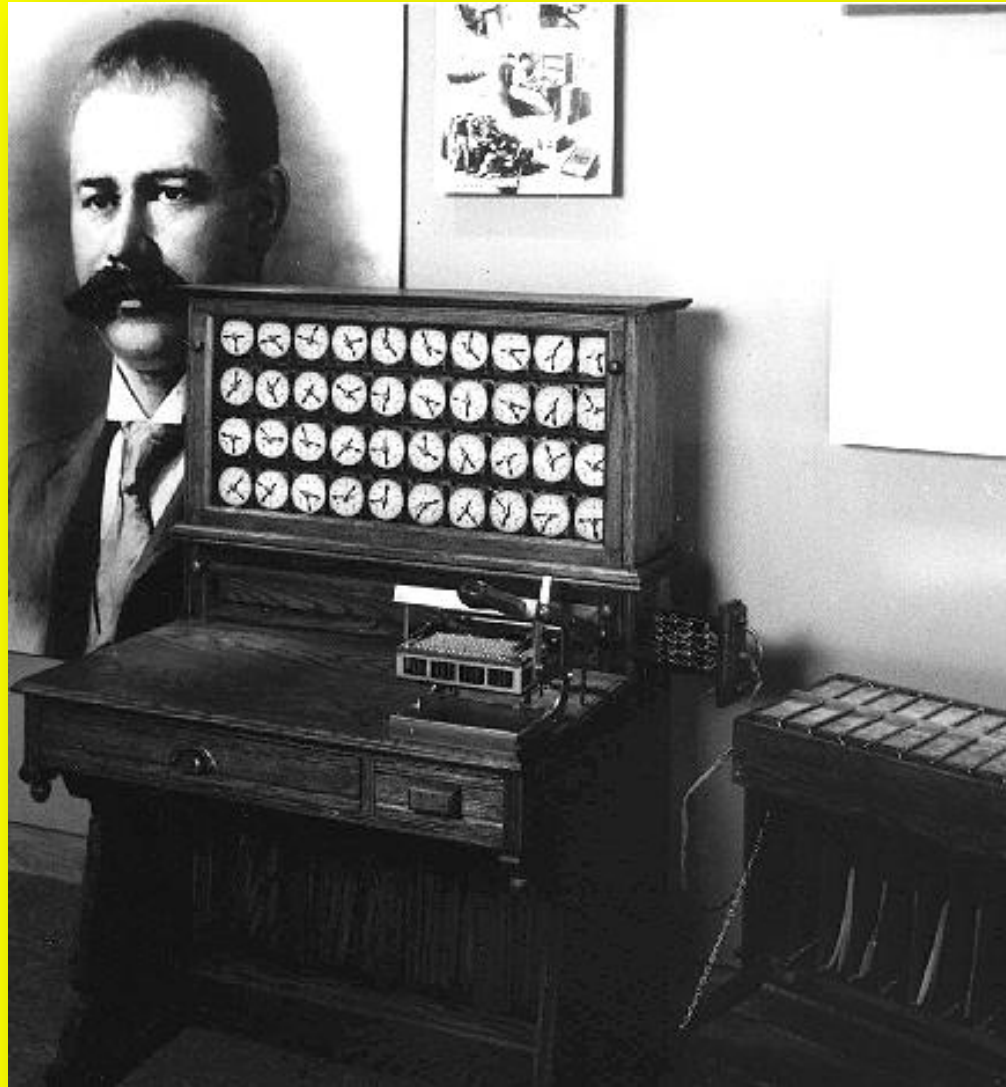
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Difference Engine (1832)
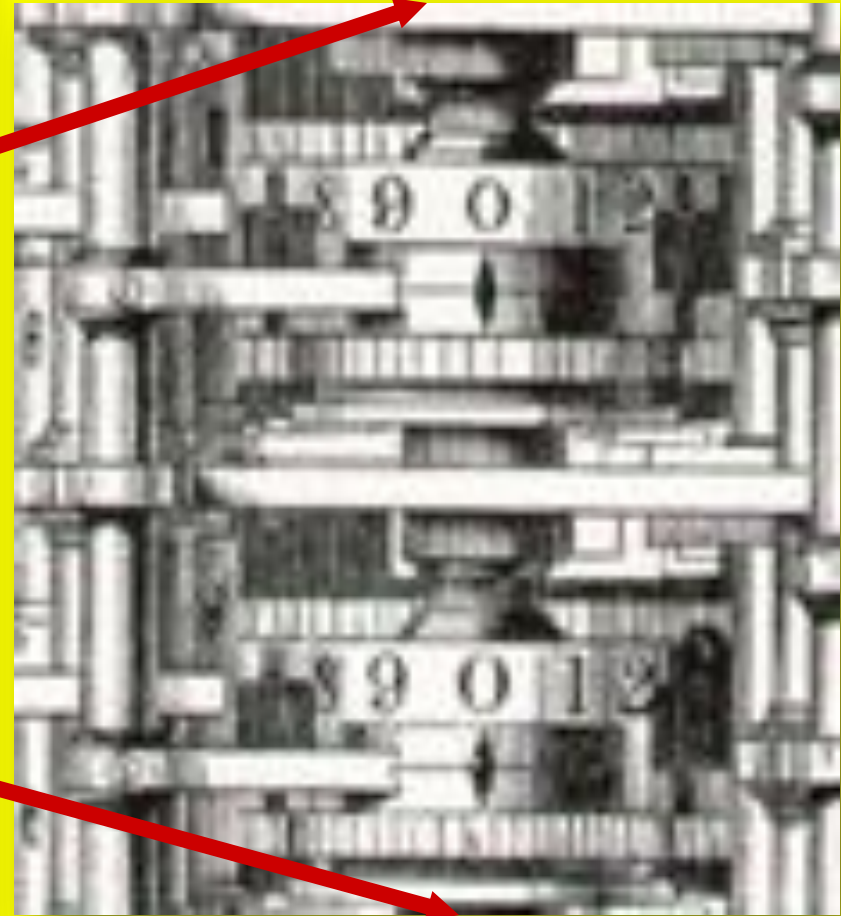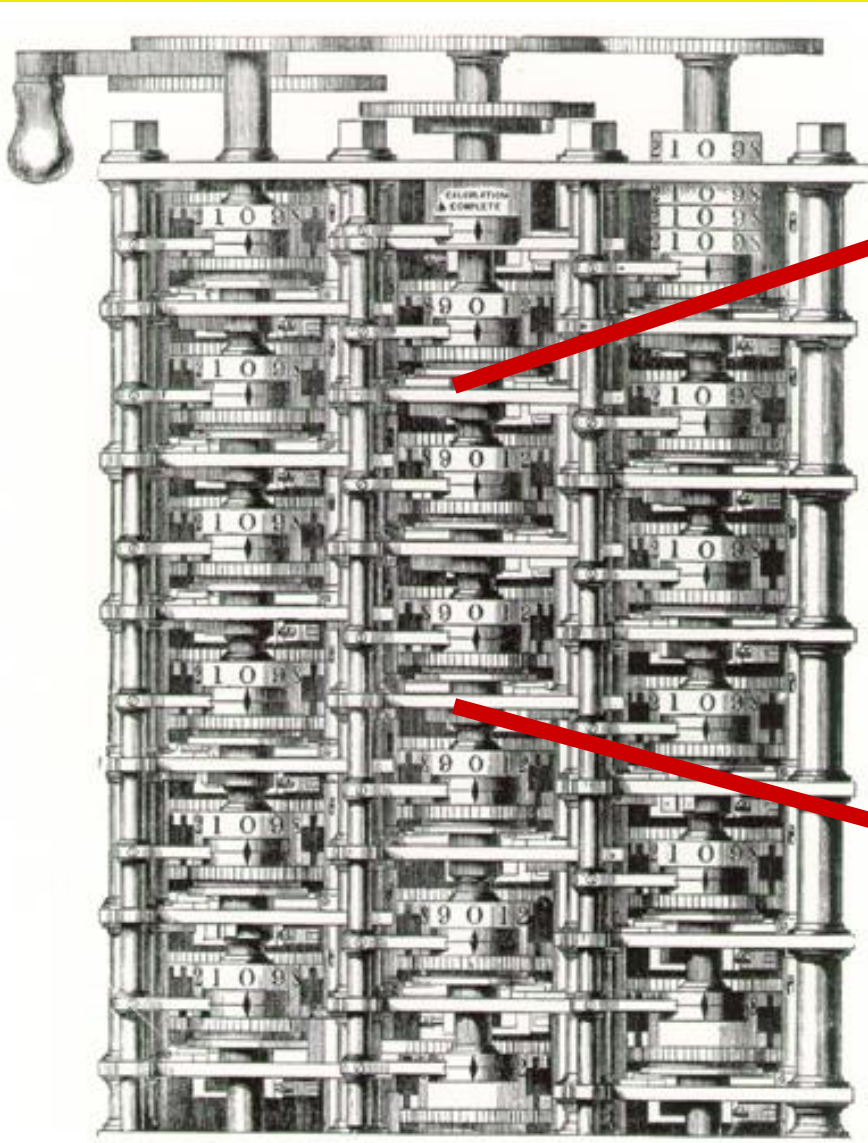
Analytical Engine (1934)

