



**Escola Politécnica da USP**

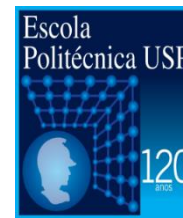
**PSI2617 – Inovação em Engenharia**

**Uma breve história da Ciência e Inovação**

**Aula 3 – Parte 2**

17 de Agosto de 2017

Leopoldo.Yoshioka@usp.br



## Aula 3

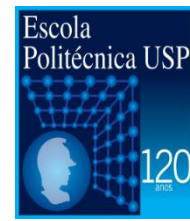
T1 Espaço de  
coworking e  
Inovação

Parte 1  
Contextualização

**Parte 2  
Como  
aconteceu?**

**Parte 3  
A Evolução**

Reflexão



## Conteúdo

**Parte I  
Onde  
Estamos?**

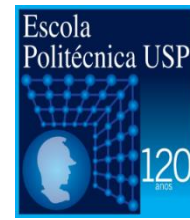
Parte II  
Como  
aconteceu?

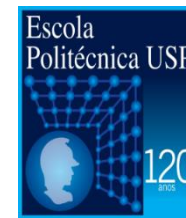
Parte III  
Método  
Científico

Reflexão

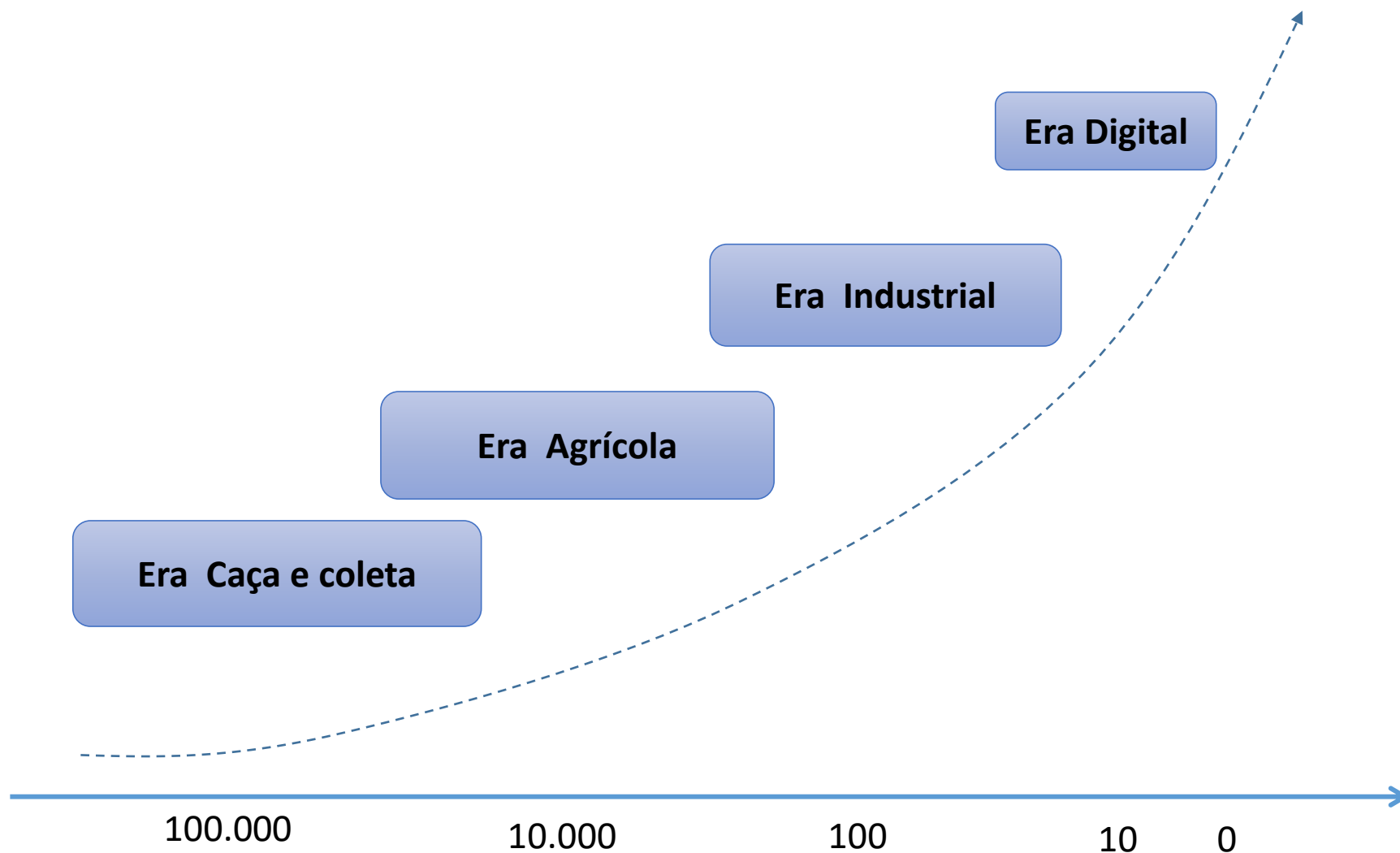


Em qual era estamos ?



