Ciutat 2050

Jornada de debat

LA CIUTAT QUE ES COMUNICA

(i alguna cosa més)

JORDI LÓPEZ i BENASAT

ACET

Barcelona, Juny 2017

LA CIUTAT 2050

- LES TENDÈNCIES DE CREIXEMENT
- **EL MODEL DE CIUTAT**
- ELS REPTES

LES TIC

- LES REVOLUCIONS TECNOLÒGIQUES
- LES TICS
- ECONOMIA DE LES TIC
- **UN MON EXPONENCIAL**

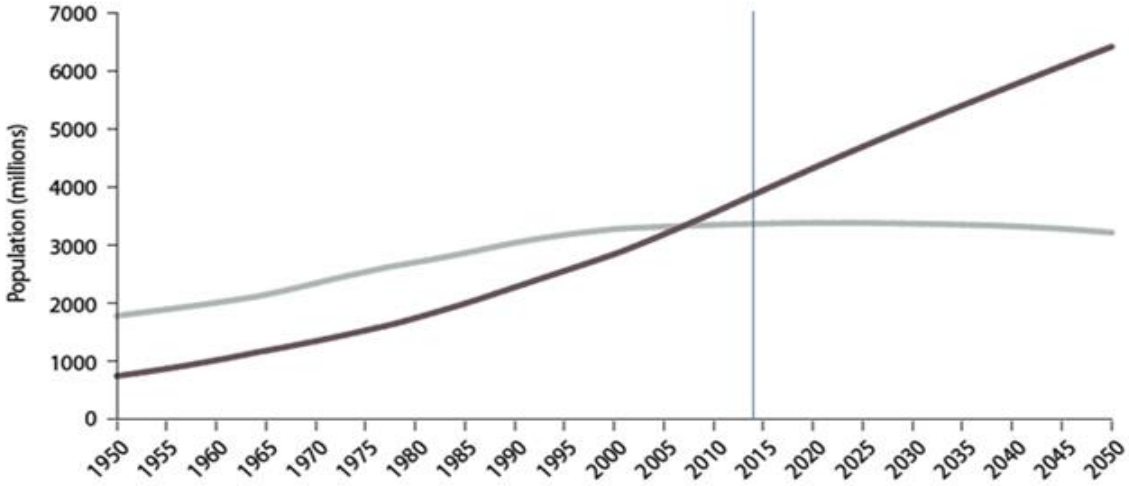
LA CIUTAT 2050

INCREMENT DE POBLACIÓ

TABLE 1. POPULATION OF THE WORLD AND MAJOR AREAS, 2015, 2030, 2050 AND 2100, ACCORDING TO THE MEDIUM-VARIANT PROJECTION

Major area	*Population (millions)*			
	2015	*2030*	*2050*	*2100*
World	7 349	8 501	9 725	11 213

Figure 2.
Urban and rural population of the world, 1950–2050

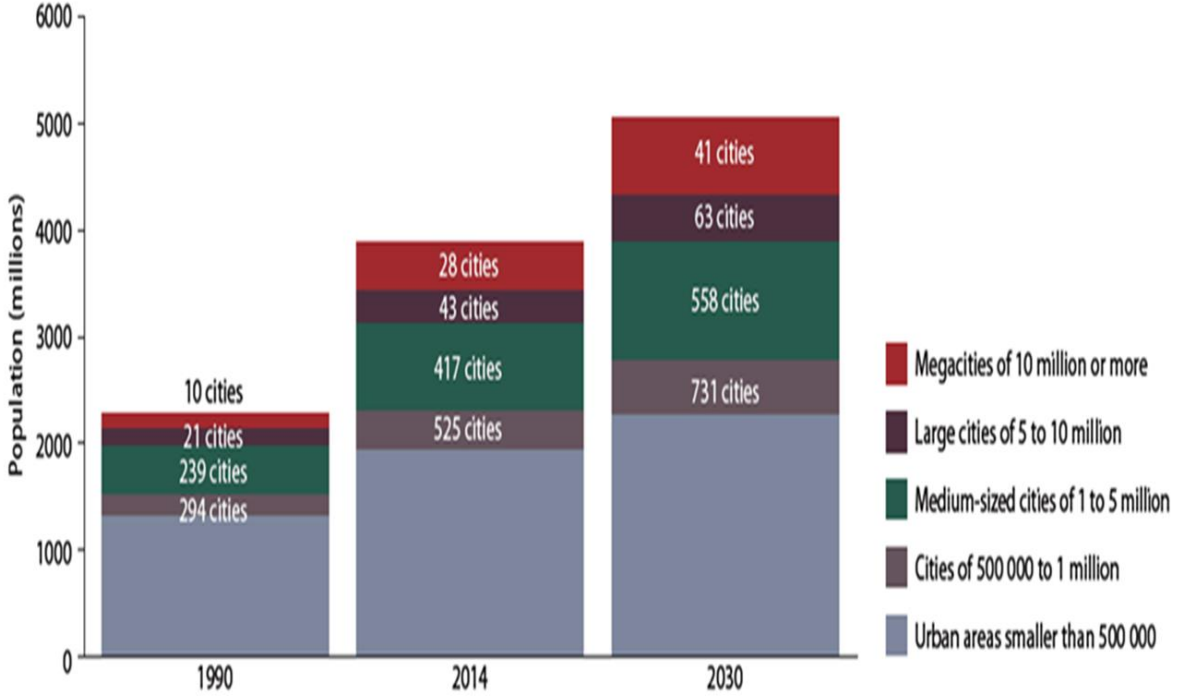


A majority of the world's population lives in urban area

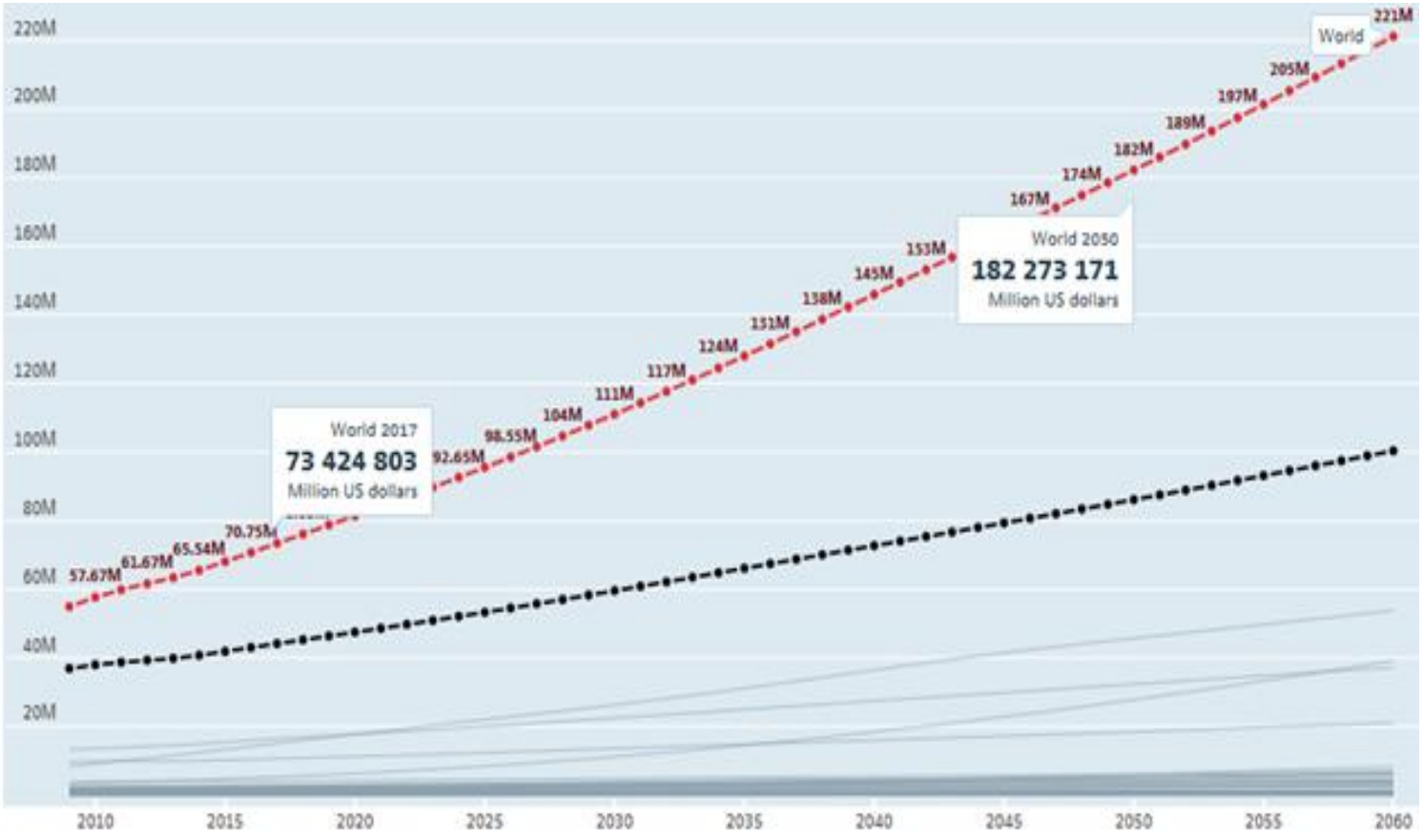
2014 REVISION

World Urbanization Prospects [highlights]

URBANITZACIÓ



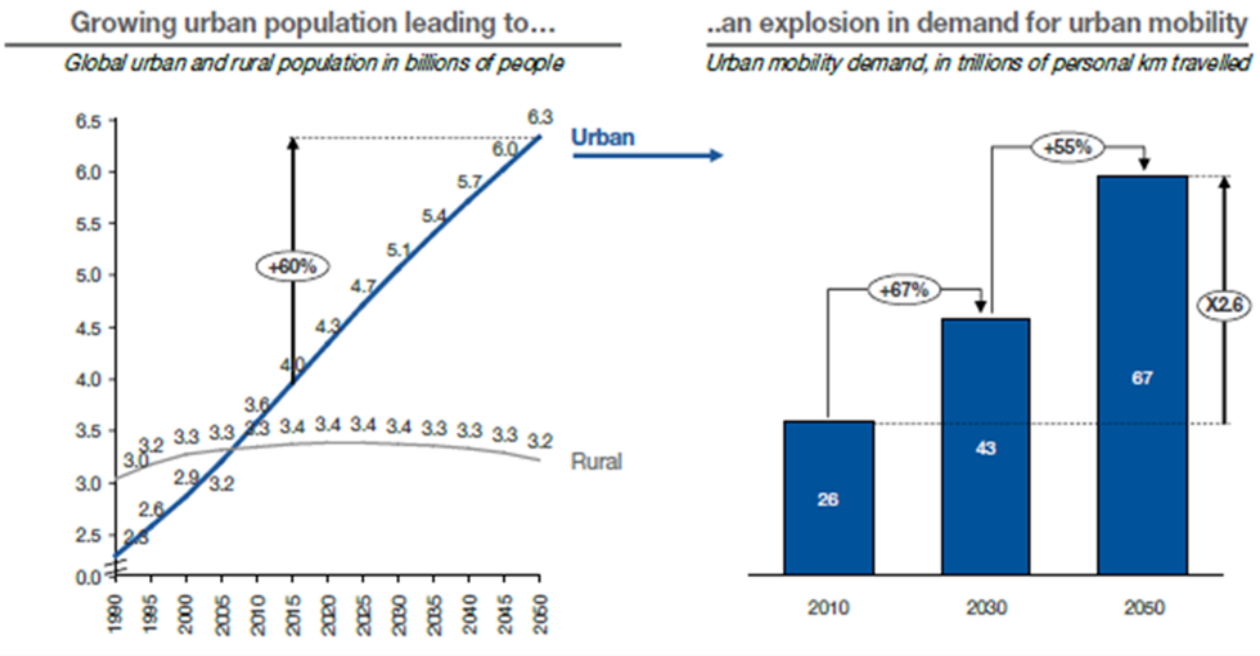
PIB

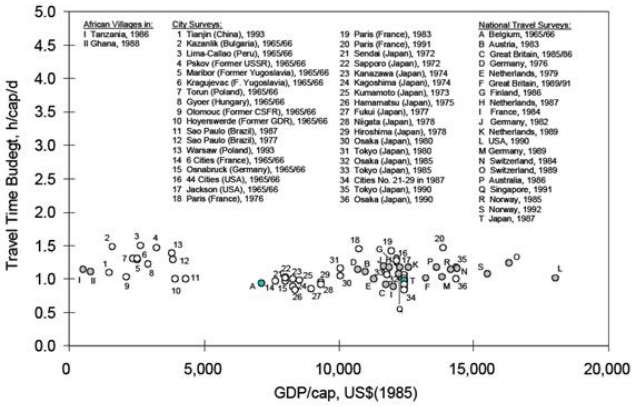


EN ELS PASSATS 50 ANYS EL PIB S'HA MULTIPILICAT PER 3

CREIXEMENT DE LA DEMANDA DE MOBILITAT

EN LES PASSADES 5 DÈCADES LA DEMANDA DE KM VIATJATS S'HA MULTIPLICAT GAIREBÉ PER 3





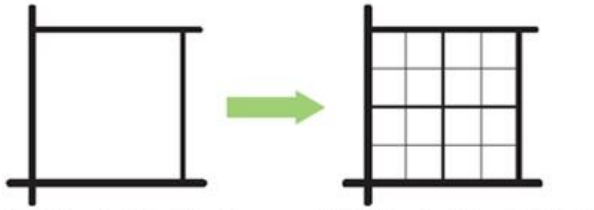
EXPANSIÓ TERRITORAL , BÀSICAMENT POLÍTIQUES DE MOBILITAT

An often cited example of urban sprawl is Atlanta, GA (US), which has a similar population as Barcelona but occupies an urban area that is 26 times as large.