Adding Machine (1889)

Hollerith Tabulator (1890)

Hollerith Card (1890)
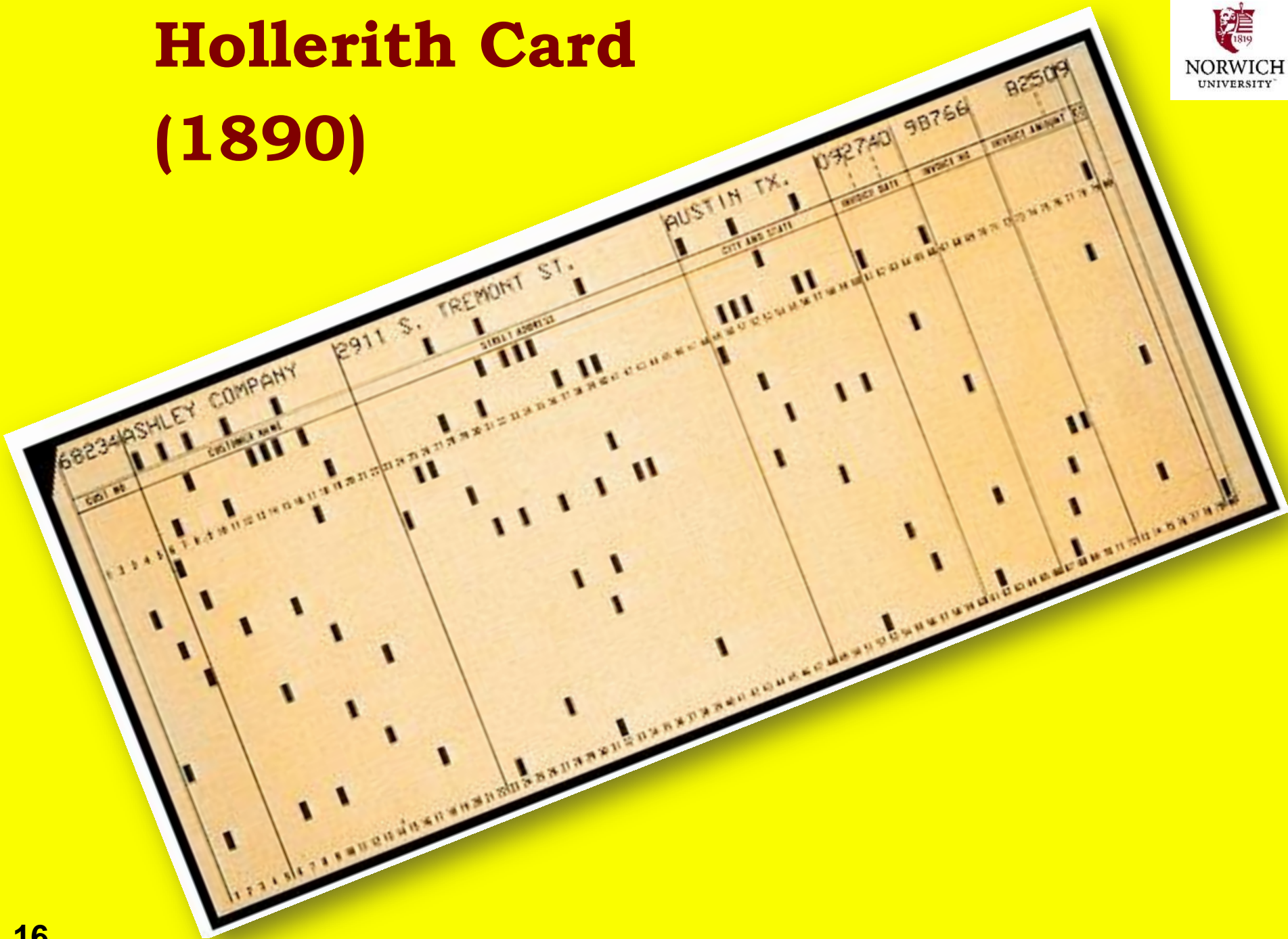
Early Electric and Electronic Computers: Unique Systems