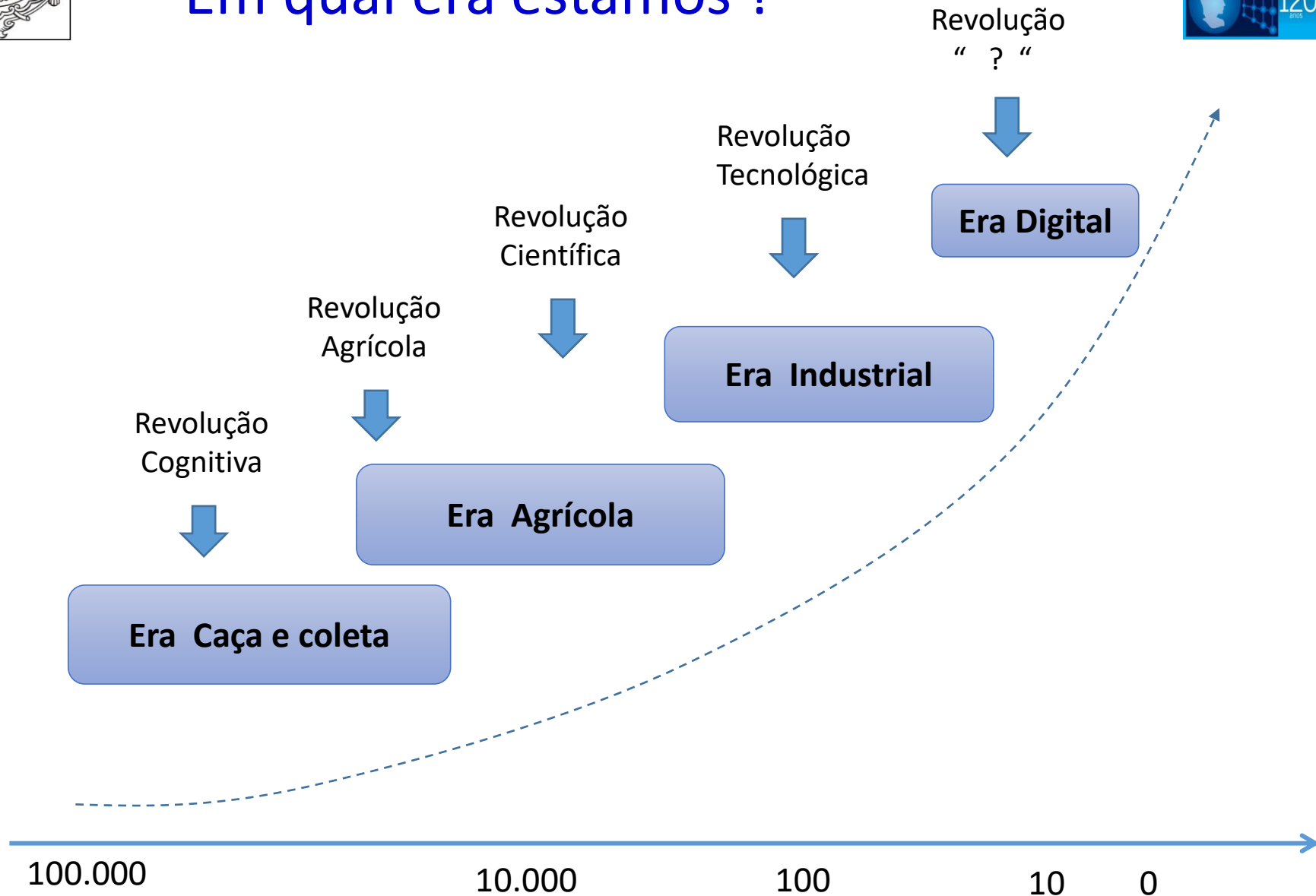


# Em qual era estamos ?





# Em qual era estamos ?



UNIVESP

Hominização

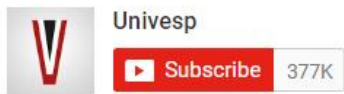
5 Milhões de anos 1,6 Milhões de anos 200 Mil anos 170 Mil anos 50 mil anos

Homo Habilis Homo Erectus Neanderthalensis Homo Sapiens Cro-Magnon (homem contemporâneo)

- Ferramentas de pedra e de osso.
- Cérebro mais desenvolvido.
- Ferramentas mais elaboradas.
- Usavam fogo de forma controlada.
- Viviam em grupos.
- Expansão craniana para aumentar a coesão de uma vida grupal com relações sociais e ferramentas mais tecnológicas.
- Raciocínio abstrato.
- Linguagem.
- Introspecção.
- Resolução de problemas.
- Comida cozida.
- Crenças

10:43 / 18:34

## Sociedade, Tecnologia e Inovação - Aula 1 - Criatividade e evolução



30,432 views

+ Add to Share ... More

354 13

UNIVESP

## Exemplos de Inovação centrada no ser humano

Modelos de negócios Saúde Empreendedorismo

Governos

Impacto Social

Bancos

softwares

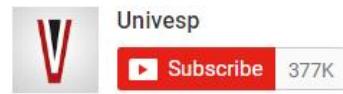
Serviços (experiências)

Educação

APLICAÇÕES

3:44 / 16:56

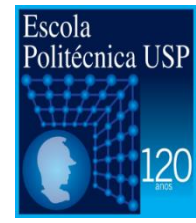
## Sociedade, Tecnologia e Inovação - Aula 2 - Inovação e criatividade