	Sprawling City	Compact City
Location	Atlanta	Barcelona
Urban Population (million inhabitants)	2.5	2.8
Urban Area (km²)	4,280	162
Urban Density (pph)	6	173
Energy Consumption Per Capita for Private Transportation (MJoules)	80	9

Source | Bertaud and Poole 2007.

Comparison of Street Networks

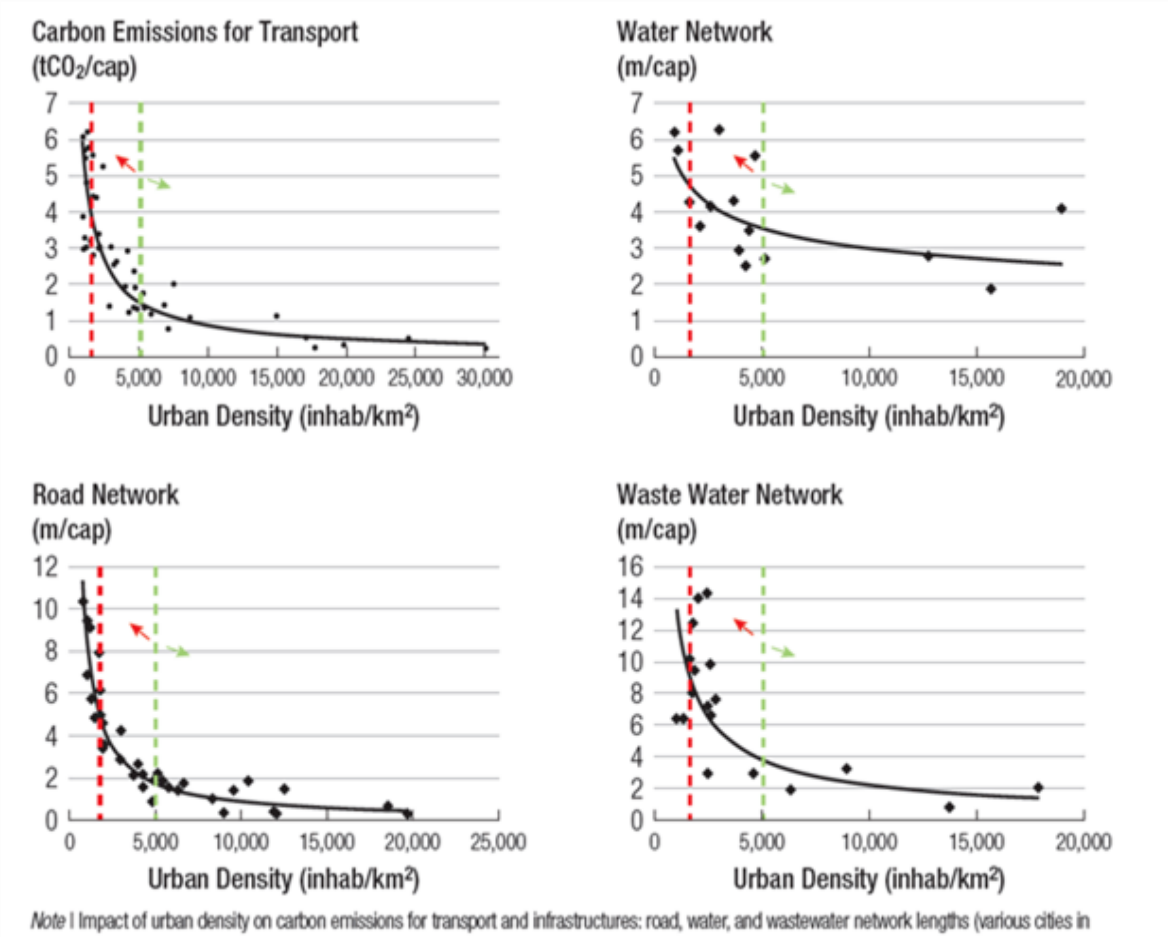


Left: Network of Arterials and Super Blocks, 400 m wide

Right: Network of Diversified Street Widths and Blocks, 100 m wide

LES CIUTATS COMPACTES SON MÉS EFICIENTS, TAMBÉ EN MOURE PERSONES I MERCADERIES.

DENSITAT I EFICIÈNCIA



Note | Impact of urban density on carbon emissions for transport and infrastructures: road, water, and wastewater network lengths (various cities in

LES CIUTATS MÉS EFICIENTS I “HABITABLES”

COMPONENTS DE DINÀMICA URBANA

US DEL SOL

ÀREES COMPACTES

EDIFICIS I URBANISME ADEQUAT AL CLIMA I ENTORN

MOBILITAT I TRANSPORT

PRIORITZAR EL CAMINAR, BICICLETA I TRANSPORT PÚBLIC

LLOCS DE TREBALL

DE QUALITAT

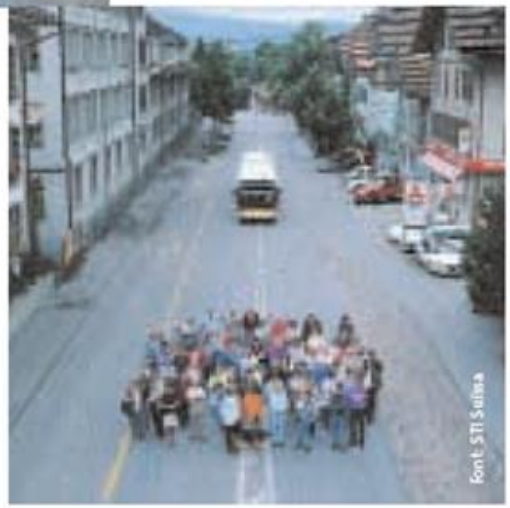
•**POBLACIÓ I HABITATGE**

ESPAIS VERDS

CULTURA I QUALITAT DE VIDA

ESPAI!

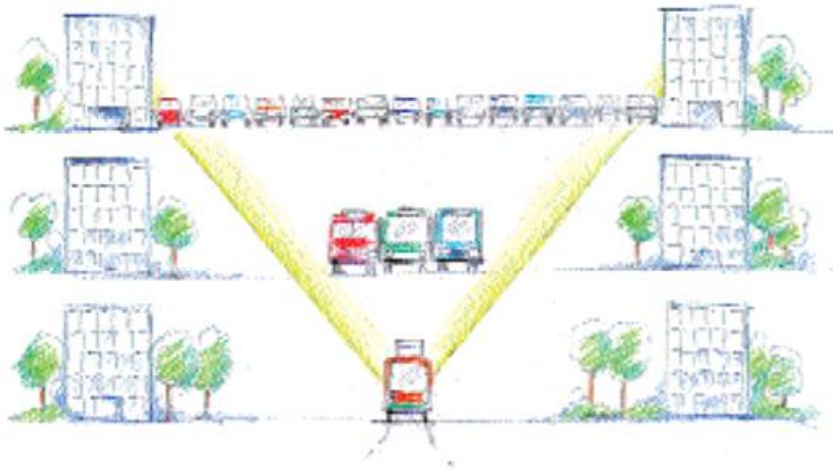
75 persones transportades:
per 60 cotxes



o per un sol autobús.

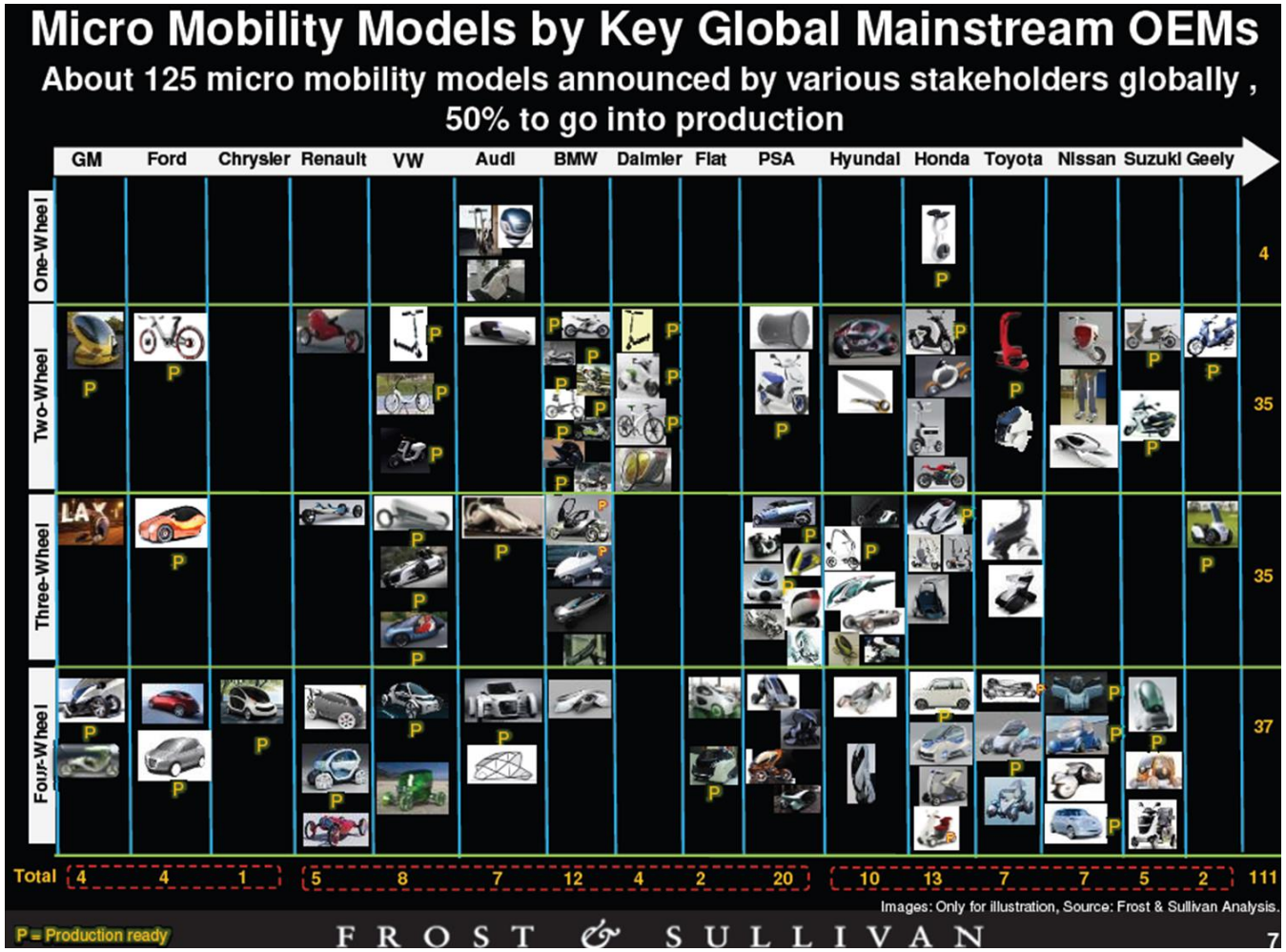
Per transportar 50.000 persones per hora i per direcció són necessaris:

- 175 m d'amplada de calçada per als cotxes, o
- 35 m d'amplada de calçada per als autobusos, o solament
- una franja de 9 m d'ample per a una línia de metro o ferrocarril.