- USA, 1930: Vannevar Bush's differential analyzer
- 1935: IBM 601 punch-card calculator achieves 1 multiplication per second
- 1940: Bell Labs' Complex Number Calculator
- 1943: Colossus (2000 vacuum tubes)
- 1944: Harvard Mark I
  - 51 feet long
  - 3 numbers added per second
- 1946: ENIAC (Electronic Numerical Integrator and Calculator) – filled entire room

Differential Analyzer (1930)

Harvard Mark I (1944)

ENIAC (1946)

Late 1940s: Stored Programs, Peripherals

➢ **1949:**

- ❑ **Cambridge University's EDSAC stores programs on paper tape**
- ❑ **EDVAC uses magnetic tape for program storage**
- ❑ *Popular Mechanics* **predicts, "Computers in the future may weigh no more than 1.5 tons."**

➢ **1950:**

- ❑ **Imperial University Tokyo – invention of floppy disk**
- ❑ **Turing Test postulated**

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Early 1950s: Software and Hardware Become Accessible

- ➤ **1951:**
    - ❑ **Adm. Grace Hopper invents the macro assembler computer language (2GL)**
    - ❑ **US Air Defense System receives Whirlwind real-time computer**
    - ❑ **UNIVAC-1 – 1st general-purpose electronic computer; delivered to US Bureau of Census**
- ➤ **1953:**
    - ❑ **At most 100 computers exist on the planet**
    - ❑ **No data communications in existence**
    - ❑ **Magnetic core memory invented**

Languages, I/O, Integrated Circuits, Mainframes, Minis

➢ **1954: FORTRAN I**

➢ **1957: 1st dot-matrix printer (IBM)**

➢ **1958: LISP**

➢ **1959: COBOL**

➢ **1960: ALGOL**

➢ **1961: APL**

➢ **1964:**

❑ **PL/1**

❑ **IBM 360 series released – mass-produced, compatible upgrade paths – 1000s built**

❑ **DEC PDP-8 – first major mini-computer**

PDP-5
(1962)

Late 1960s: More 3GLs, Hardware, Networking

- 1965:
  - BASIC (Thomas Kurtz*, John Kemeny – Dartmouth College)
  - Mouse (Douglas Englebart)
  - CDC CD6600 supercomputer
- 1967-71: PASCAL (Wirth)
- 1968:
  - Intel Corp founded
  - LOGO
- 1969:
  - ARPANET (US DoD)
  - RFC0001 *Host Software*. S. Crocker.

Early 1970s: Mainframes, Glass House, Chips

- **1970:**
  - **1st RAM chip (Intel) 1024 bits**
  - **UNIX development starts (Thomson & Ritchie)**
  - **FORTH**
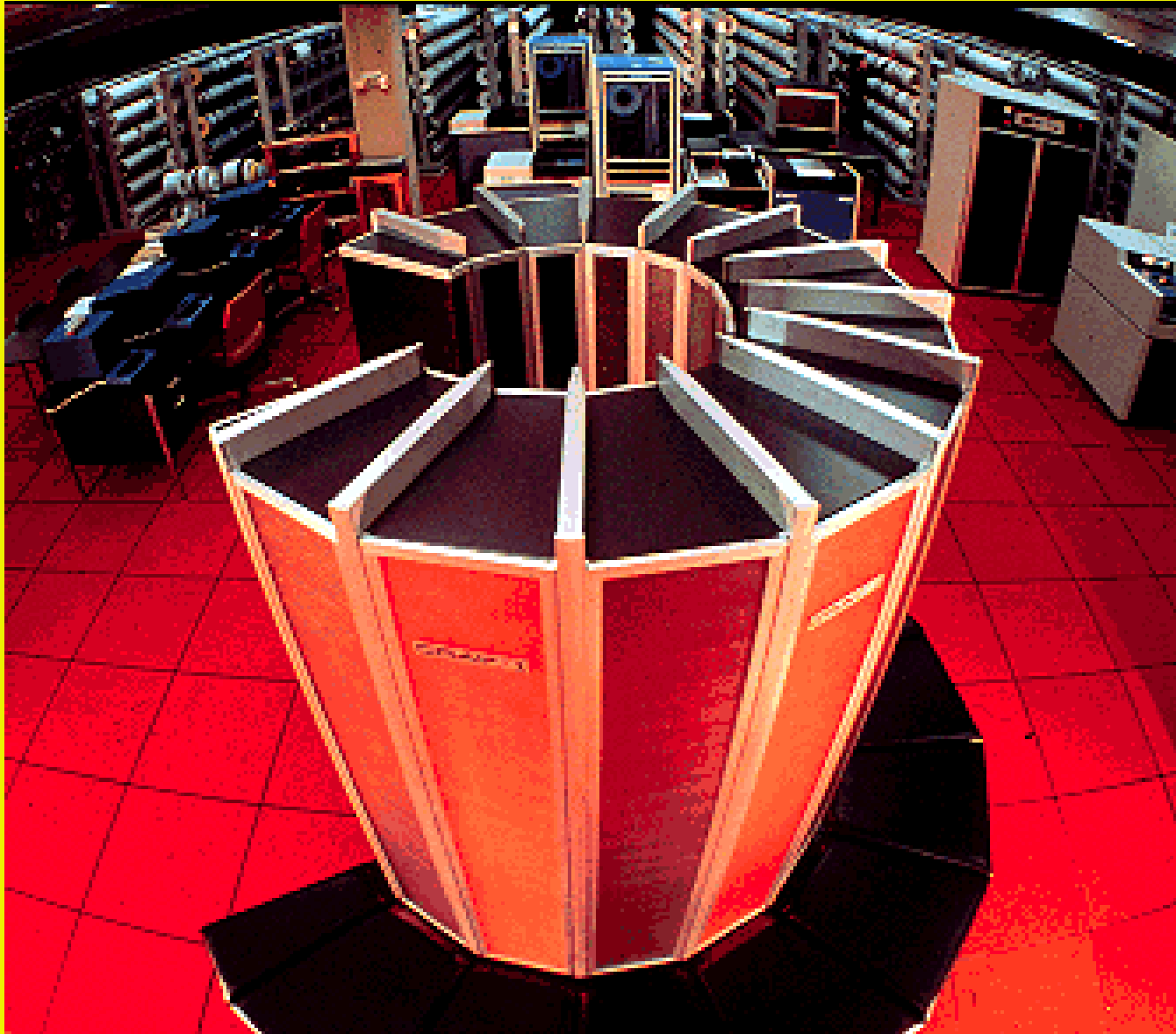- **1971: Intel 4004 microprocessor – the 1st ever**
- **1972:**
  - **PONG video game (Atari)**
  - **Large Scale Integration (LSI) 500 components per chip**
  - **C**
- **1973: HP releases its first minicomputer, CX**