11,594 views

+ Add to Share ... More

112 1



**Há muito tempo** ( ~ 13 bilhões anos)

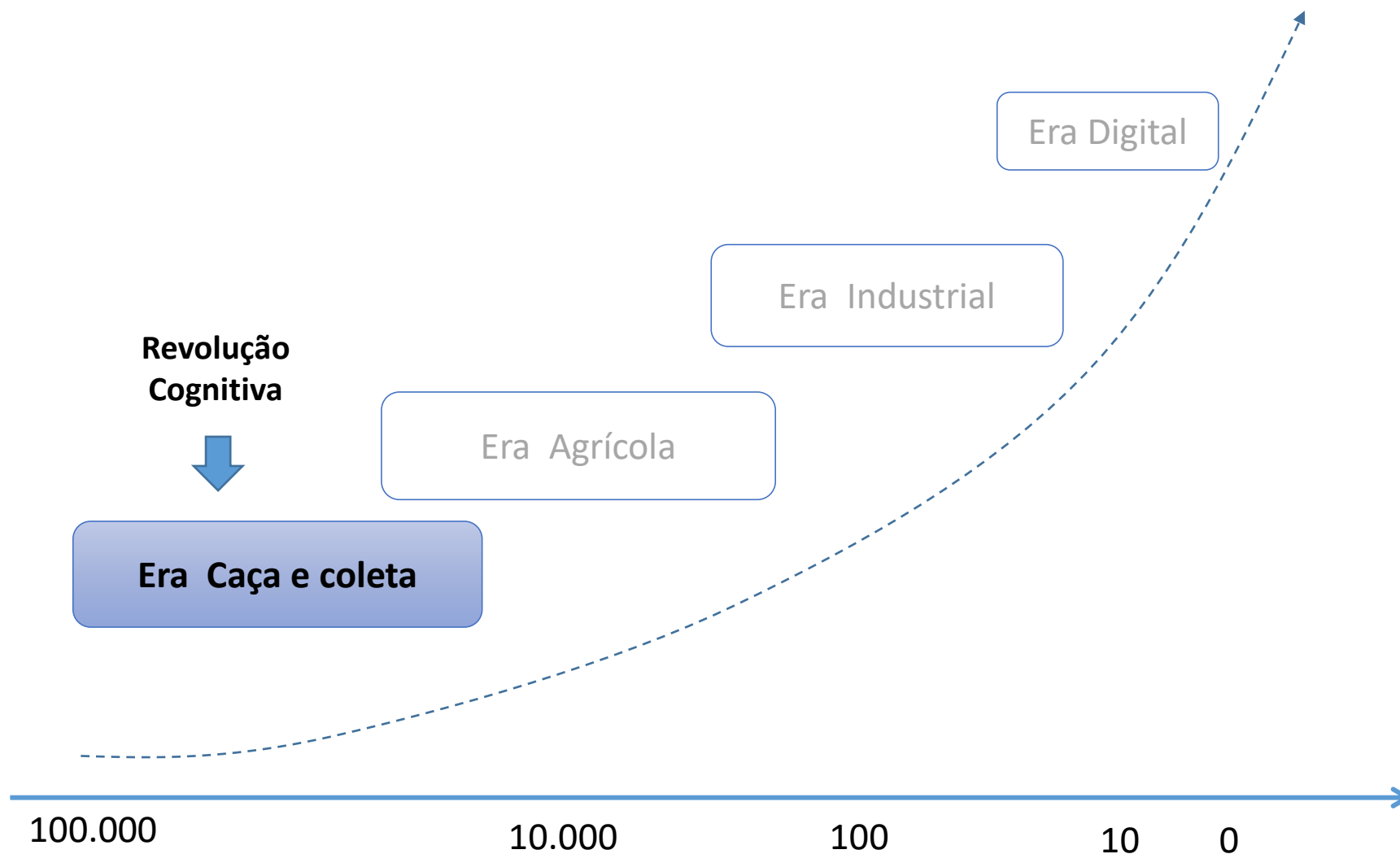






**Muito tempo depois ....** (2 milhões de anos)



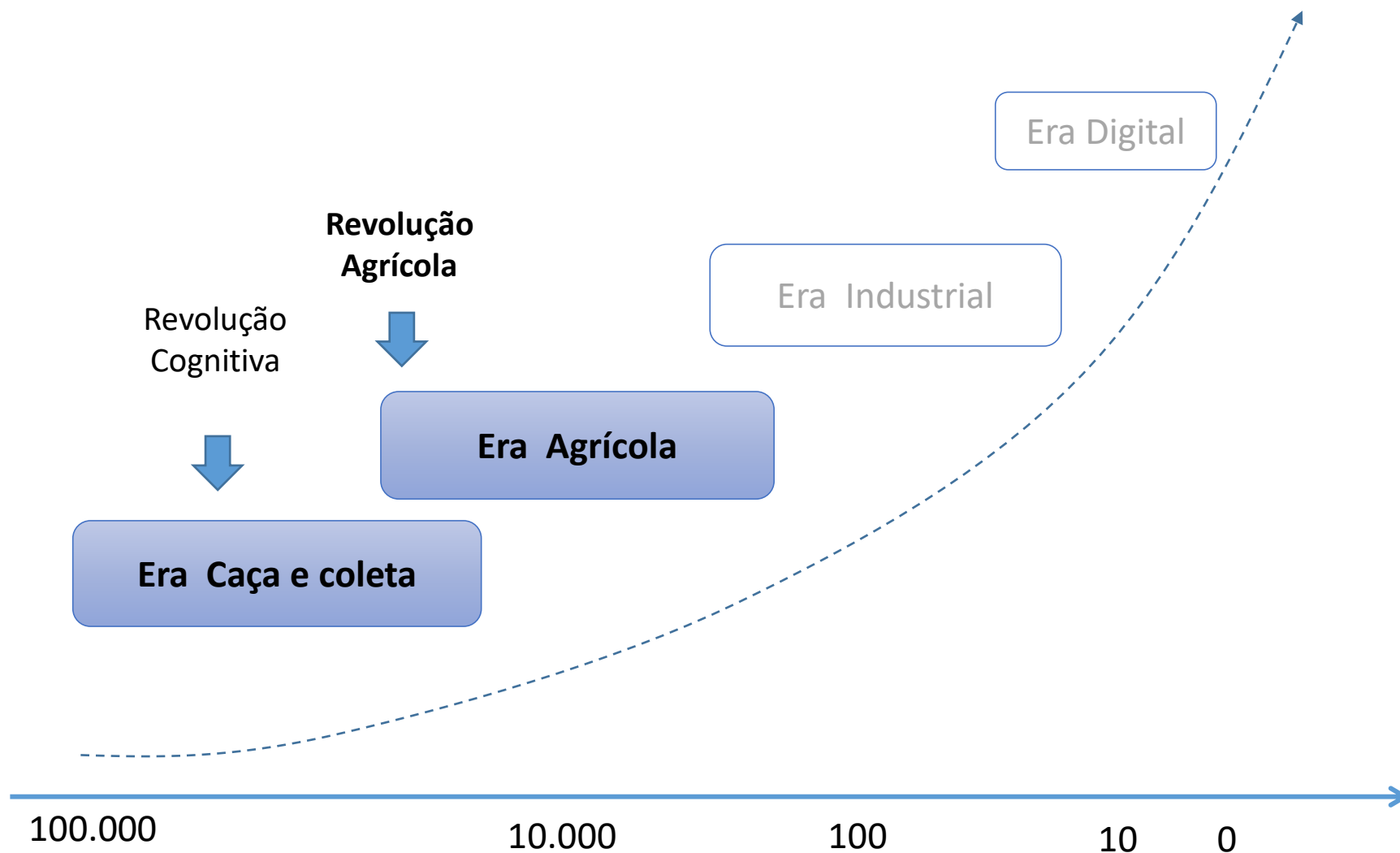
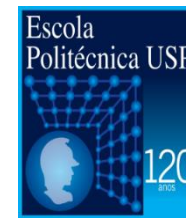




## Revolução Cognitiva - 70 mil anos



(coletar, caçar, queimar, comunicar, relacionar, cooperar, trocar)







## Revolução Agrícola - 14 mil anos



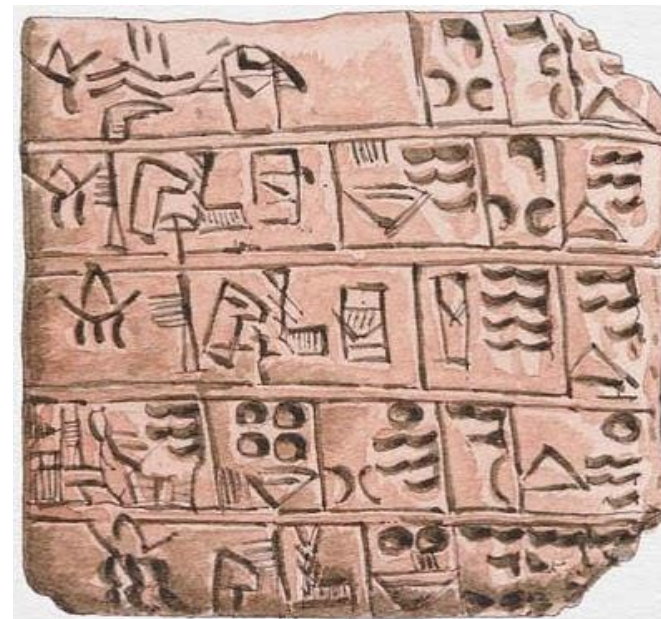
(semear, cuidar, colher, armazenar, trocar, organizar, acreditar)

(controle: plantas, animais domésticos, ambiente)



**Cidades - 10 mil anos**

**Escrita - 5 mil anos**



(construir, reformar, ampliar, comprar, vender, emprestar, contar, calcular, medir, estimar, prever, legislar, coibir, punir, defender, atacar)