MICROMOBILITAT

INNOVACIÓ I COMPETÈNCIA EN MICROMOBILITAT



APLICACIÓ DE LES TIC PER ACONSEGUIR EL MODEL

SOSTENIBLE

SATISFÀ LES NECESSITATS ACTUALS SENSE COMPROMETE LES DEL FUTUR

$$x(t) = x(t-1) + \text{regeneration} - \text{depletion}$$

$$x = constant \text{ or } dx/dt = 0$$

NOU MODEL DE CIUTAT

@ Activitats

Espais verts

Infraestructures avançades

Patrimoni industrial

22

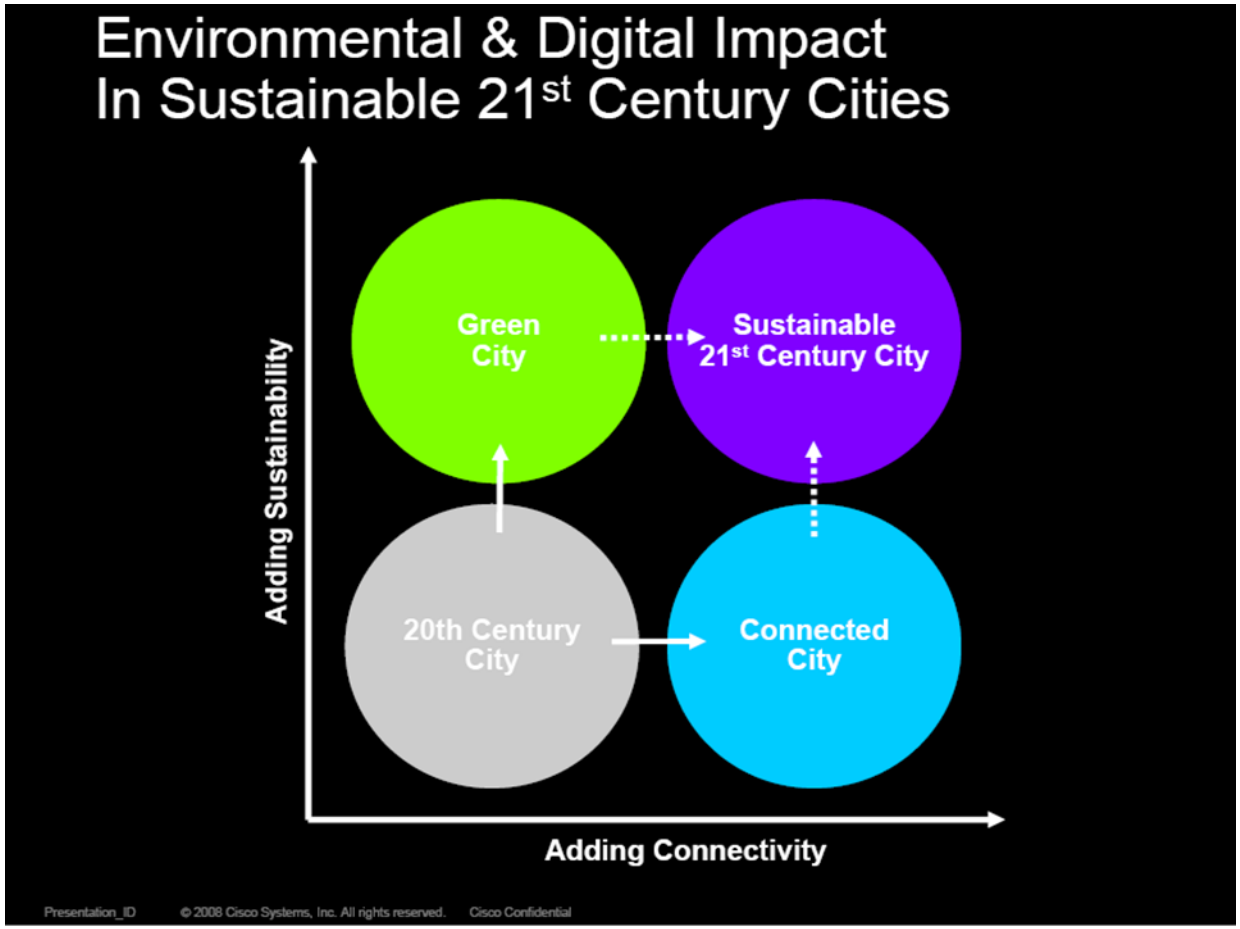
Facilitats

Vivendes socials

Nou model de mobilitat

Revitalització espais públics

LA CIUTAT DEL FUTUR



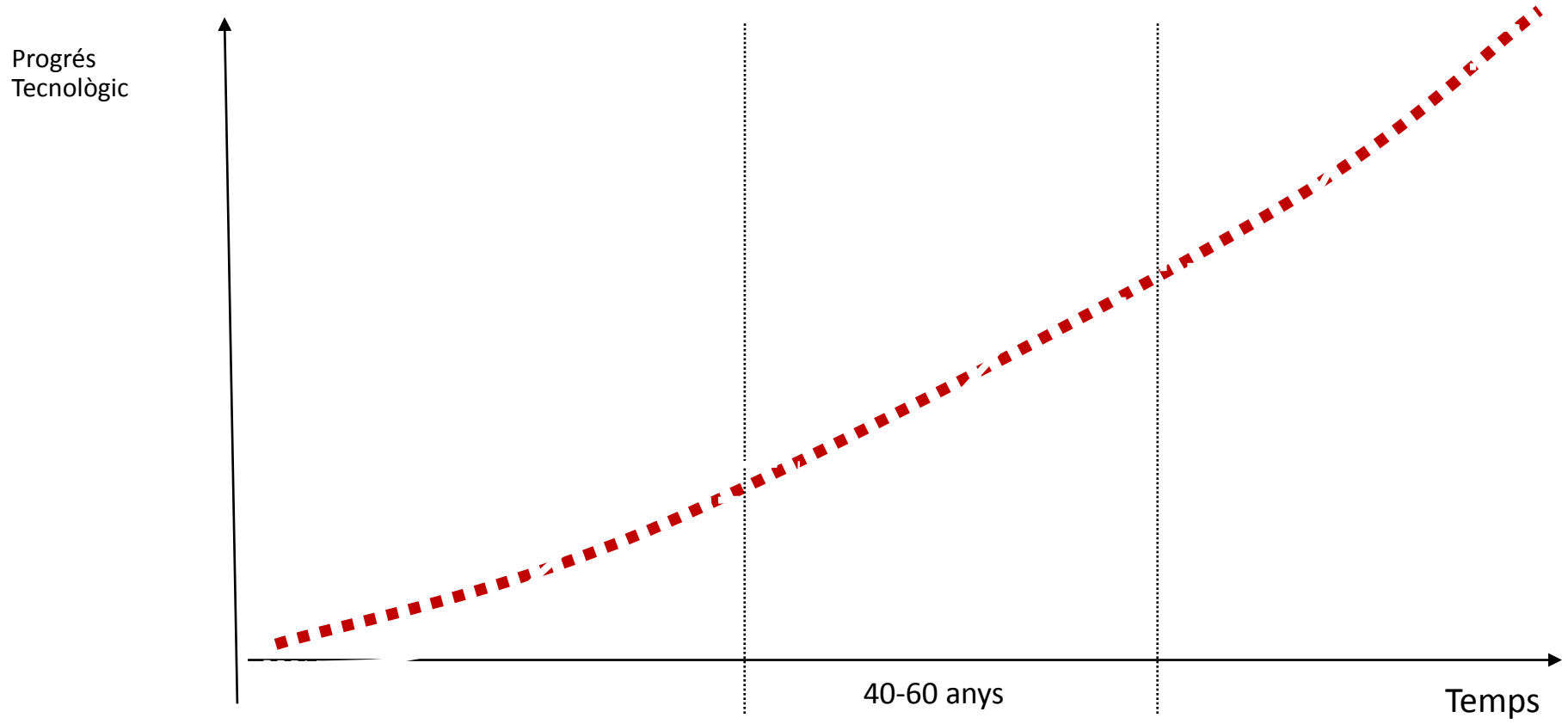
El FUTUR TIC A LES CIUTATS
VERD I INTEGRAT

LES TIC

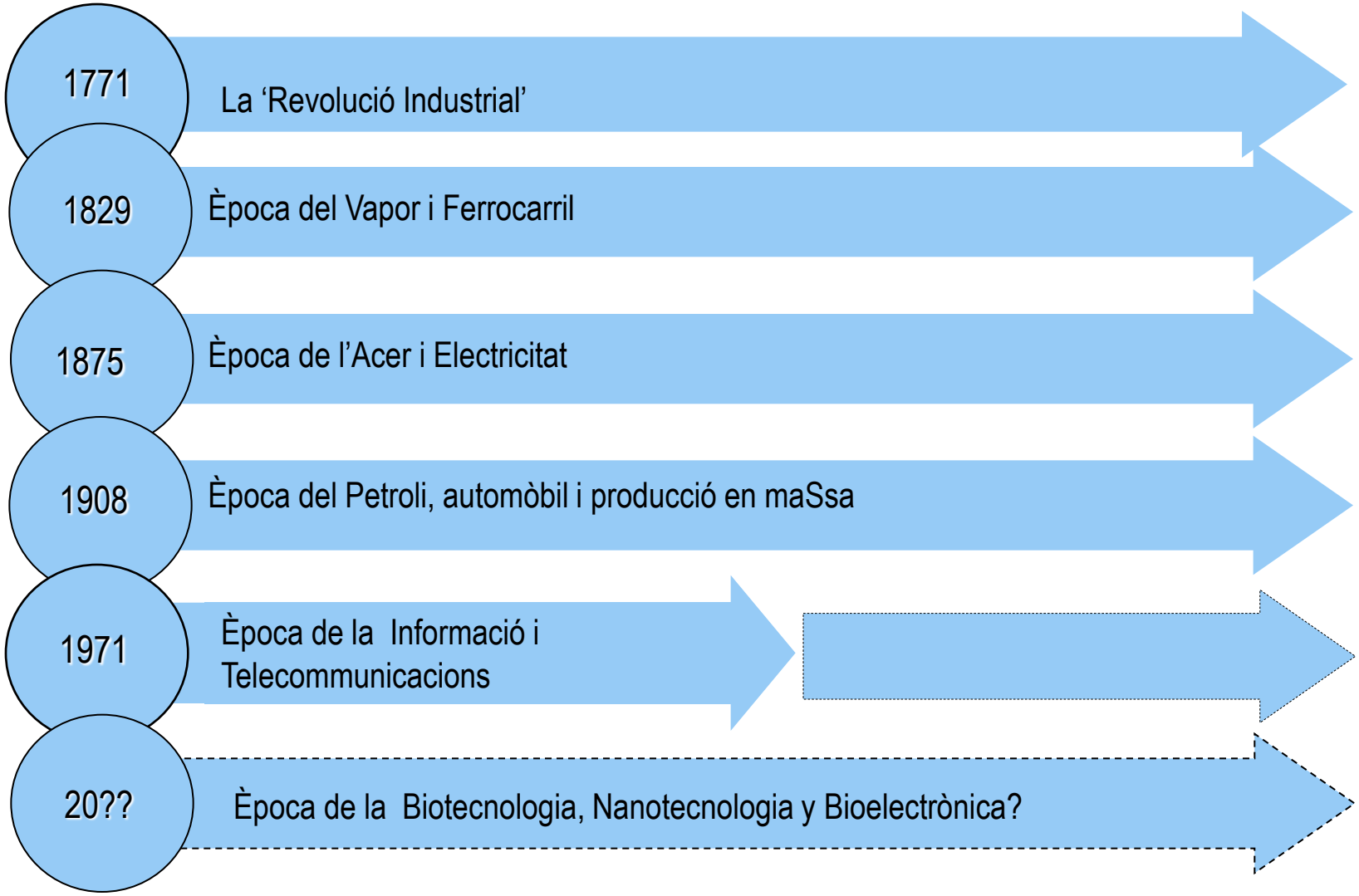
- LES REVOLUCIONS TECNOLÒGIQUES
- LES TICS
- ECONOMIA DE LES TIC
- UN MON EXPONENCIAL