CDC 7600 Supercomputer

Cray I (1976) – 75 MHz

Mid 1970s: Databases, Personal Computers

- **1974: MITS Altair 8800 – 1ˢᵗ personal computer**
    - **$397**
    - **256 bytes of RAM**
    - **I/O – lights and switches only**
- **1975: Bill Gates and Paul Allen form Microsoft, create BASIC for Altair 8800**
- **1976:**
    - **Stephen Wozniak & Stephen Jobs design Apple I computer**
    - **1ˢᵗ IBM laser printer – size of an SUV**
    - **Cray I supercomputer 150 Mflops**

Altair Kit (1974)
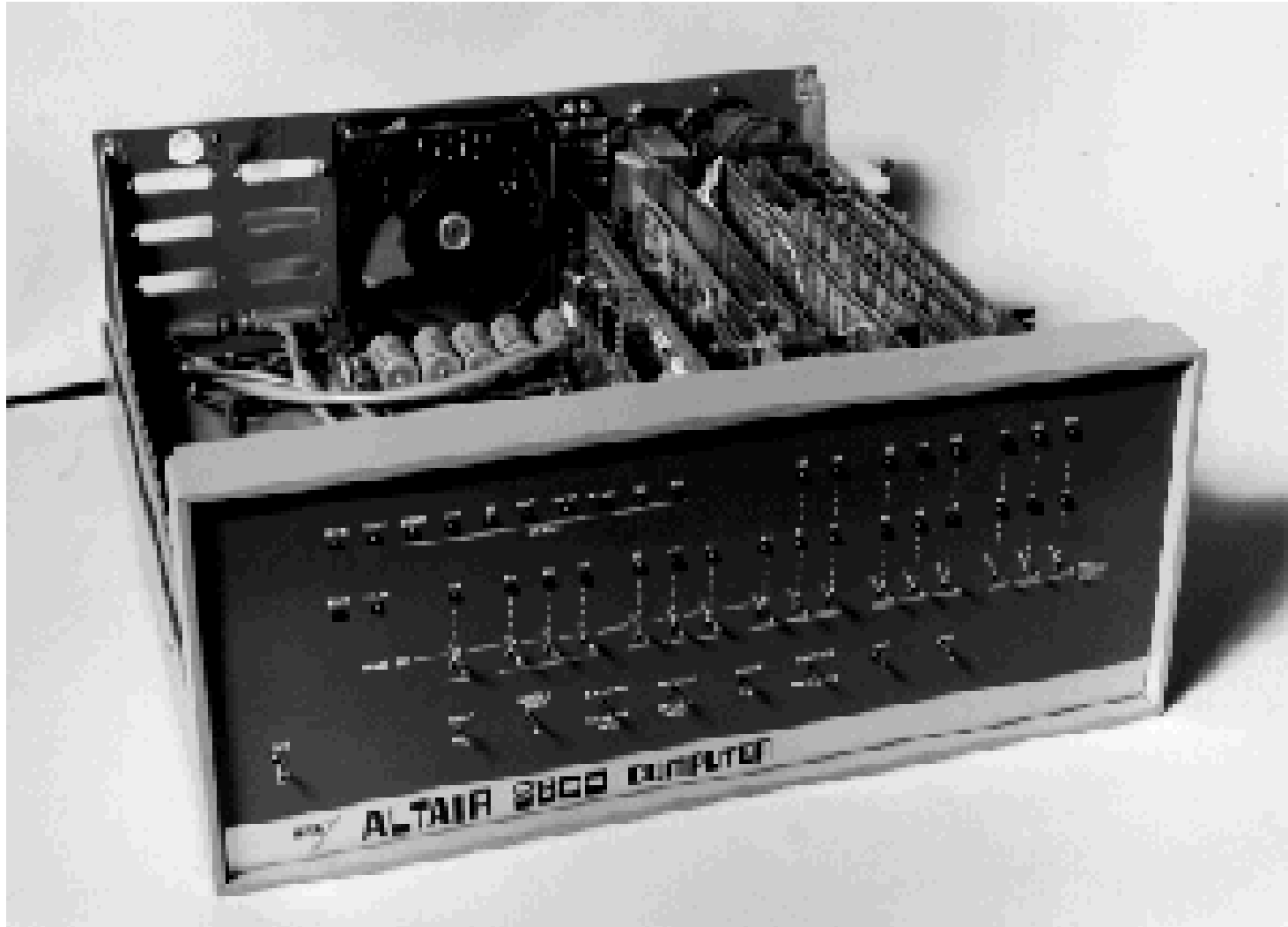
Apple I Prototype (1976)

Late 1970s: Networking, Microprocessors

- **1977:**
  - **TCP (Transmission Control Protocol) replaces NCP (Network Control Protocol) in ARPANET**
  - **Apple II computer introduced**
- **1978:**
  - **Intel releases 8086 16-bit microprocessor**
- **1979:**
  - **Commodore PET 1MHz clock, 8 KB RAM**
  - **Motorola releases 68000 microprocessor**

Early 1980s: Minis, Datacomm, EDI

➢ **1980:**

 ❑ **Microsoft begins work on MS-DOS**

 ❑ **HP 3000 minicomputer supports 128 users**

 ✓ **Refrigerator-sized**

 ✓ **1 MB RAM max**

 ✓ **HP7925 disk drives = 120 MB**

➢ **1981:**

 ❑ **Xerox 8010 computer uses WIMP (Windows, Icons, Menus, Pointing Devices) GUI**

 ❑ **IBM releases 1st PC @ $2880 w/ 64 KB RAM, monochrome display, optional cassette drive & 160 KB floppies**

➢ **1982:** *The Internet* **defined as internetwork using TCP/IP**

➢ **1984: DNS invented; Internet has 1000 hosts**

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HP3000 Series III (c. 1979)

Mid-1980s: LANs, WANs, MANs, PCs, Viruses

➢ **1982-1988: LANs explode**

➢ **1983: Fred Cohen defines computer viruses**

➢ **1985:**

 ❑ **Intel 80386 chip released with 20 MHz (max 33 MHz) clock**

 ❑ **MS-Windows 1 released**

➢ **1986: Lehigh University hit by virus on floppies**

➢ **1988:**

 ❑ **IBM releases optical WORM drives ("CDs")**

 ❑ **Morris Worm downs 9000 Internet hosts**

➢ **1989: Tim Berners-Lee invents the WWW**

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Early 1990s: UNIX, Internet, Web, Microsoft Dominance