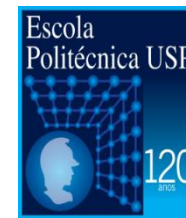
Engenheiro

Contador

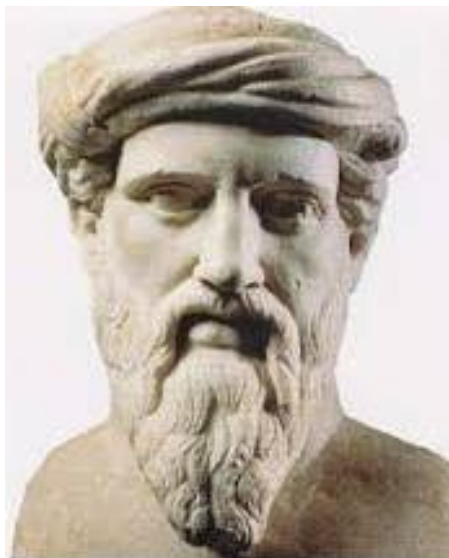
Advogado

Rei

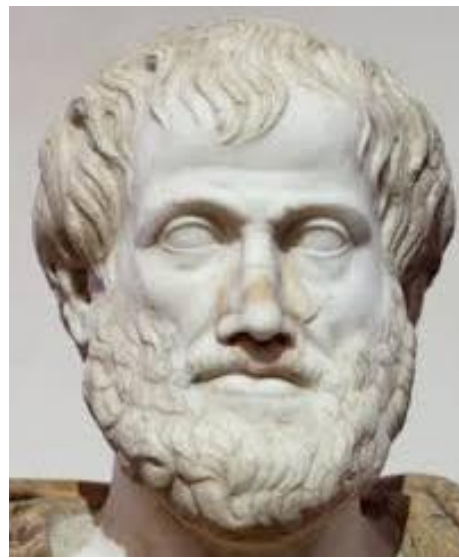
Sacerdote



## Filosofia e Matemática - 300 a.C.



Pitágoras

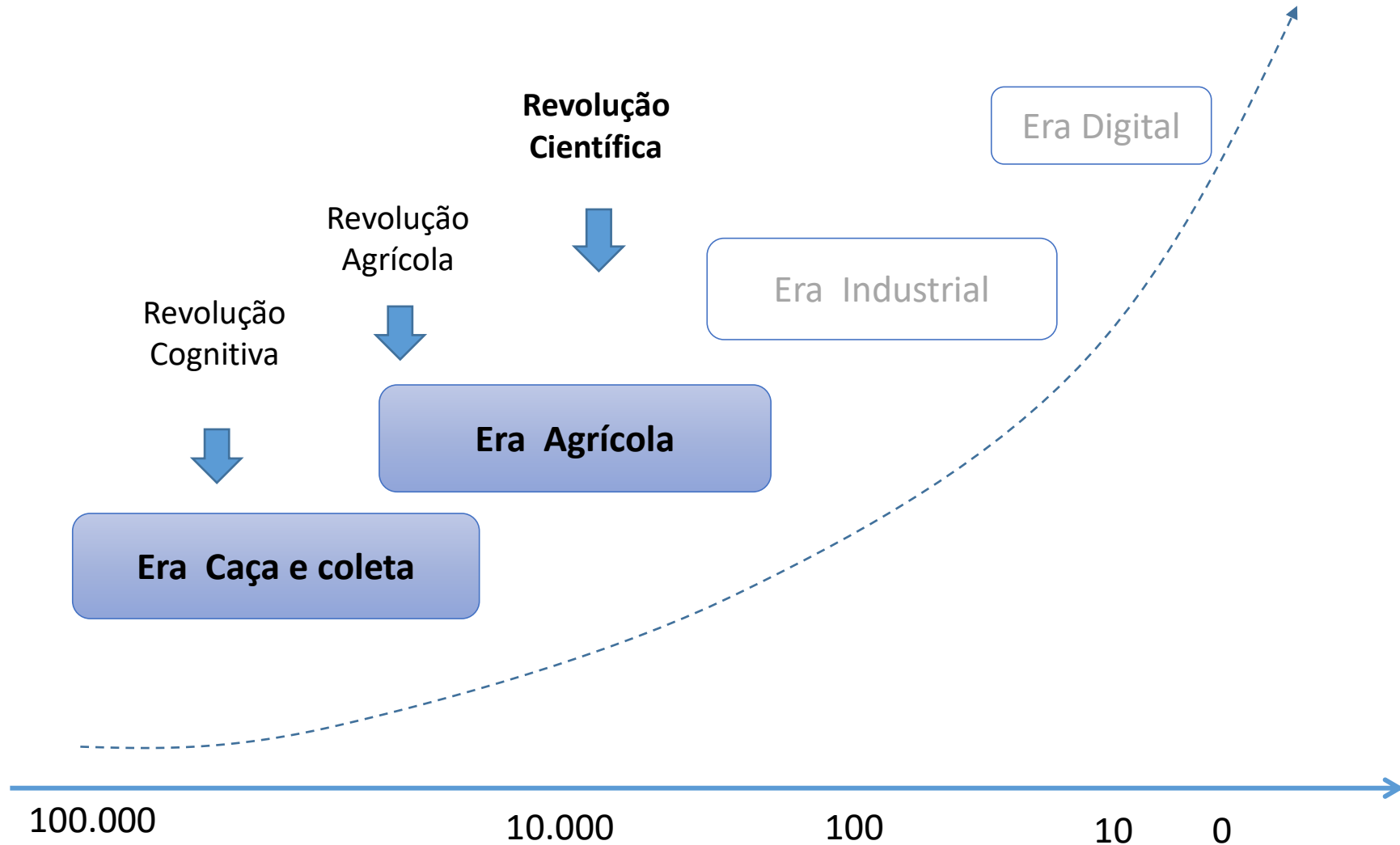
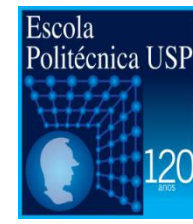


Aristóteles



Euclides



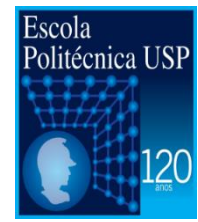






QUIZ # 6

Reconhece essas pessoas?



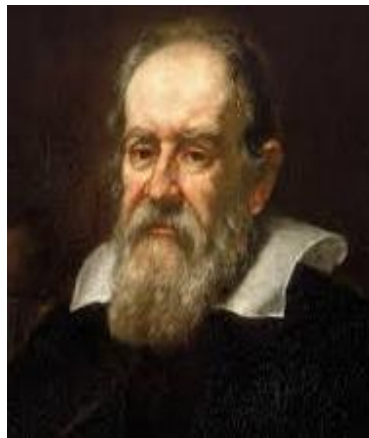
1.