EL DESVOLUPAMENT TECNOLÒGIC

LA HISTORIA DEL DESENVOLUPAMNET TECNOLÒGIC
SEMBLA UN PROCÉS CONTINUAT



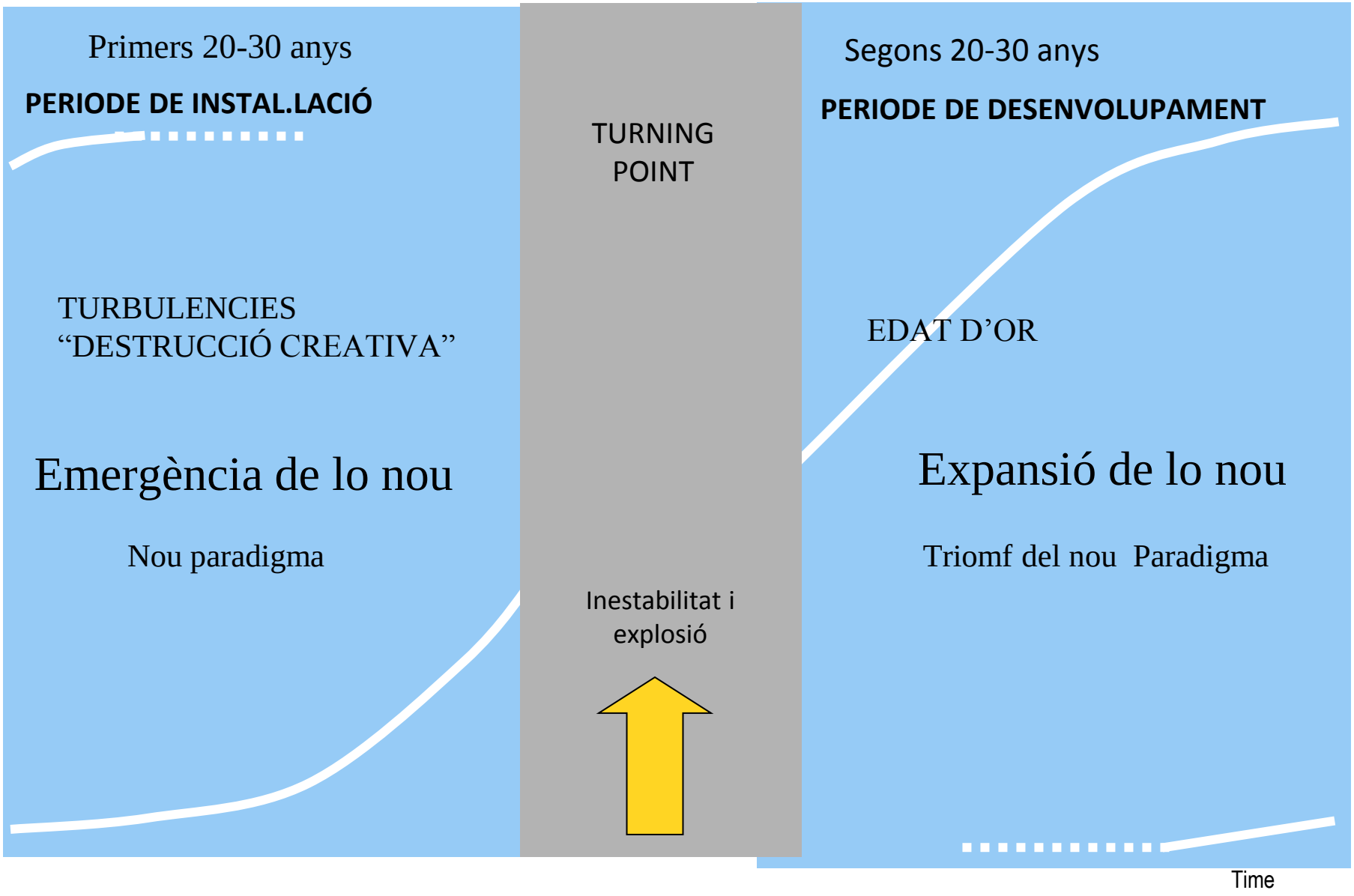
LES REVOLUCIONS TECNOLÒGIQUES



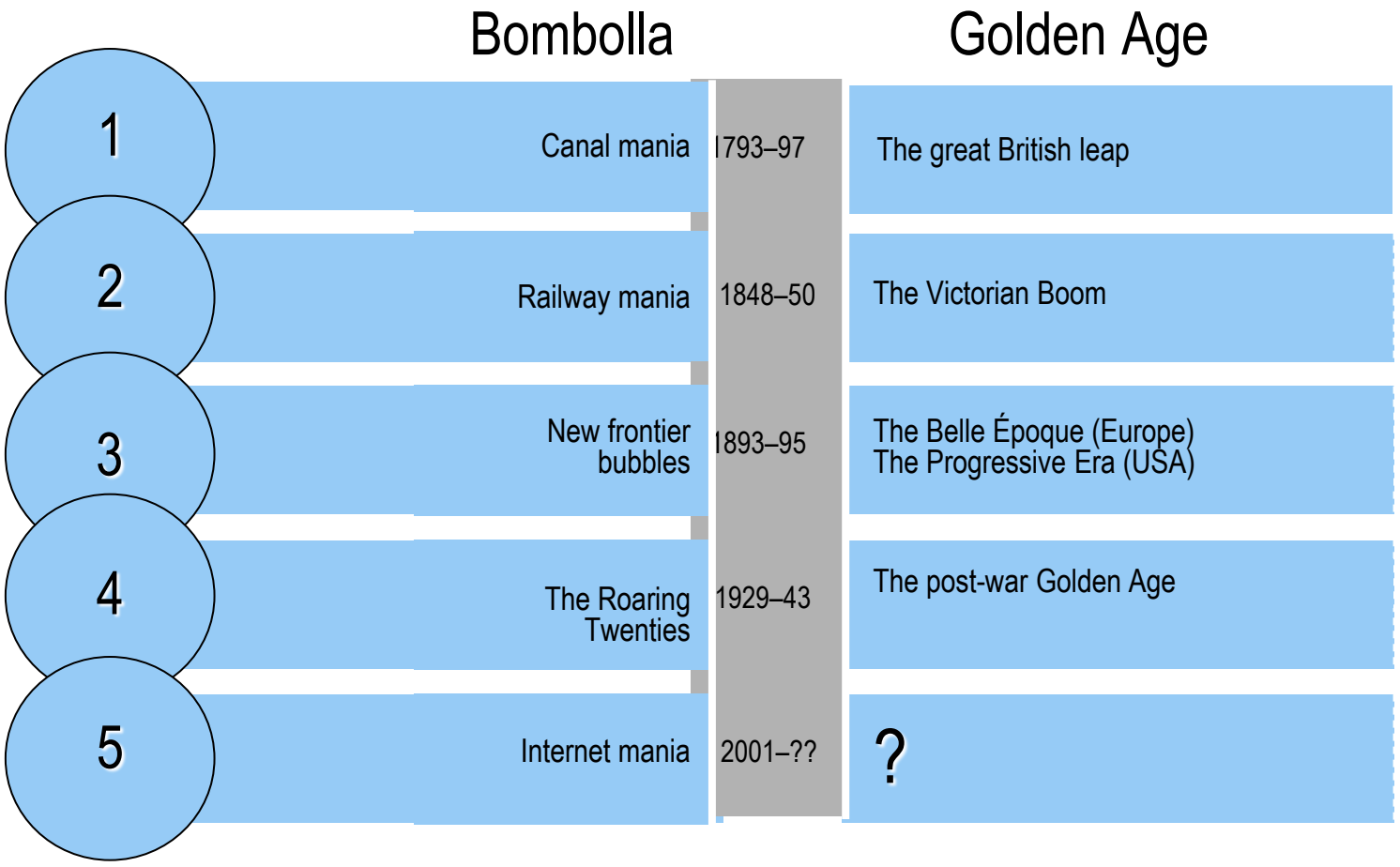
5 REVOLUCIONS TECNOLÒGIQUES EN 200 ANYS

Carlota Perez

DOS FASES DIFERENTS EN CADA PERIODE

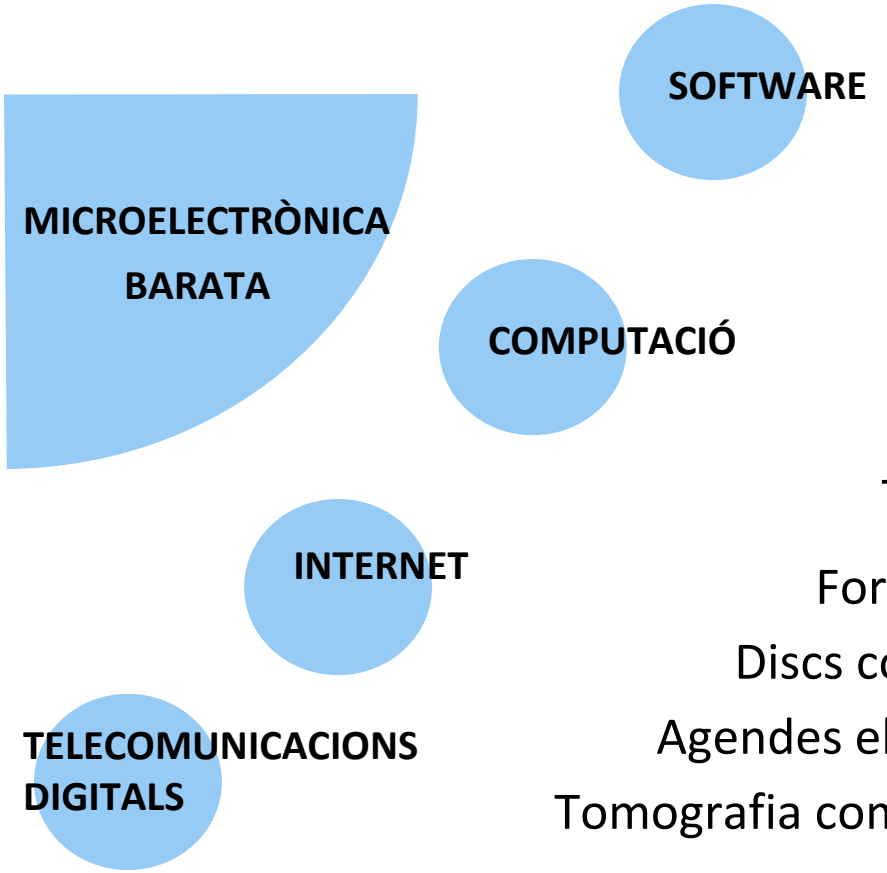


MODEL D'EVOLUCIÓ



INNOVACIÓ!

EL QUE NO EXISTÍA EN 1970



Rellotges digitals

Calculadores de butxaca

Televisió por cable

Computadores personals

Telèfons inalàmbricos

Telèfons celul.lars. Smart phones

Forns de microones

Discs compactes (CD)

Agendes electróniquess. Tablets.

Tomografia computeritzada

Tarjetes de crèdit digitals

Caixers automàtics

Fax

Correu electrònio

EL QUE NO EXISTIA EN 1907

Radios

Tocadiscs

Televisors

Grabadores

Màquines d'escriure elèctriques

C. Perez

LA REVOLUCIÓ DE LES TIC
LA MICROELÈCTRONICA

1950s
Silicon Transistor

1
Transistor

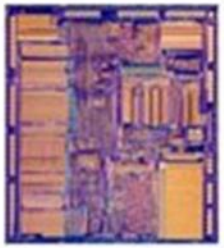
1960s
TTL Quad Gate

16
Transistors

1970s
8-bit Microprocessor

4500
Transistors

1980s
32-bit Microprocessor



275,000
Transistors

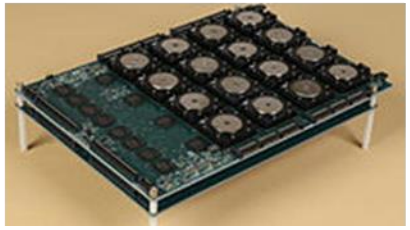
1990s
32-bit Microprocessor

3,100,000
Transistors

2000s
64-bit Microprocessor

592,000,000
Transistors

2010s



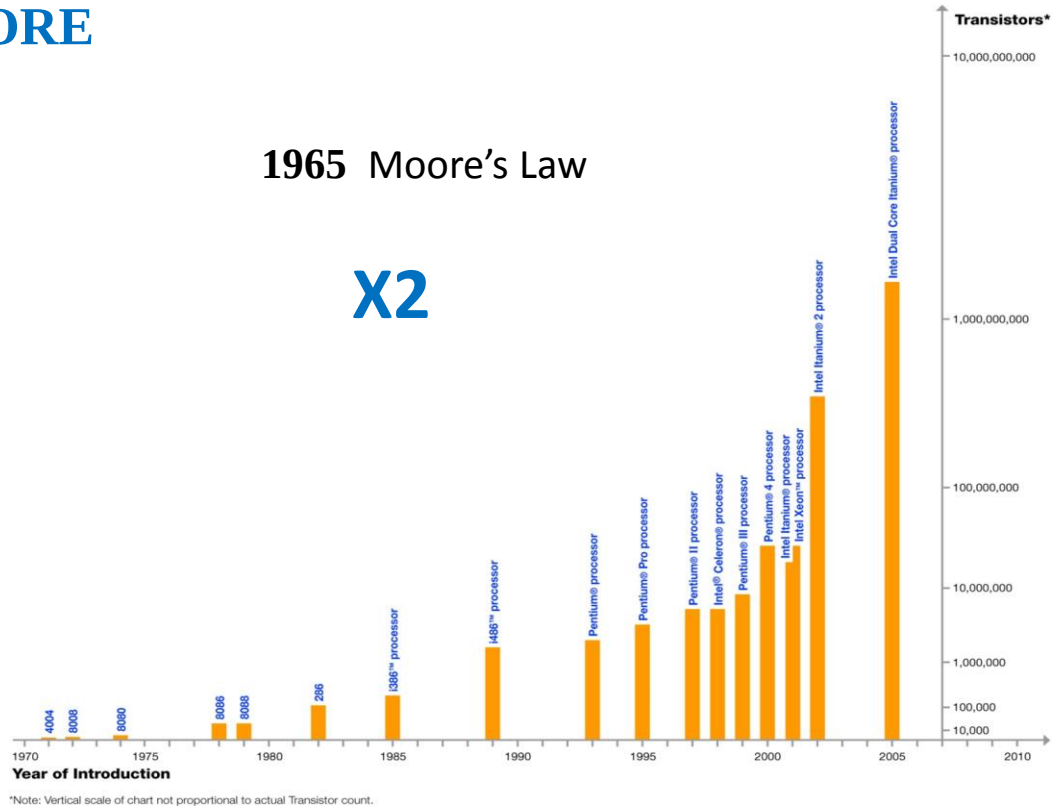
A circuit board with a 4×4 array
Each chip using 5.4 billion transistors