- **1991: Linus Torvalds begins writing LINUX**
- **1993: Internet explodes with opening of .COM**
- **1994:**
  - **First major spam explosion (Canter & Siegel)**
  - **Intel Pentium runs 100 MHz clock**
  - **Netscape browser 1.0**
- **1995:**
  - **Windows 95**
  - **First *macro concept virus* released**

2000s: Mobile Computing, BYOD, & Moore's Law
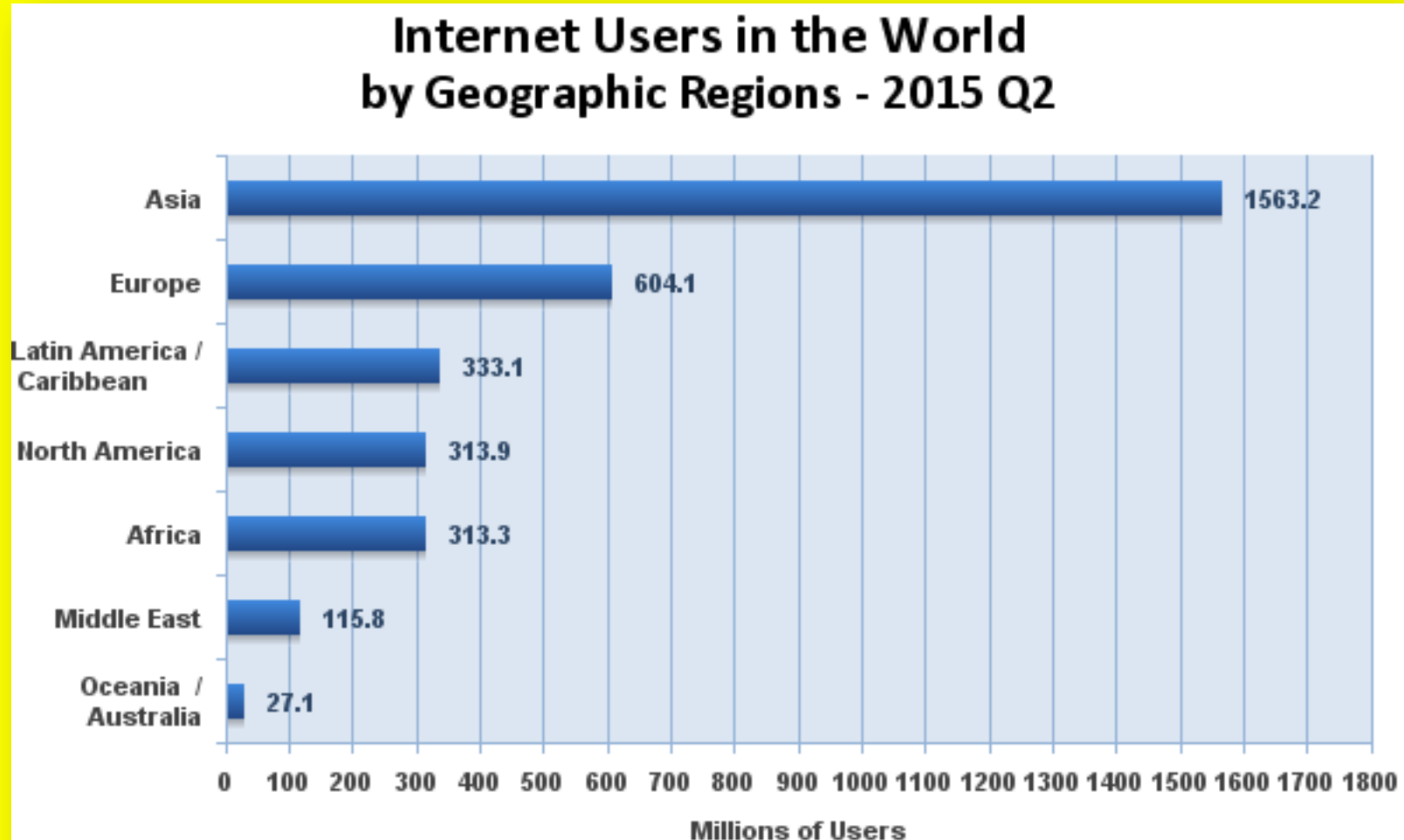
➢ **Enormous growth in use of more-portable computers**

  ❑ **Smart phones**

  ❑ **Tablets**

➢ **Employees want to access corporate resources via personal mobile devices**

➢ **Drop in price of laptop computers and workstations leads to insistence on access from personal systems**

➢ **Continued decrease in costs of disks, flash drives, RAM, other components**

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2010s: Increasing Interest in Cloud Computing

➢ **Return to aspects of 1980s mainframes**

  ❑ **Rent resources from "cloud" computing**

  ❑ **Much more gradual increase in costs instead of large step-functions**

➢ **Security issues growing in importance**

  ❑ **Questions about QoS, continuity of operations**

  ❑ **Overseas services in question -- espionage**

  ❑ **US and other government surveillance, data capture – hot topics**

Internet Usage by Region

Internet Users in the World
by Geographic Regions - 2015 Q2

| Region	Millions of Users
Asia	1563.2
Europe	604.1
Latin America / Caribbean	333.1
North America	313.9
Africa	313.3
Middle East	115.8
Oceania / Australia	27.1

Millions of Users

Source: Internet World Stats - www.internetworldstats.com/stats.htm
3,270,490,584 Internet users estimated for June 30, 2015
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http://www.internetworldstats.com/images/world2015users.png