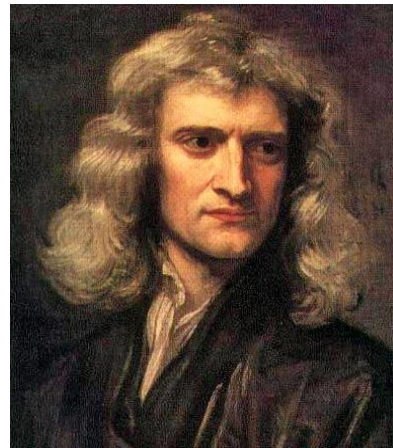
2.



3.



4..



5.



6.



## Revolução Científica - Mecânica



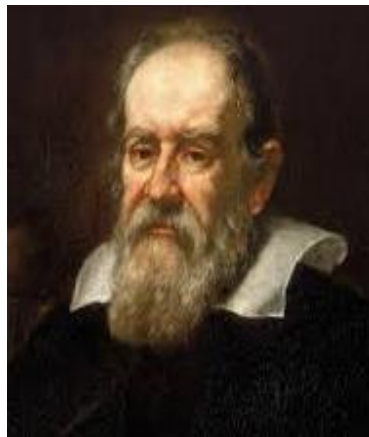
**1. Nicolas Copernicus**



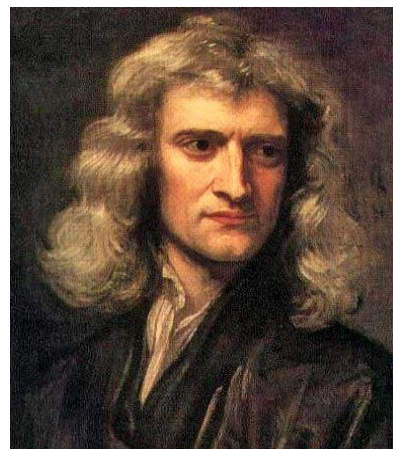
**2. Tycho Brahe**



**3. Johannes Kepler**



**4. Galileo Galilei**



**5. Isaac Newton**



**6. Gottfried Leibniz**





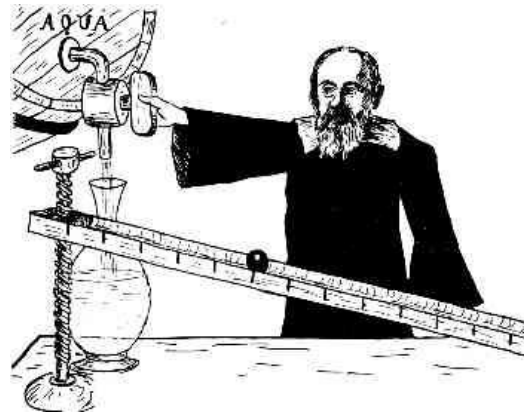
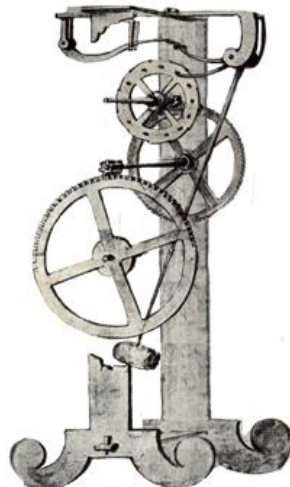
# Revolução Científica - Óptica



(vidro, espelho)



# Revolução Científica - Relógios



- Verão: 82 min
- Inverno: 38 min



## Revolução Científica 2/2 - Elétron



**1. Gauss**



**2. Ampere**



**3. Faraday**



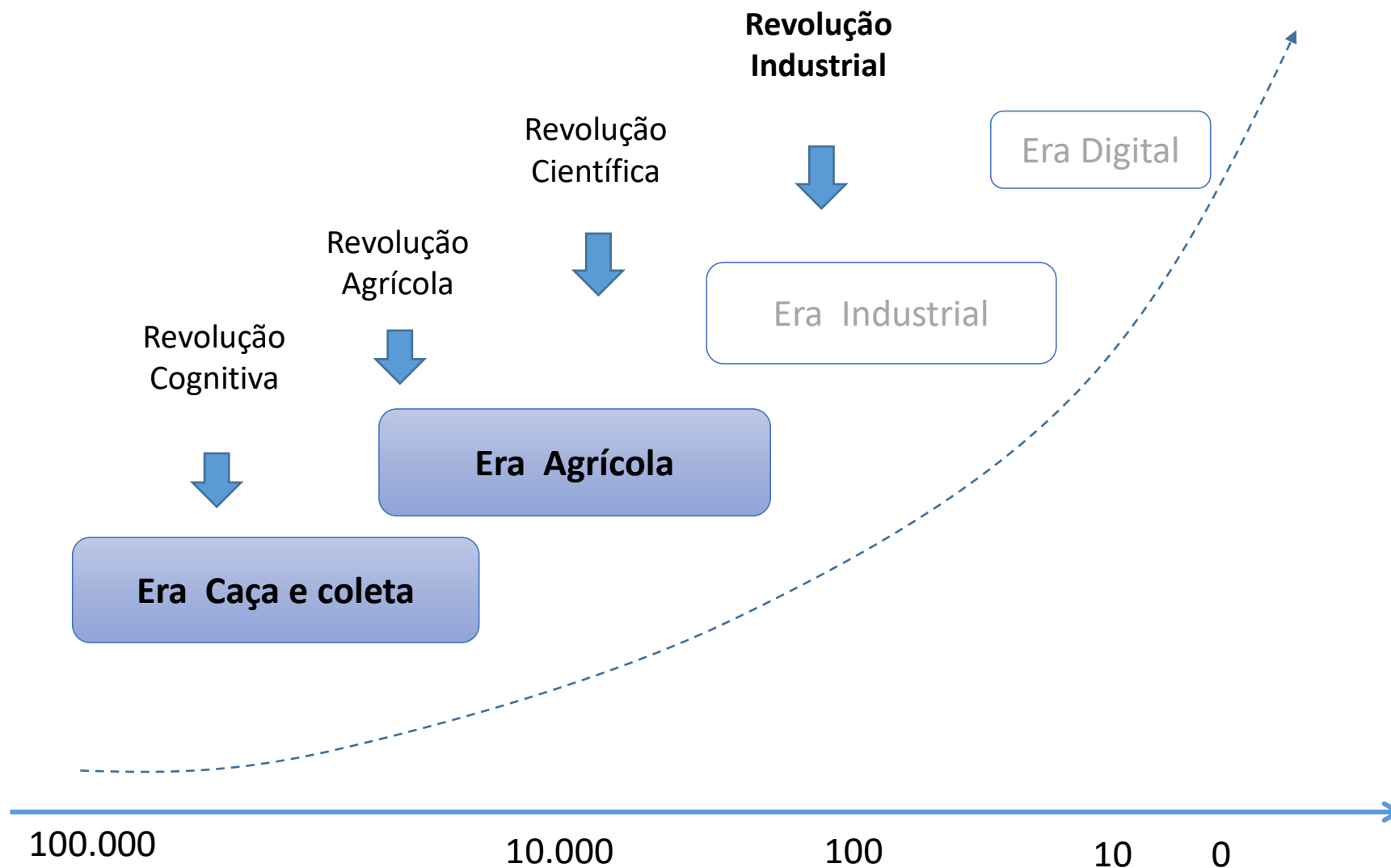
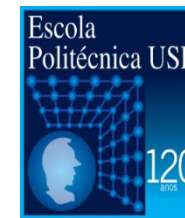
**1. Maxwell**