LA BASE DEL CREIXEMENT EXPONENCIAL

LLEI DE MOORE

1965 Moore's Law

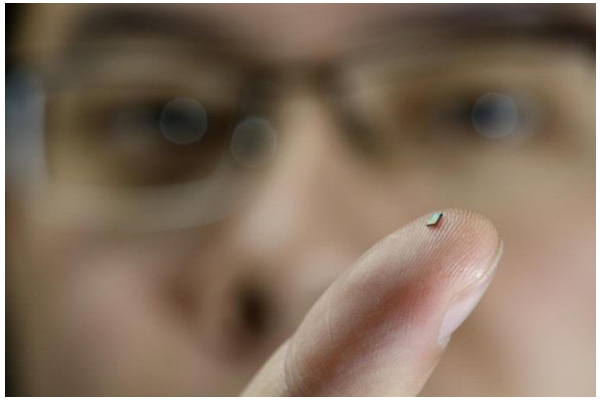
X2



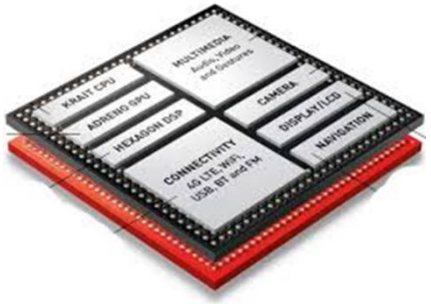
Intel ®

INFORMATION TECHNOLOGIES *(OF ALL KINDS)*
DOUBLE THEIR POWER *(PRICE PERFORMANCE, CAPACITY, BANDWIDTH)*
EVERY YEAR

ELS SENSORS

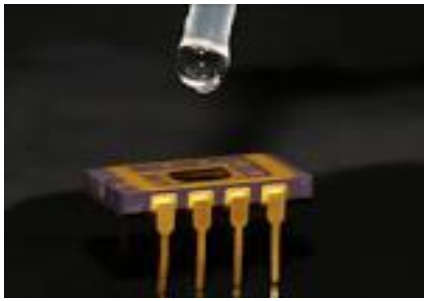


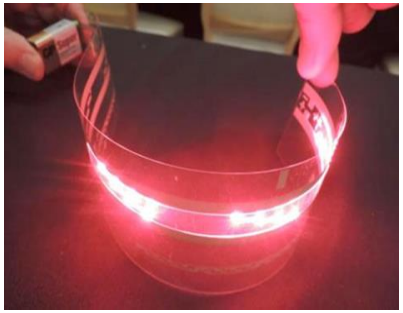
INTEGRATS I COMPACTATS

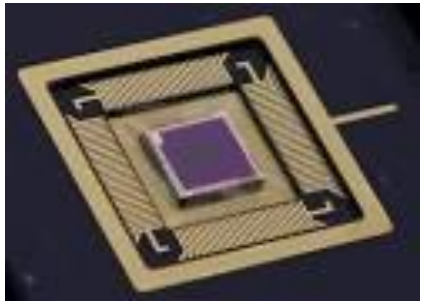


Chip 2 mil·límetres quadrats
Es un sensor inalàmbric de temperatura
Obté la seva energia de les ones de radio

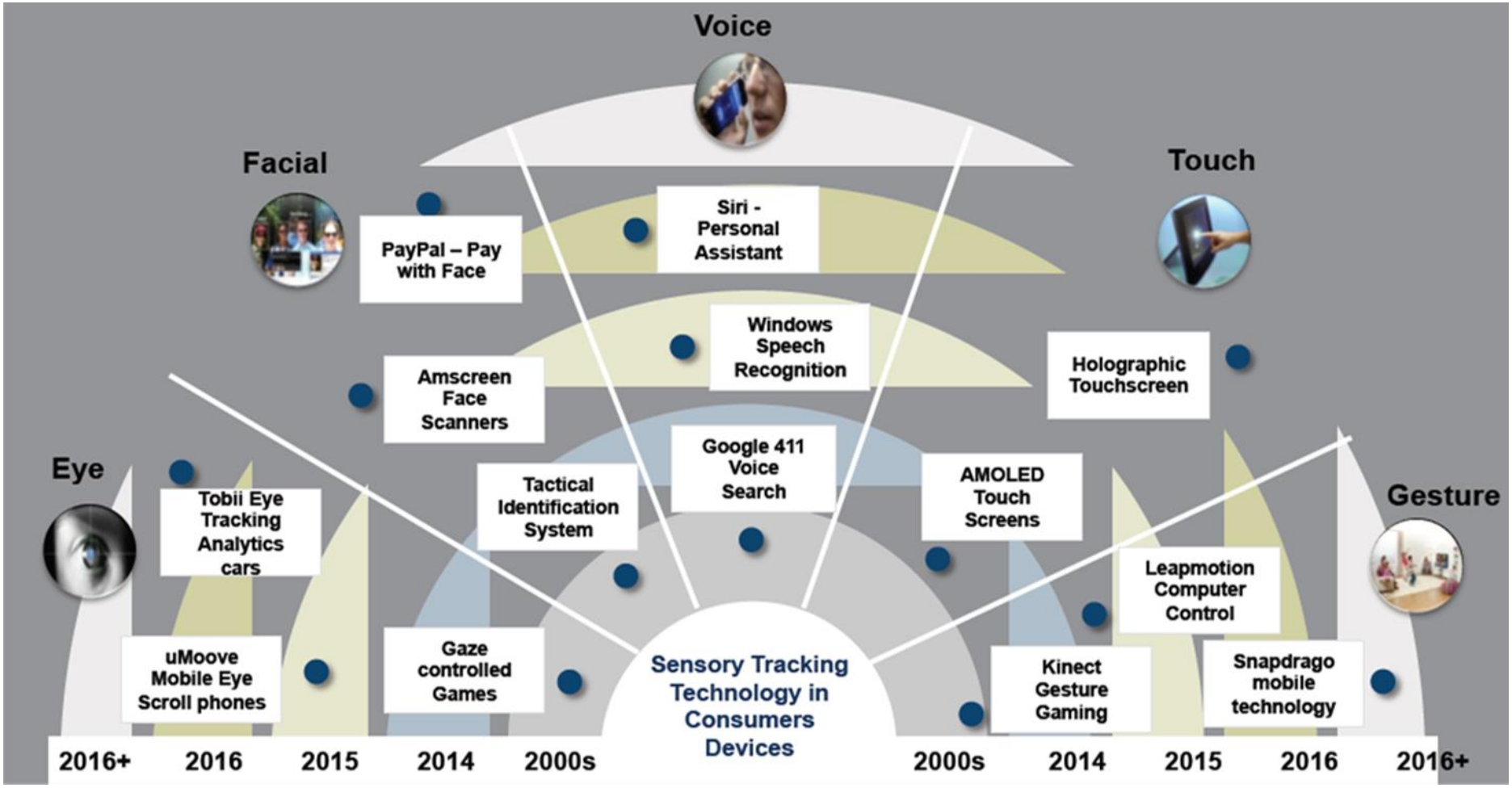
TSensors Summit
Supporting Abundance with Trillion Sensor Roadmap