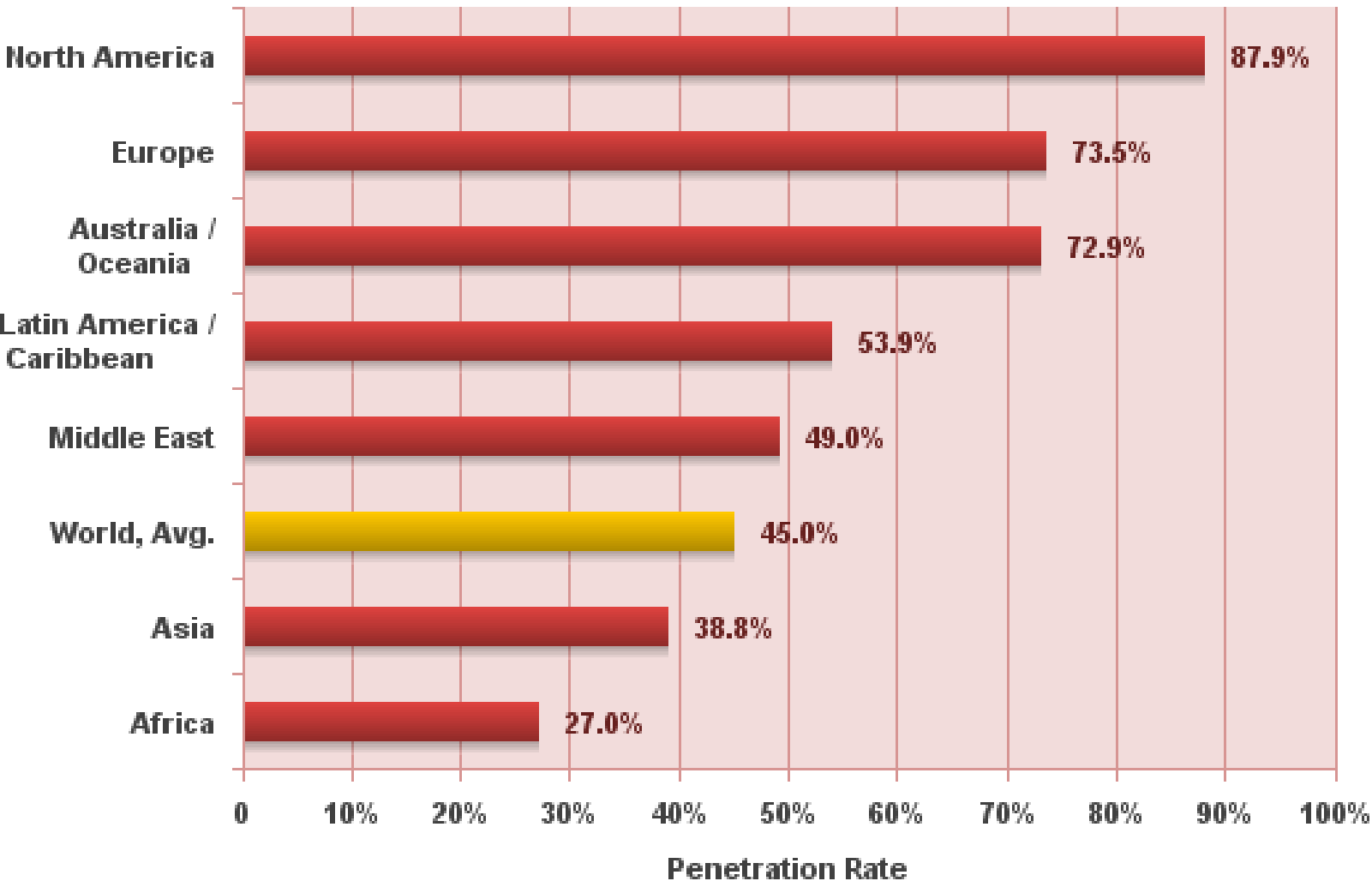# Internet Users /100 Inhabitants 1996-2014
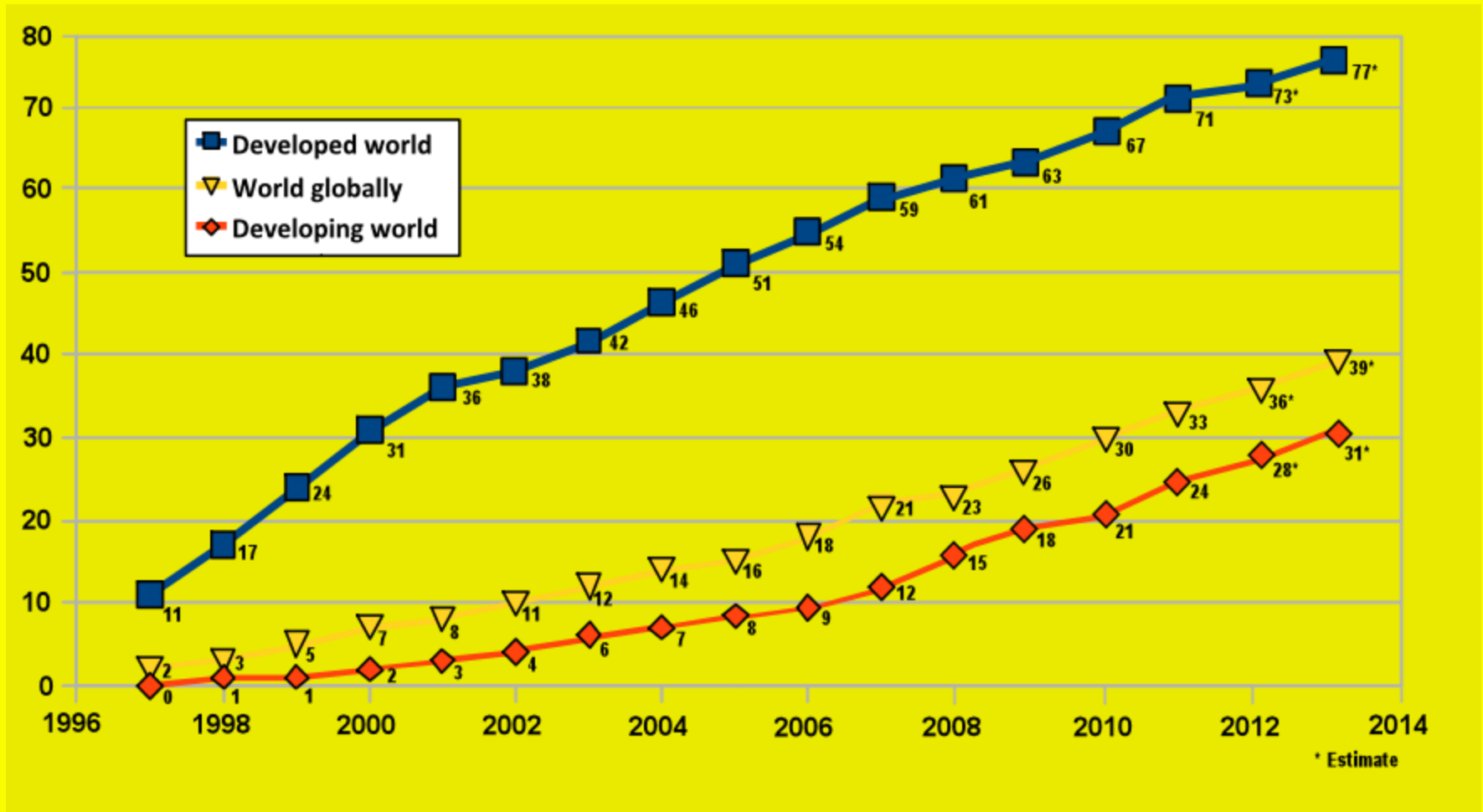
Internet Usage Details