**2. Hertz**



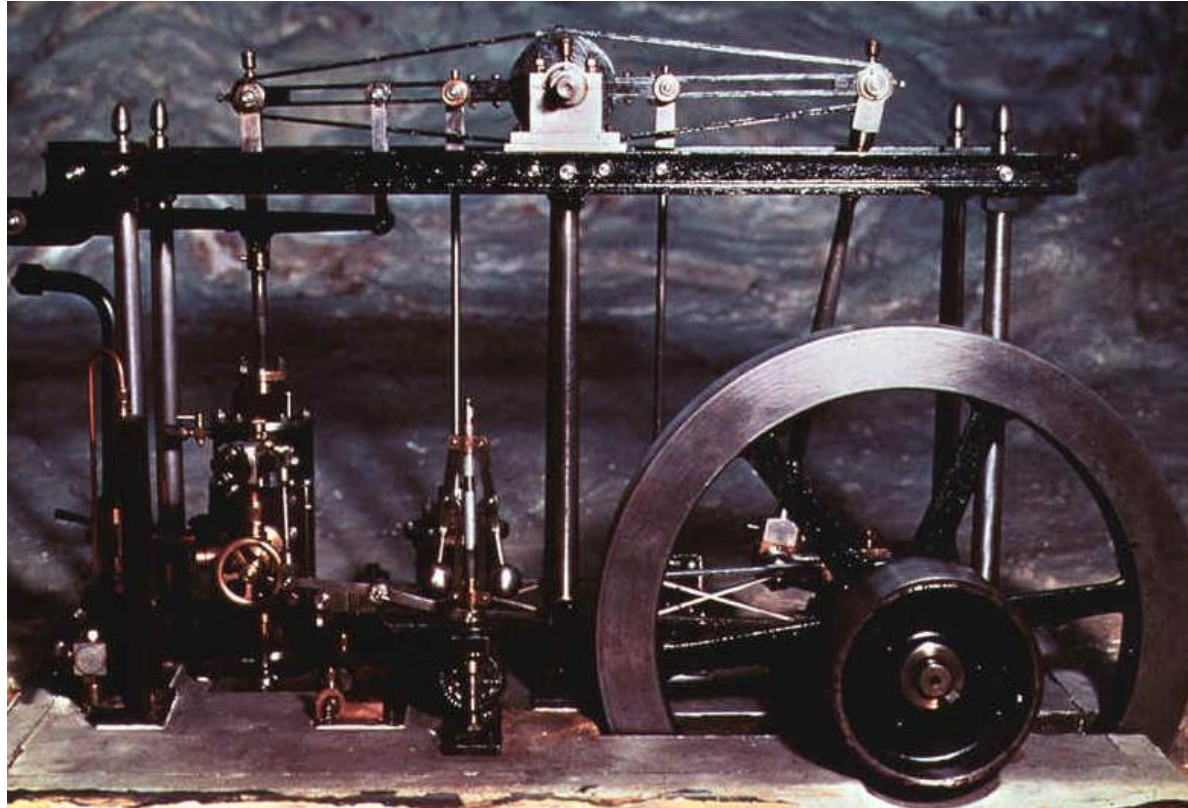
**3. Fourier**







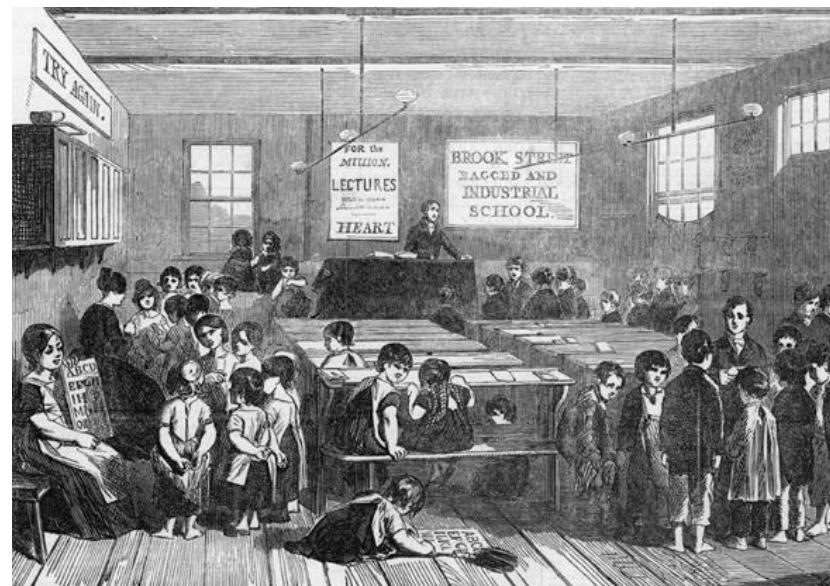
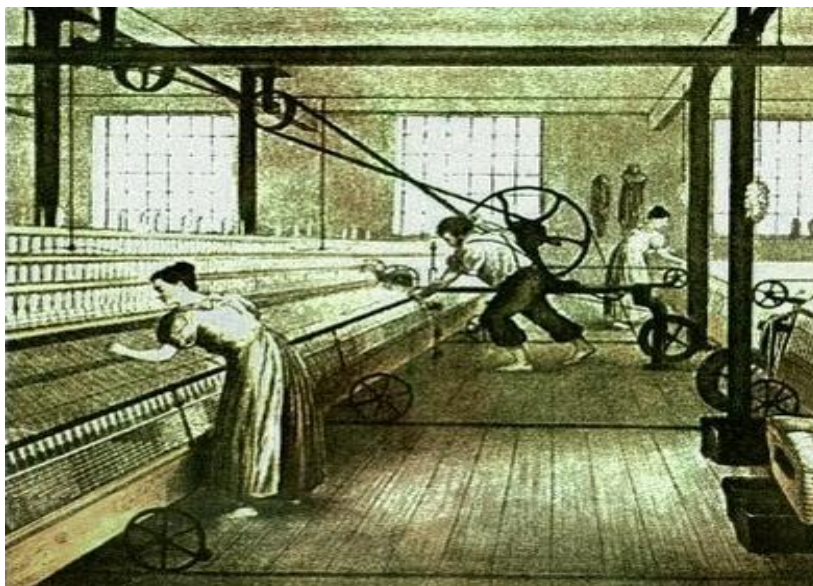
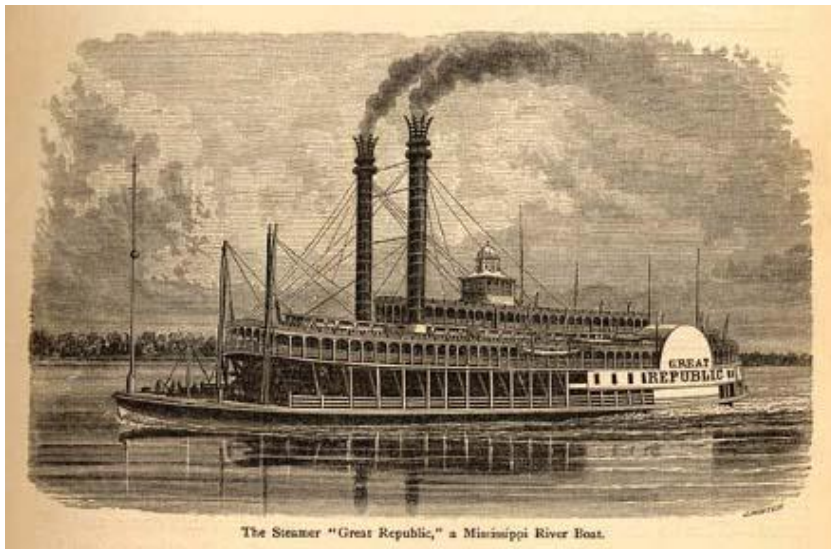
## Revolução Industrial - Máquina a Vapor