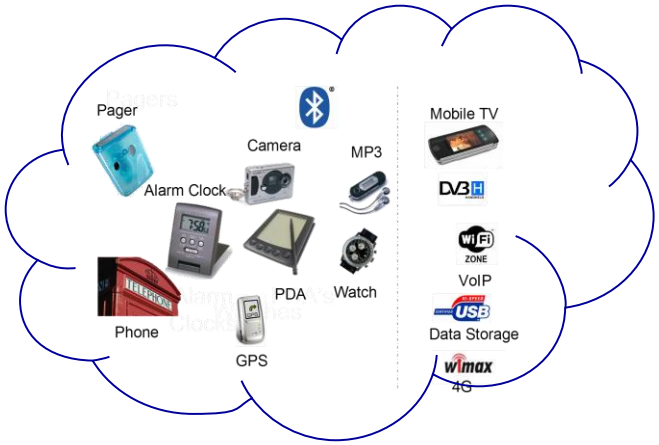


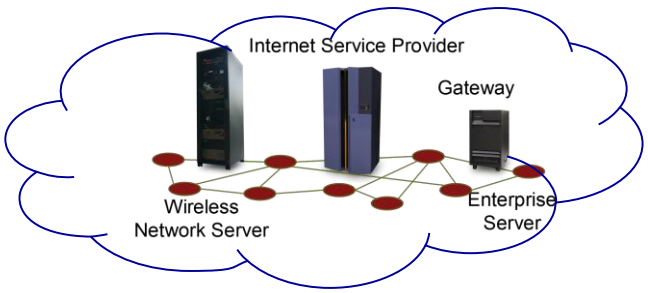
SENSORITZACIÓ DE LES COSES



INTEGRACIÓ DE FUNCIONS TOTAL

TOT EN UN EQUIP DE RADIO → **"RADIO" EN TOT** → **EQUIPS EN XARXA**

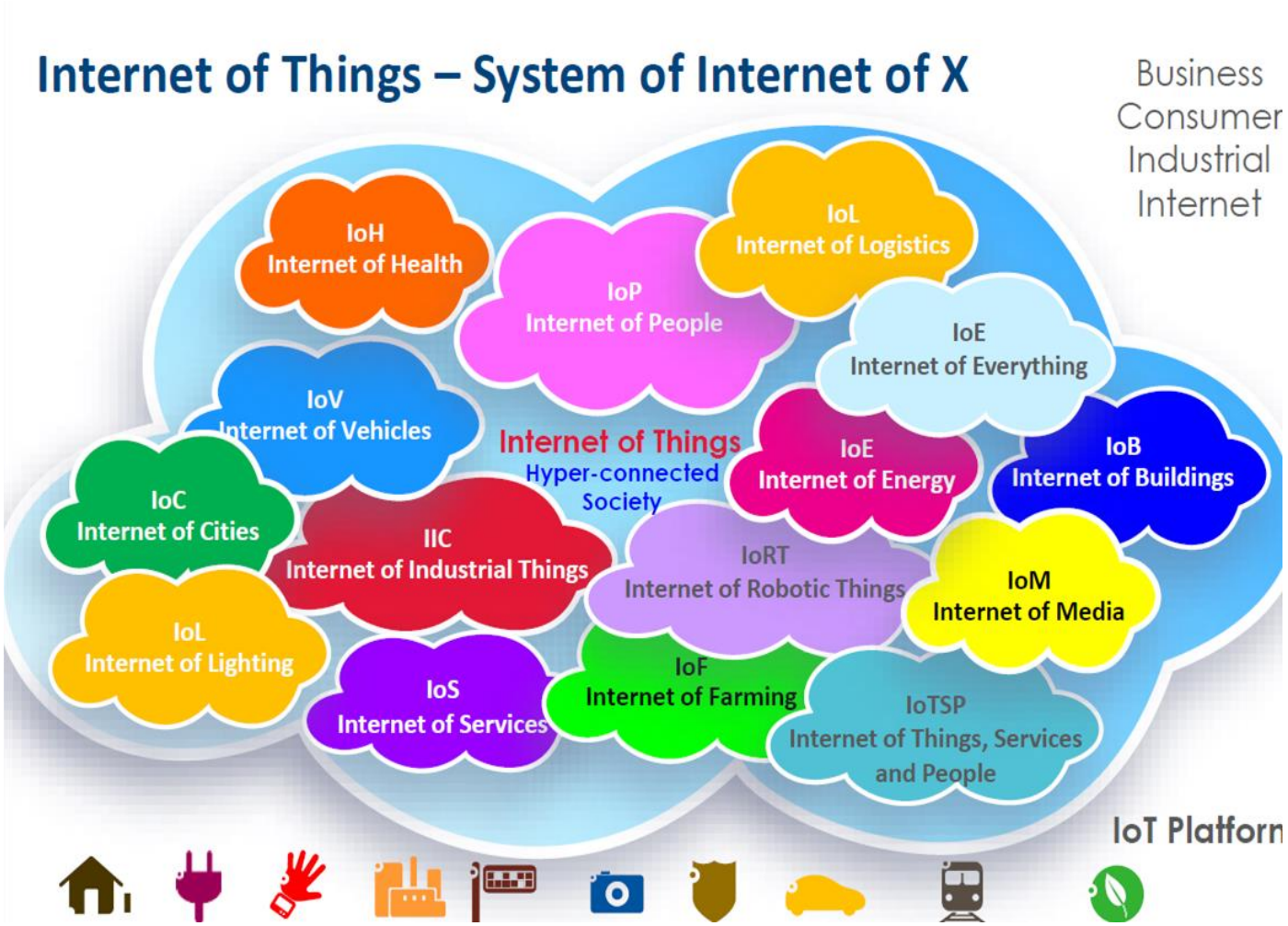




On es la intel.ligència?

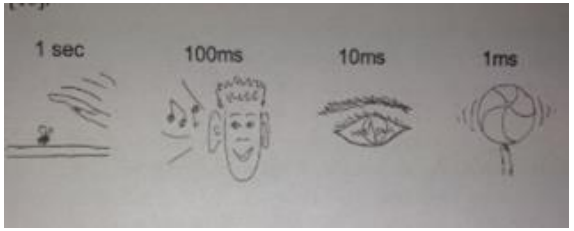
- Sensar
- Processar
- Comunicar

INTERNET DE LES COSES



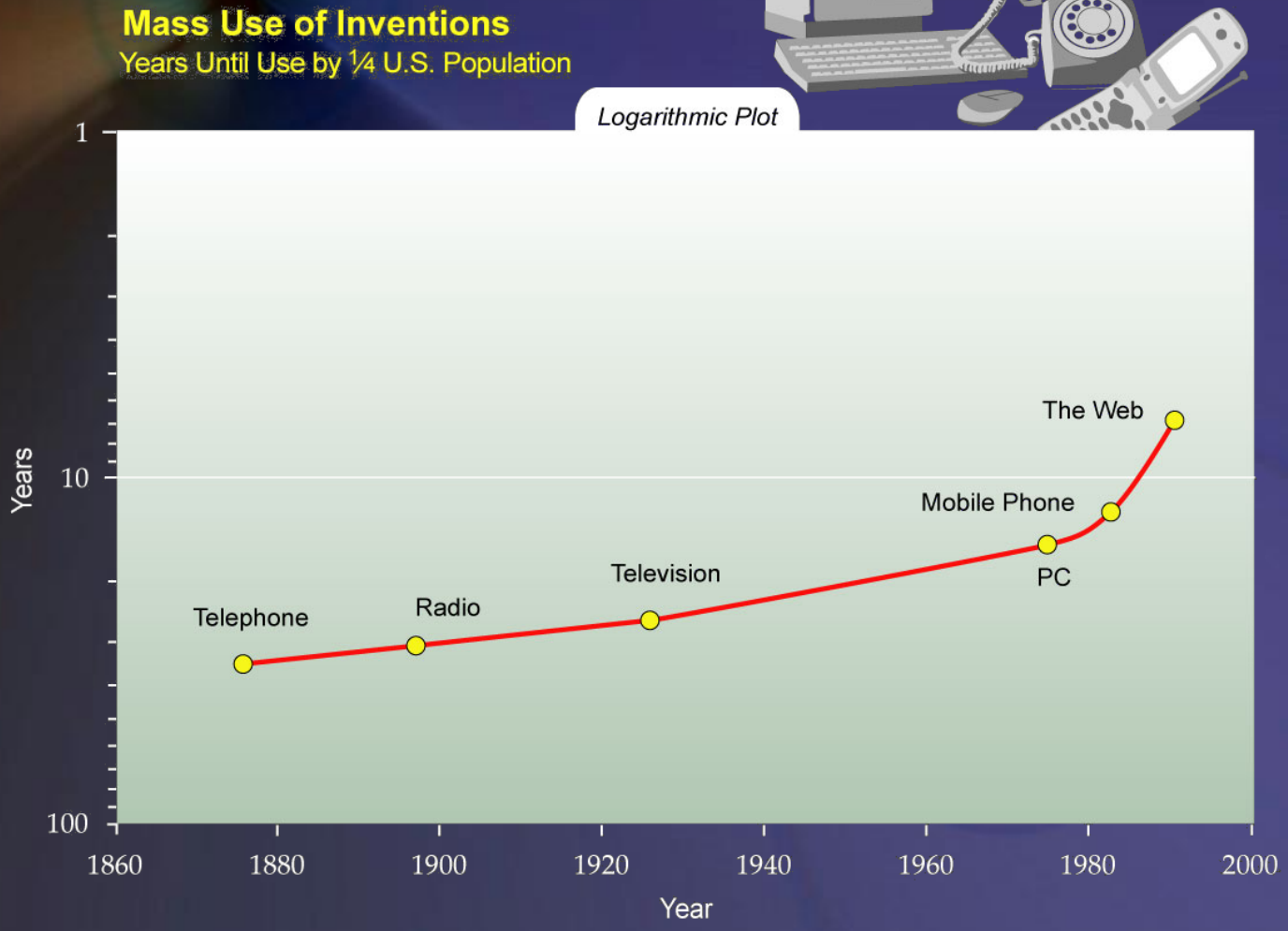
INTERNET TÀCTIL I 5G

IOT
SENSORS



- ROUND-TRIP LATENCY OF APPROXIMATELY **1MS** IS NECESSARY
- 1 GBIT
- 99.99999% CARRIER GRADE ROBUSTNESS AND AVAILABILITY MUST BE PROVIDED.

TEMPS D'EXPANSIÓ



ELS SISTEMES DEL FUTUR PROPER

Robots have entered our homes for personal use.

Big data has entered the Zettabyte era.

Sensory devices guide our everyday lives.

3D printing is commonplace. 4D printing is gaining mainstream acceptance .

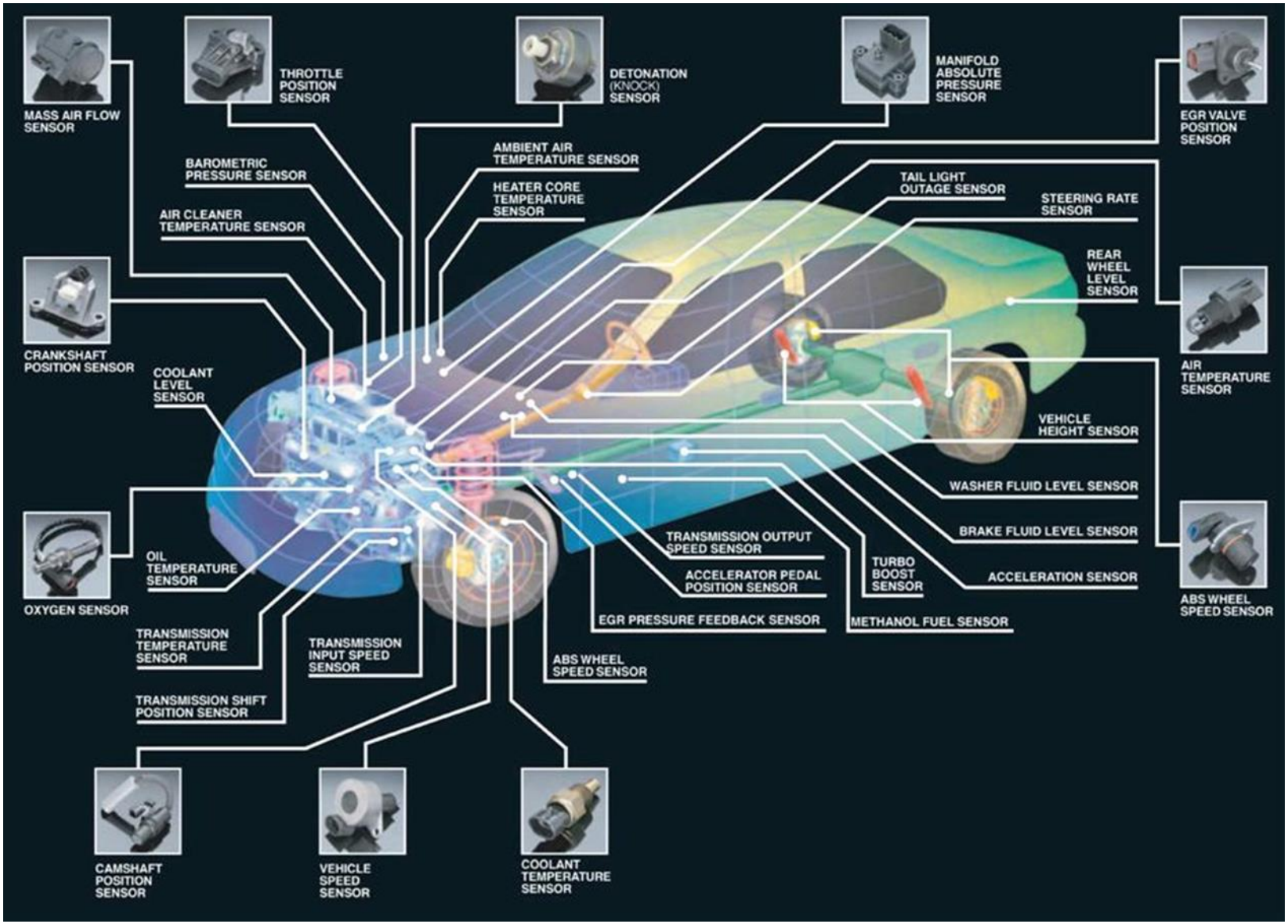
Mobile financial transactions are now in crypto-currencies.