WORLD INTERNET USAGE AND POPULATION STATISTICS
JUNE 30, 2015 - Mid-Year Update

World Regions	Population (2015 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Users % of Table	Growth 2000-2015
Africa	1,158,355,663	4,514,400	313,257,074	27.0 %	9.6 %	6,839.1%
Asia	4,032,466,882	114,304,000	1,563,208,143	38.8 %	47.8 %	1,267.6%
Europe	821,555,904	105,096,093	604,122,380	73.5 %	18.5 %	474.8%
Middle East	236,137,235	3,284,800	115,823,882	49.0 %	3.5 %	3,426.1%
North America	357,172,209	108,096,800	313,862,863	87.9 %	9.6 %	190.4%
Latin America / Caribbean	617,776,105	18,068,919	333,115,908	53.9 %	10.2 %	1,743.6%
Oceania / Australia	37,157,120	7,620,480	27,100,334	72.9 %	0.8 %	255.6%
WORLD TOTAL	7,260,621,118	360,985,492	3,270,490,584	45.0 %	100.0 %	806.0%

NOTES: (1) Internet Usage and World Population Statistics are preliminary for June 30, 2015. (2) CLICK on each world region name for detailed regional usage information. (3) Demographic (Population) numbers are based on data from the US Census Bureau, Eurostats and local census agencies. (4) Internet usage information comes from data published by Nielsen Online, by the International Telecommunications Union, by GfK, local ICT Regulators and other reliable sources. (5) For definitions, disclaimers, navigation help and methodology, please refer to the Site Surfing Guide. (6) Information in this site may be cited, giving the due credit and placing a link to www.internetworldstats.com. Copyright © 2001 - 2015, Miniwatts Marketing Group. All rights reserved worldwide.

http://www.internetworldstats.com/stats.htm

World Internet Penetration Rates
by Geographic Regions - 2015 Q2

Region	Penetration Rate
North America	87.9%
Europe	73.5%
Australia / Oceania	72.9%
Latin America / Caribbean	53.9%
Middle East	49.0%
World, Avg.	45.0%
Asia	38.8%
Africa	27.0%

Penetration Rate

Source: Internet World Stats - www.internetworldststs.com/stats.htm
Penetration Rates are based on a world population of 7,260,621,118
and 3,270,490,584 estimated Internet users on June 30, 2015.
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Top Ten Languages in the Internet
2015 Q2 - in millions of users

NORWICH UNIVERSITY 1819

Language	Millions of Users
English	851.6
Chinese	704.5
Spanish	245.2
Arabic	155.6
Portuguese	131.6
Japanese	114.9
Russia	103.1
Malay	93.9
French	92.3
German	83.7
All the rest	693.9