(chaleira ficou fervendo por mais de 1000 anos !!)



## Revolução Industrial - Aumenta a capacidade



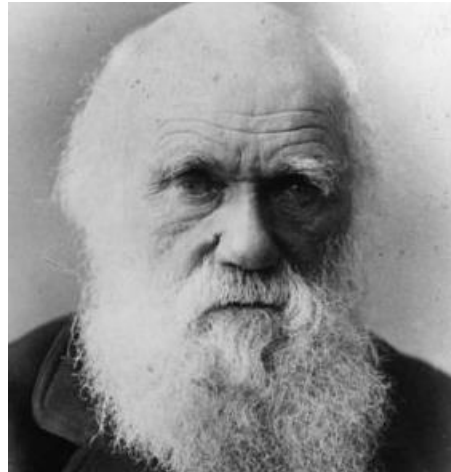




## Revolução da Vida



**Jean-Baptiste Lamarck**



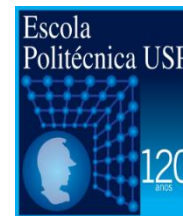
**Charles Darwin**



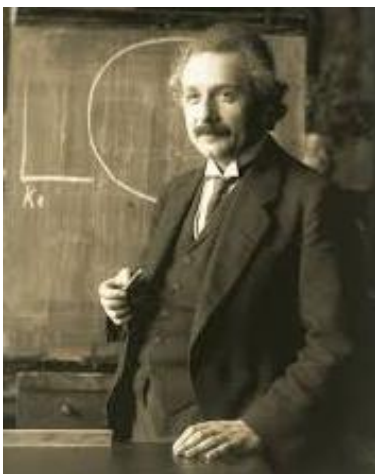
**Gregor Mendel**



## Revolução do Átomo (início sec. XX)



**Max Planck**



**Albert Einstein**



**Ludwig Boltzmann**



**Ernest Rutherford**



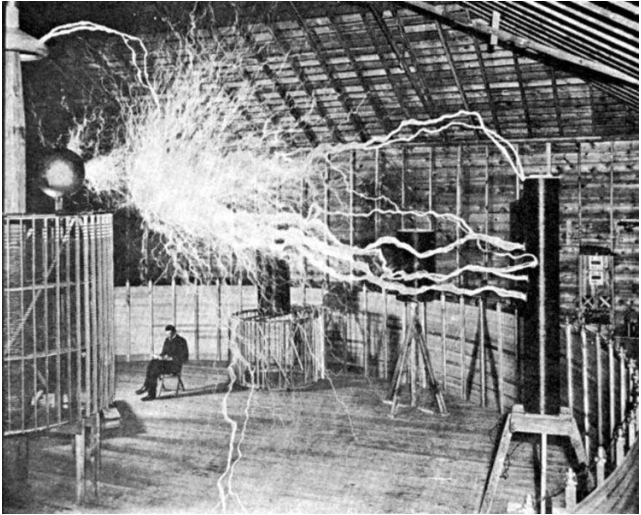
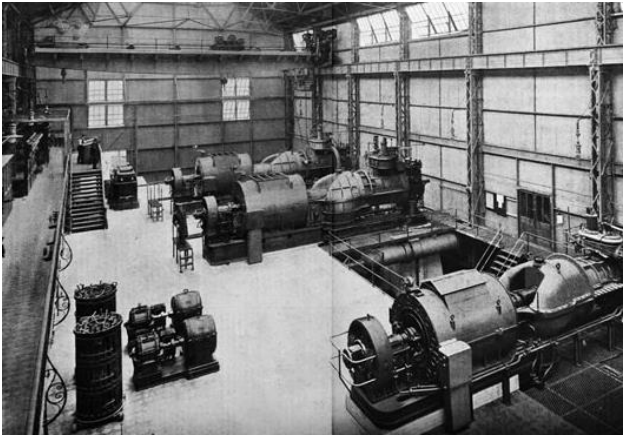
**Werner Heisenberg**