High Speed Rail line to connect from London to Beijing work begins

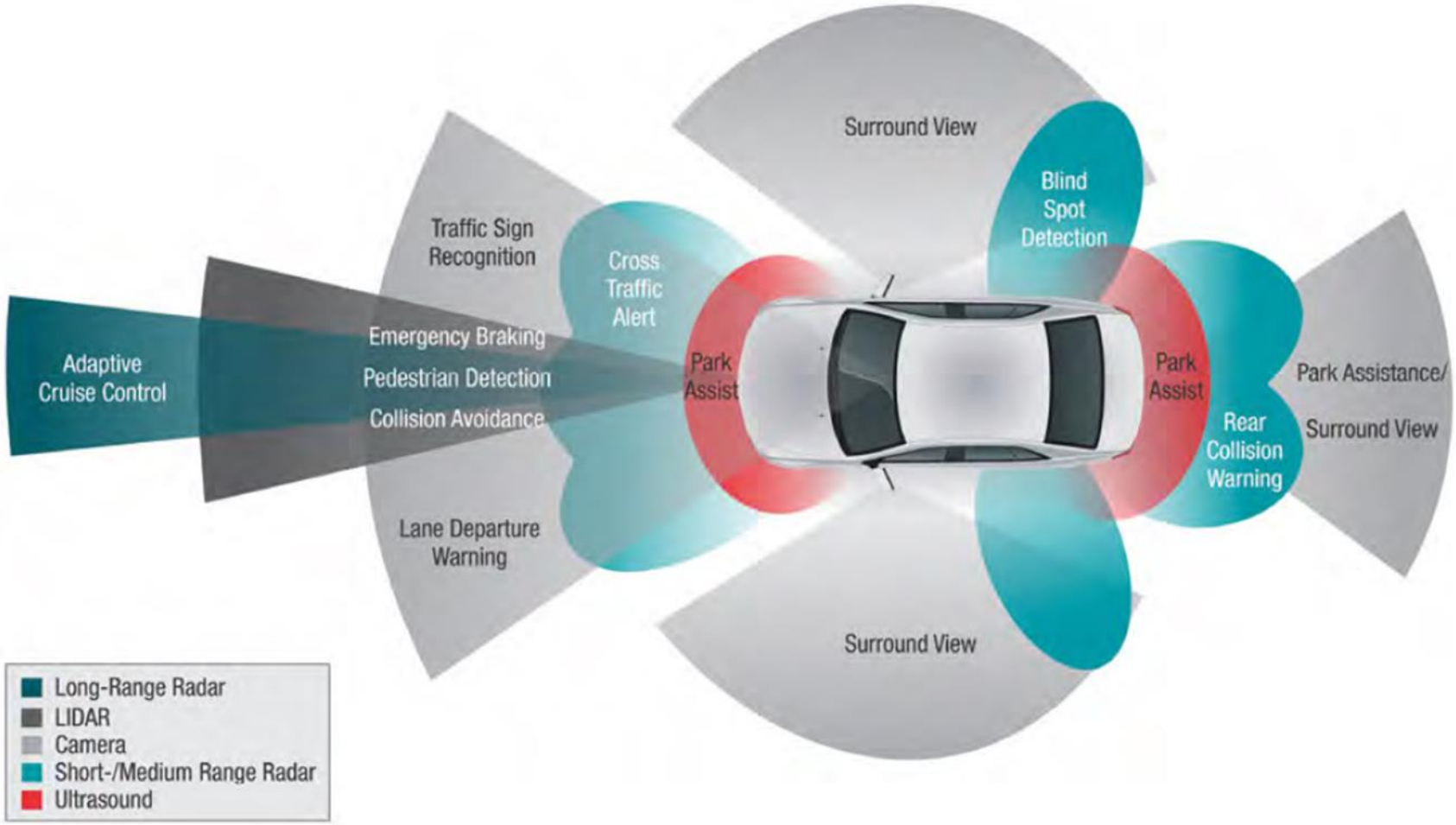
There are 6 million autonomous cars in Europe and North America.

Summer Sale: Low-cost holidays in space.

SENSORS EN VEHICLES – INTERNS-

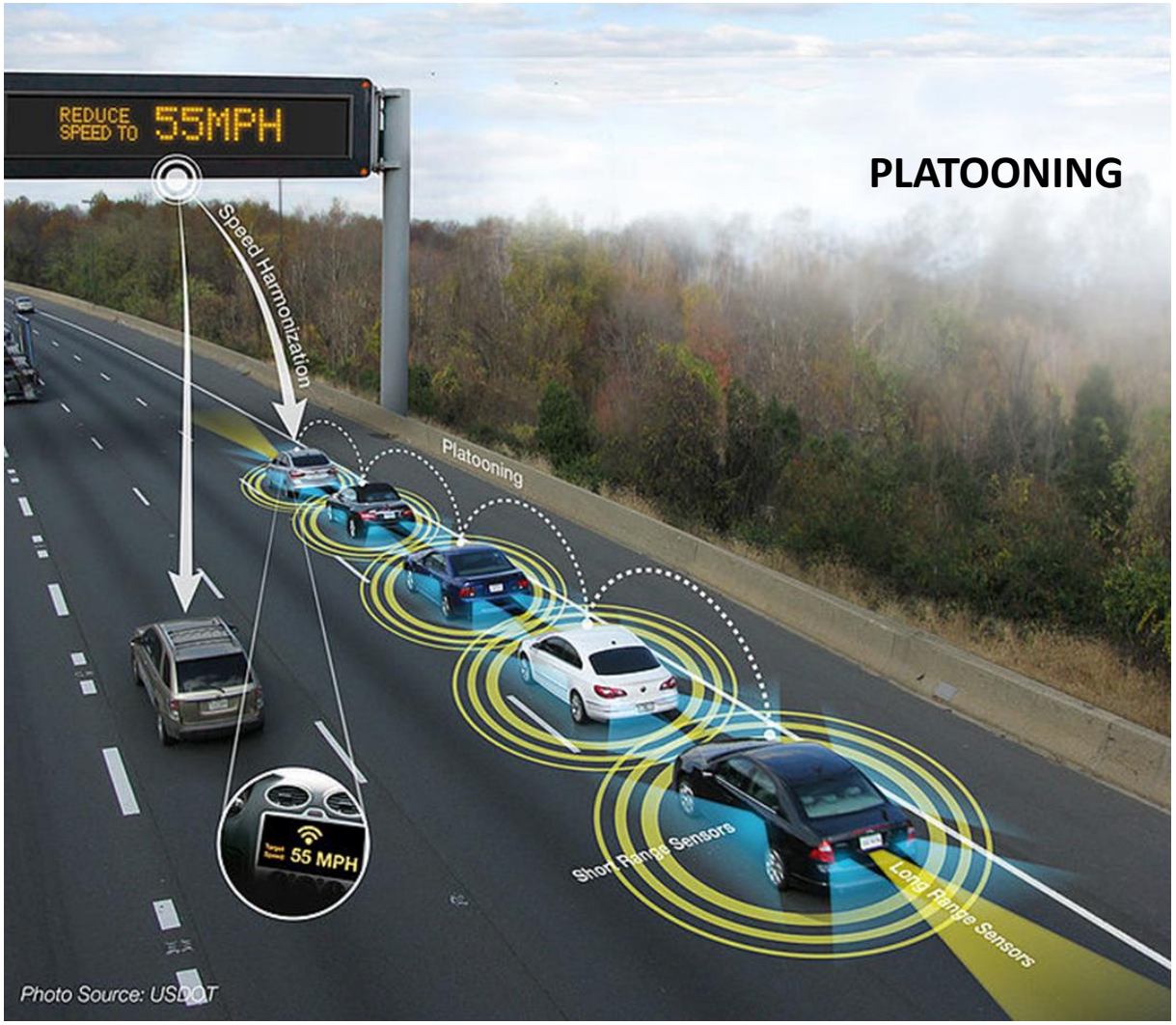


SENSORS EN VEHICLES – EXTERNS-



Source: Texas Instruments ADAS

COMUNICACIONS



ECONOMIA DE LES TIC

- How much would 5 GBs of storage have cost using 1995 technology?

1) $5.50
2) $55
3) $550
4) $5,500

El cost dels sensors
1$
0.1$
0,01$

EL COST MARGINAL!

EL MON EXPONENCIAL
EL MON DE L'ABUNDÀNCIA

INTEL

TRILLION SENSORS BY 2020-2022

QUALCOMM SWARM LAB AT UC BERKELEY

1000 RADIOS PER PERSON ON EARTH BY 2025, WITH TRILLIONS OF CONNECTED DEVICES TO LINK THE CYBER AND PHYSICAL/BIOLOGICAL WORLDS.

BOSCH SENSORY SWARMS

VISION FOR 7 TRILLION DEVICES CONSISTING OF SENSORY

FUNDED DEVELOPMENT GROUP

THIS VISION TRANSLATES TO 1000 SENSORS PER AVERAGE PERSON.

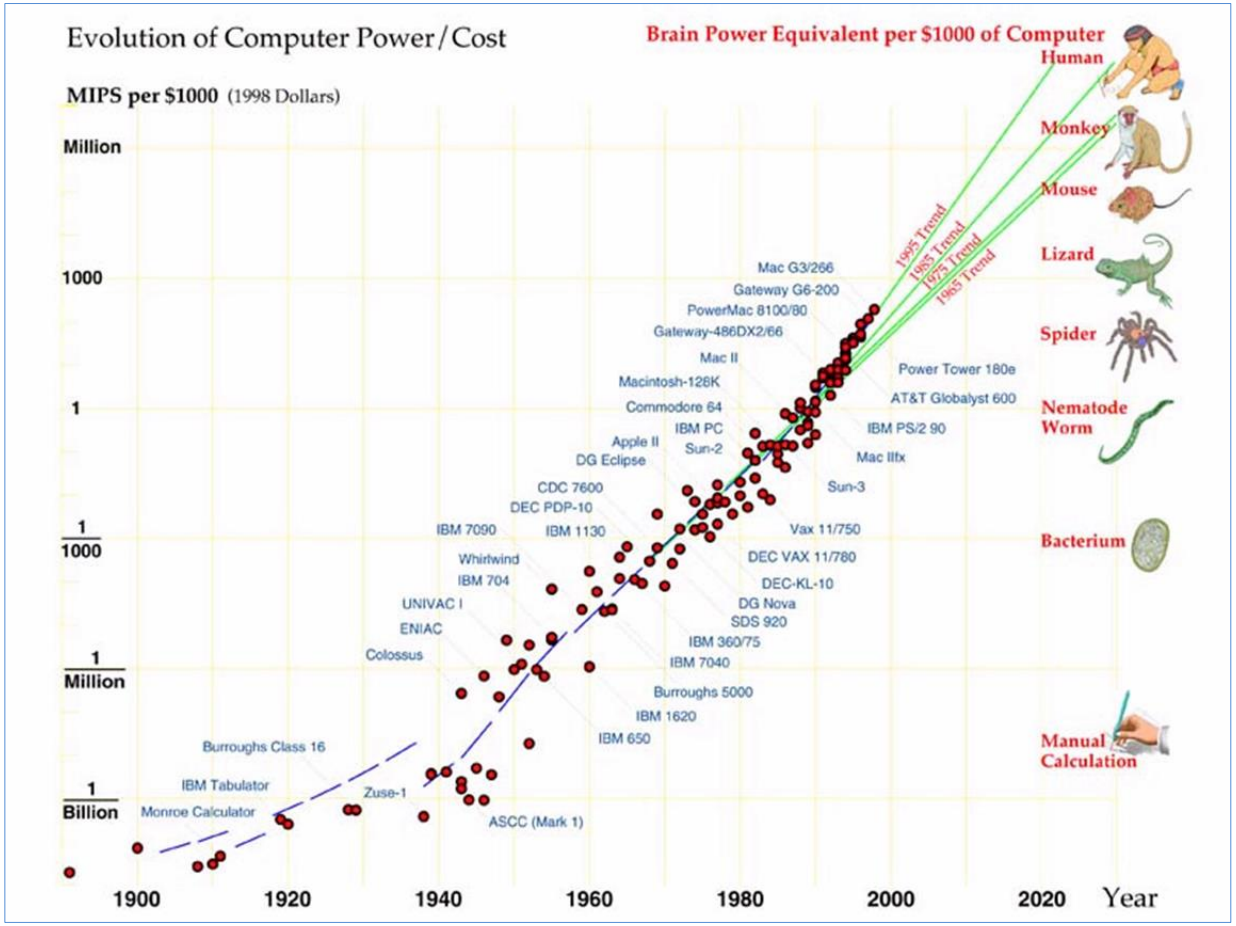
Advanced cars have close to 100 sensors.

Smart homes use 10s and 100s of sensors.

Smart phones use now up to 18 sensors.

.

LA TECNOLOGIA
EVOLUCIÓ



La intel·ligència no biològica continuarà creixent, la biològica es fixe.