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950

Millions of Users

http://www.internetworldstats.com/images/languages2015.png
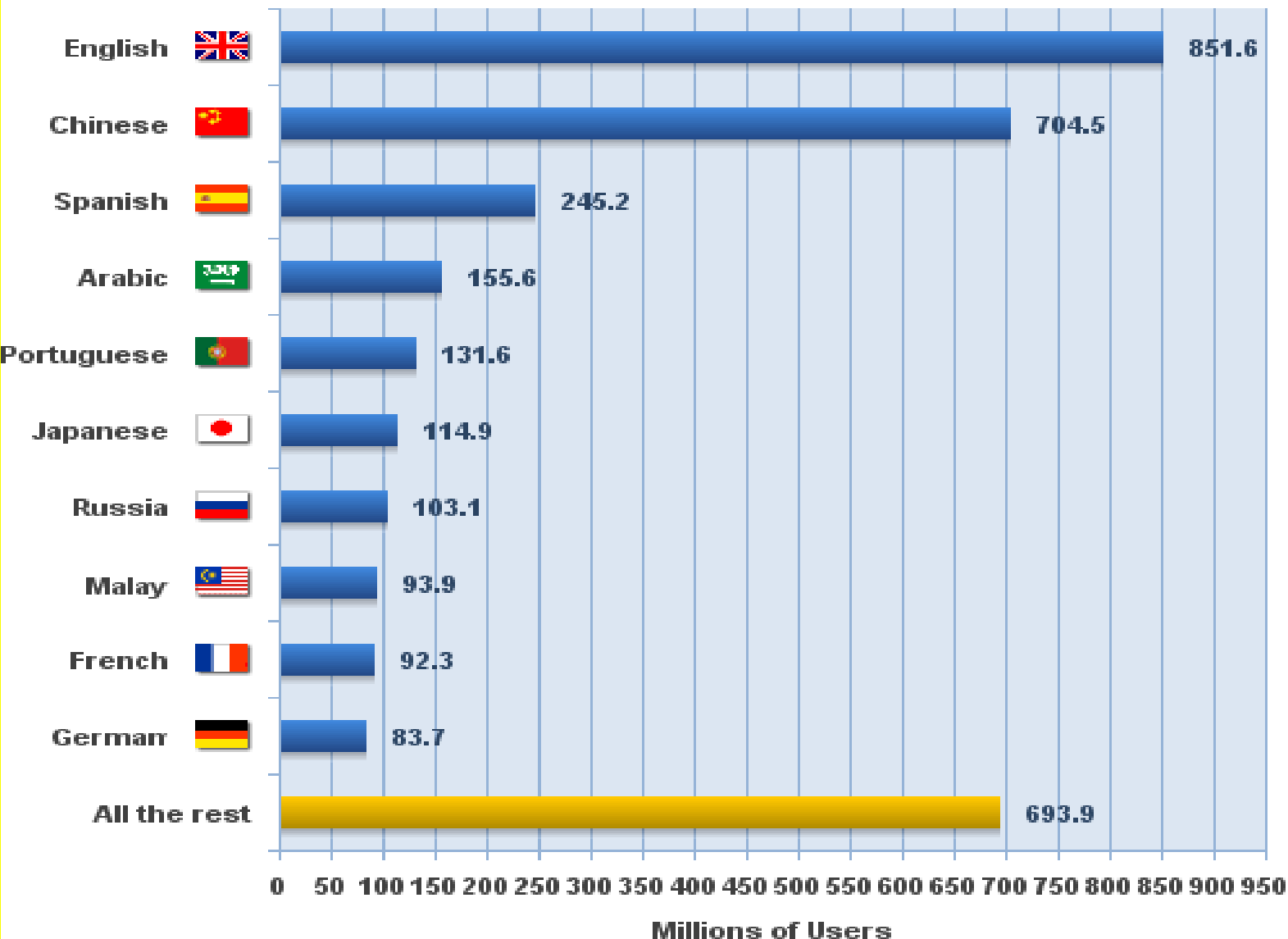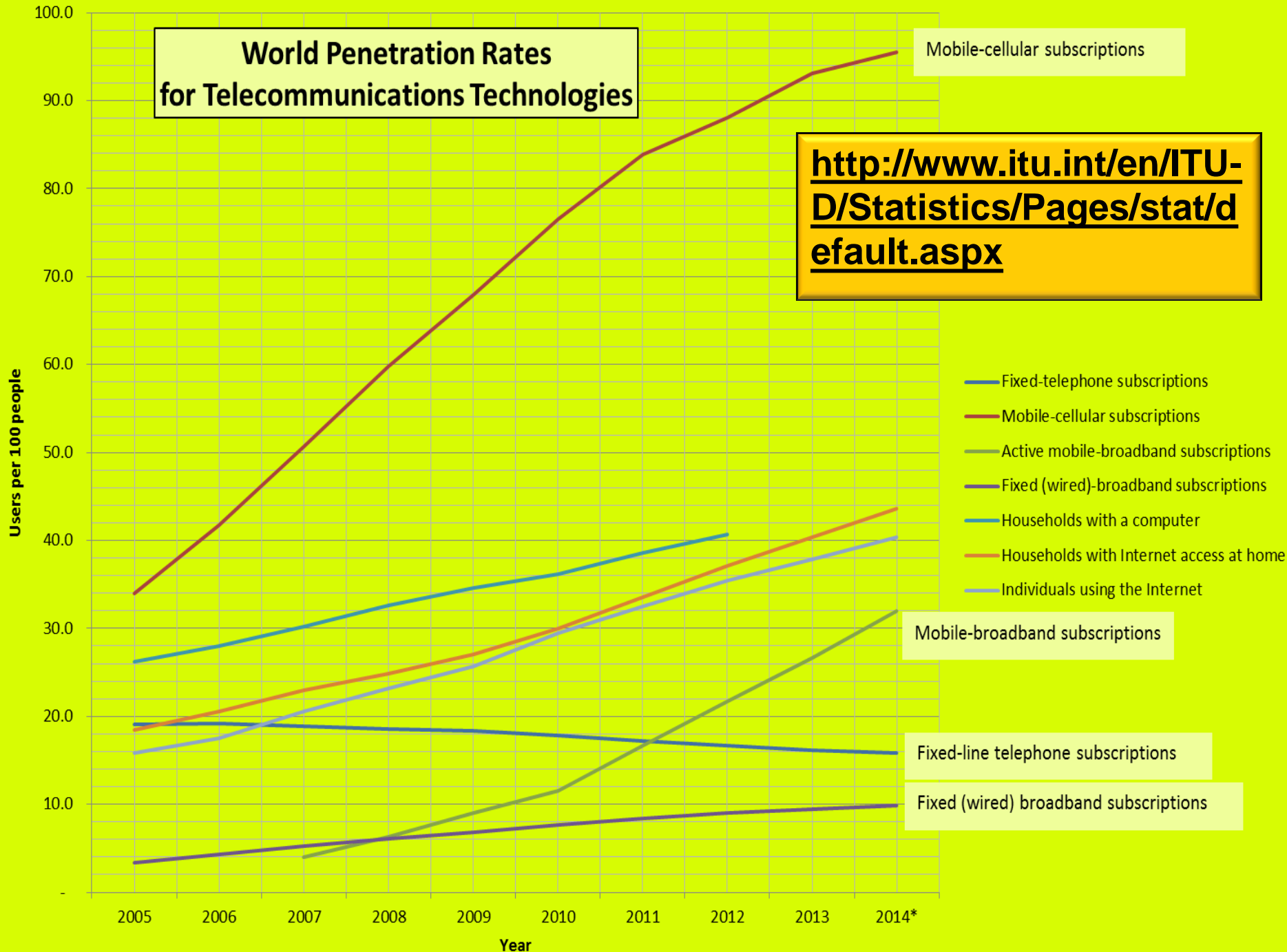
Source: Internet World Stats - www.internetworldstats.com/stats7.htm
Estimated total Internet users are 3,270,490,584 on June 30, 2015
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BYOD
The latest in mobile for business

DEFINITION ⬇

Bring Your Own Device: (noun) Refers to employees taking their own device to work, whether laptop, smartphone, or tablet, in order to interface to the corporate network.

35% 35% of workers indicated it is very important to separate personal profiles from work profiles on their mobile devices

MAJORITY OF EMPLOYEES VERY CONCERNED with their organization's policies on cloud, social and mobile

41% of the devices used to obtain corporate data are owned by the employee

Why BYOD?
↓ costs
↑ worker satisfaction
↑ worker productivity

Who Uses BYOD?
· **Small businesses**
· **Medium-size business**
· **Enterprise**

IT (Information Technology)

How many more devices must we support?

How much will it cost? $

SECURITY 🔒 **SENSITIVE** or **FINANCIAL** information could be exposed

EMPLOYEES "We're not going to stop using our devices when we walk in"

CONCLUSION:
Whether for or against BYOD in your office, you must have a policy in place. Workers expect to know what they can use and what measures are in place to protect data and their devices.

SalesVerge.com

Sources:
http://www.pcmag.com/encyclopedia_term/0,1237,t=BOYD&i=63452,00.asp
http://blogs.technet.com/b/security/archive/2012/08/02/byod-organizations-question-risk-vs-benefit.aspx
http://www.pcworld.com/businesscenter/article/246760/pros_and_cons_of_bringing_your_own_dev graphs.net

http://tinyurl.com/lzq9n7x (graph)
http://www.graphs.net/201208/byod-at-work.html (page)

BYOD (2)

- ➤ **Benefits**
  - ❑ **User-driven demand**
  - ❑ **Convenience**
  - ❑ **Hardware costs can be lowered**
- ➤ **Serious questions about security**
  - ❑ **Individuals generally use poor controls**
  - ❑ **Loss of devices = compromise corporate information**
- ➤ **NAC: Network Access Controls**
  - ❑ **Compatibility issues**
  - ❑ **Support**

Now go and study