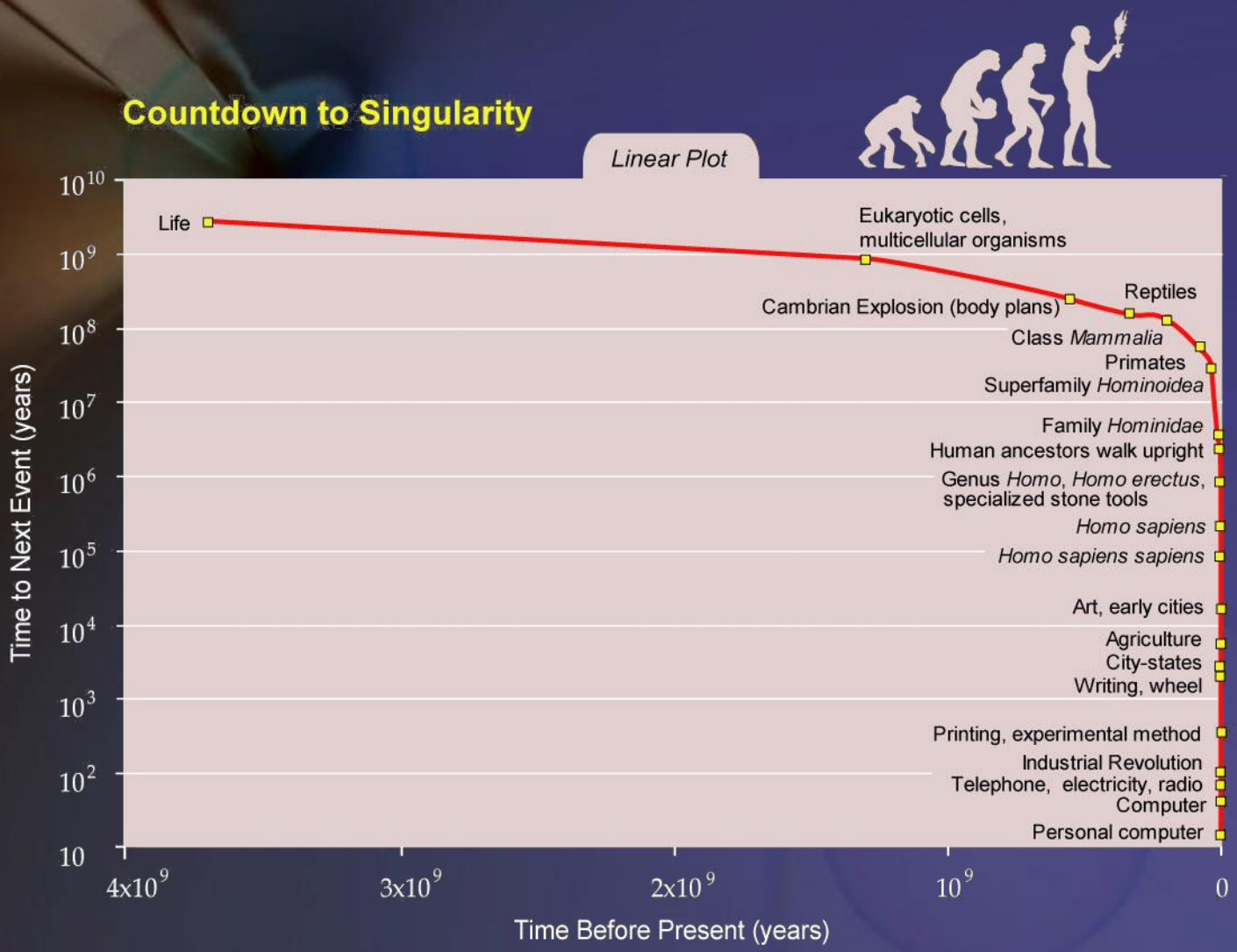
2029

$1,000 of computation = 1,000 times the human brain

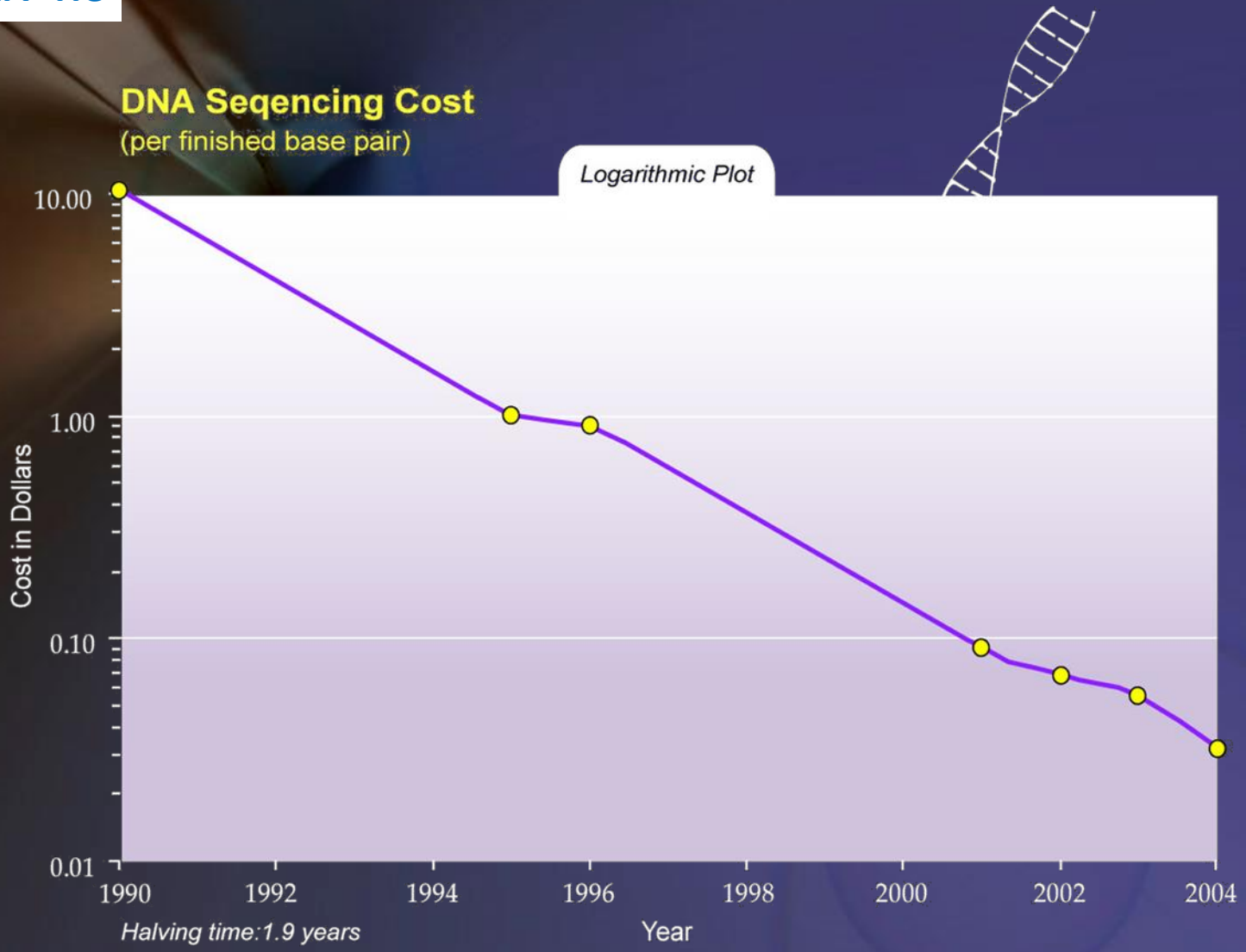
Computers pass the Turing test

Ray Kurzweil

EVOLUCIÓ


Countdown to Singularity
Linear Plot
Time to Next Event (years)
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
10^{5}
10^{4}
10^{3}
10^{2}
10
Life
Eukaryotic cells, multicellular organisms
Cambrian Explosion (body plans)
Reptiles
Class *Mammalia*
Primates
Superfamily *Hominoidea*
Family *Hominidae*
Human ancestors walk upright
Genus *Homo*, *Homo erectus*, specialized stone tools
Homo sapiens
Homo sapiens sapiens
Art, early cities
Agriculture
City-states
Writing, wheel
Printing, experimental method
Industrial Revolution
Telephone, electricity, radio
Computer
Personal computer
$4x10^9$
$3x10^9$
$2x10^9$
10^9
0
Time Before Present (years)

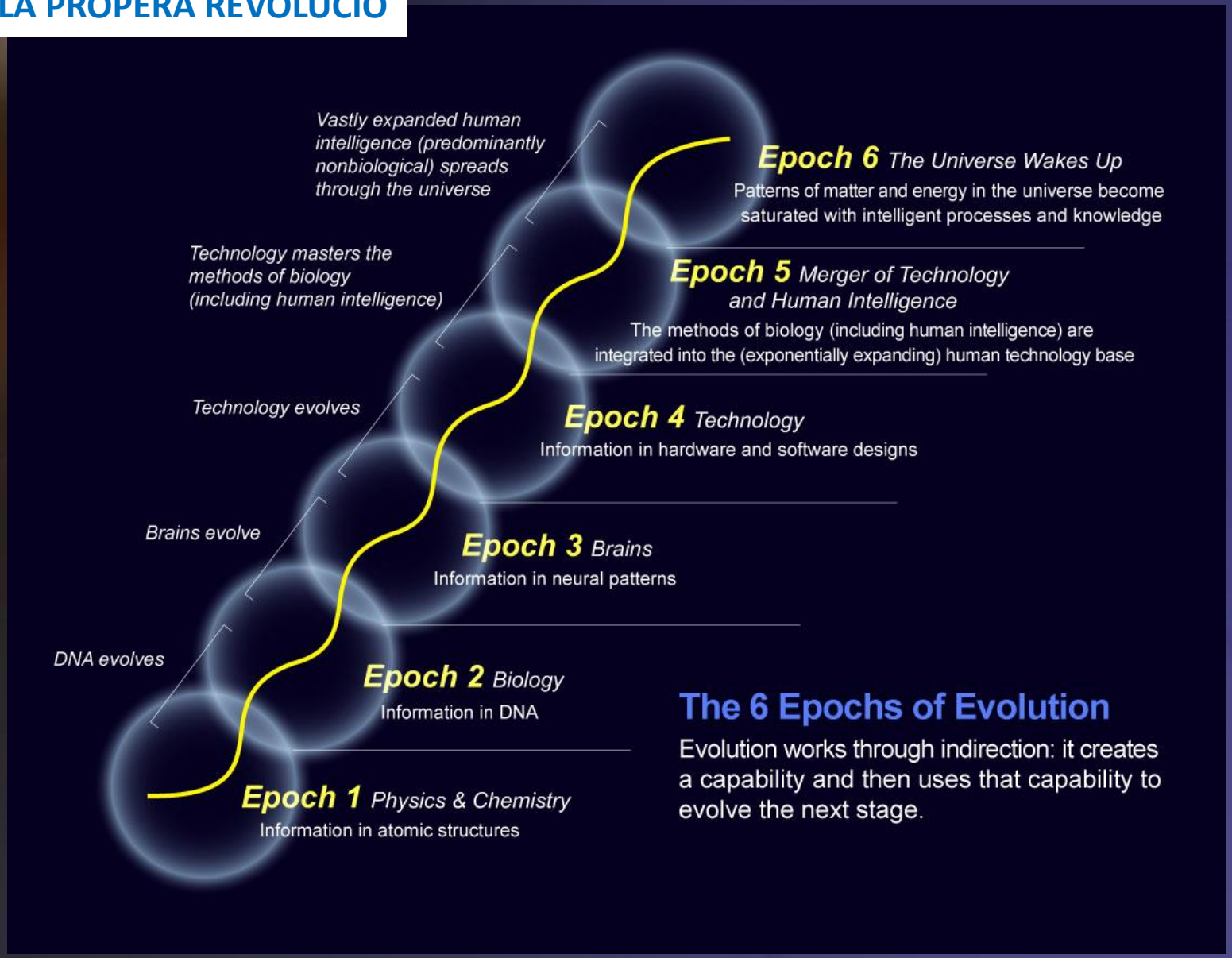
DNA+TIC



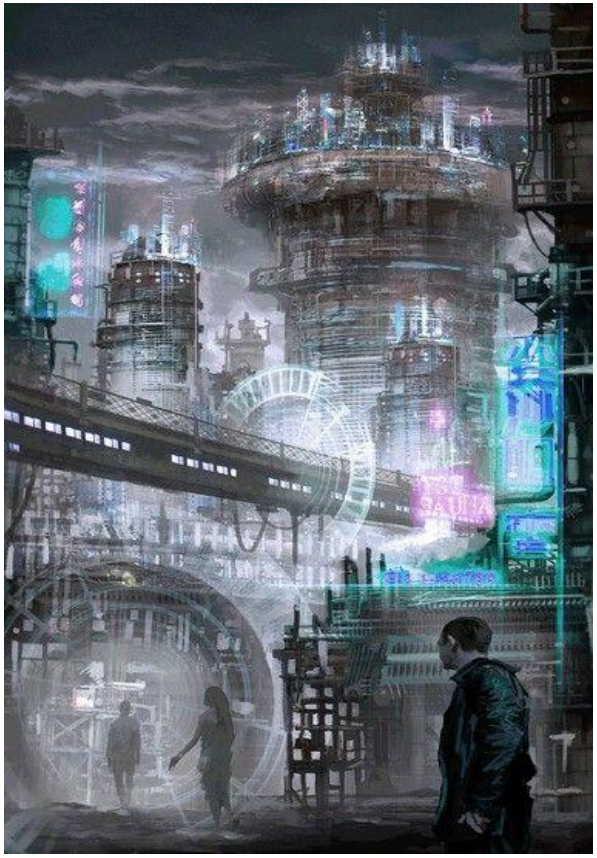
The Biotechnology revolution:

The intersection of biology with information technology

LA PROPERA REVOLUCIÓ



LA CIUTAT DEL FUTUR?



UNA VISIÓ MILLO!R

google

BARCELONA 2050!

VERDA

http://st-ar.nl/o-mighty-green-summary/

TIC