**Erving Schrodinger**



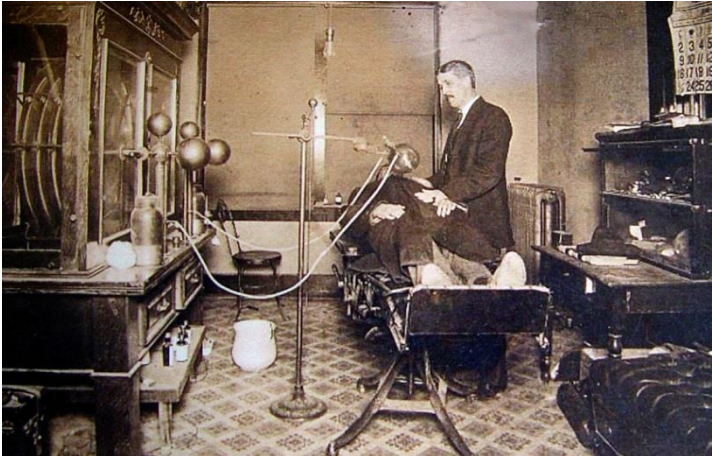
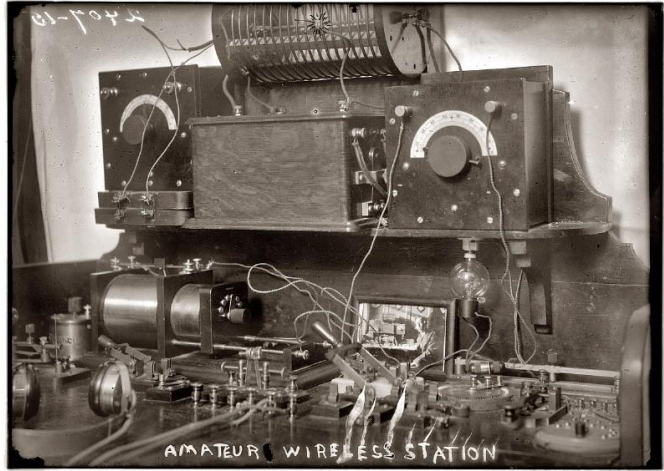
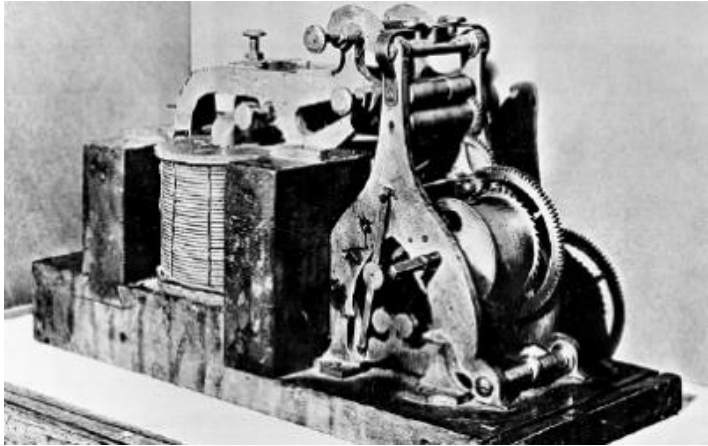
# Revolução da Eletricidade (1/2)

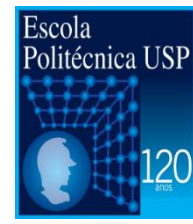




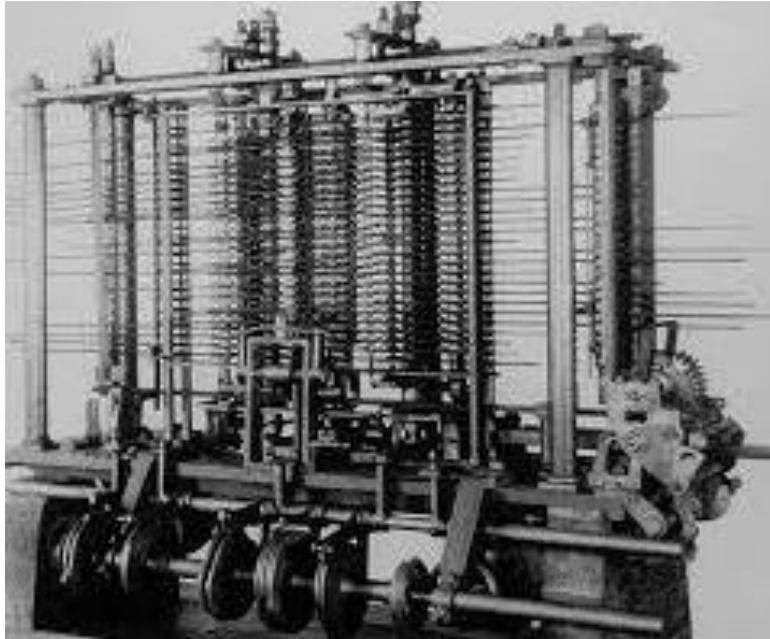


# Revolução da Eletricidade (2/2)

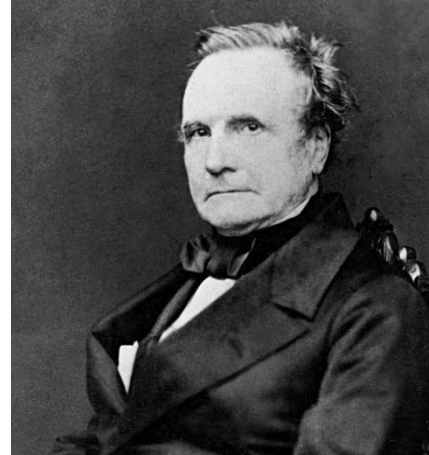




**Voltando um pouco no tempo ....**



**Máquina Diferencial  
(1847)**



**Charles Babbage**



**Ada Lovelace**



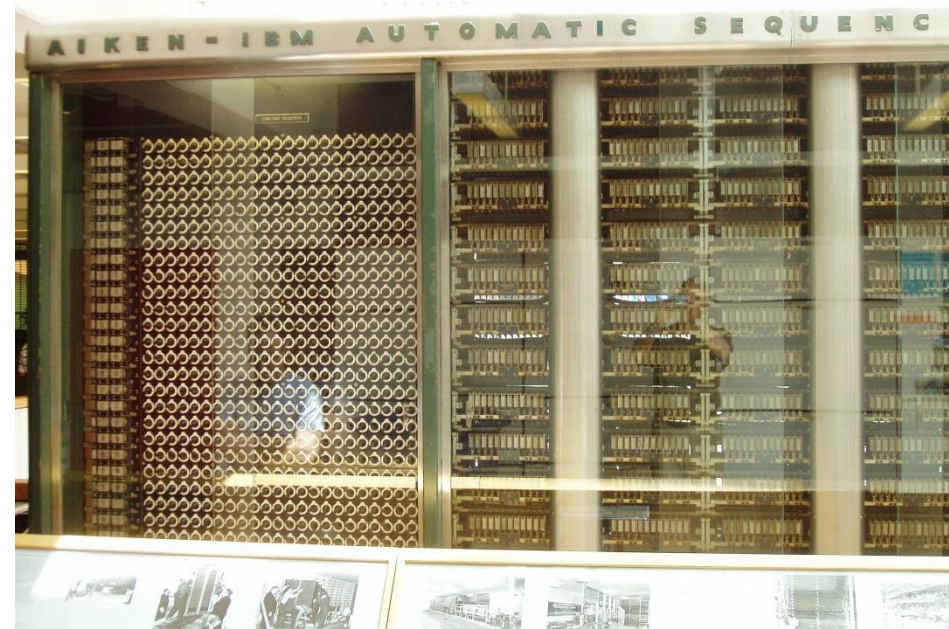


# O Computador



Electronic Numerical Integrator And Computer

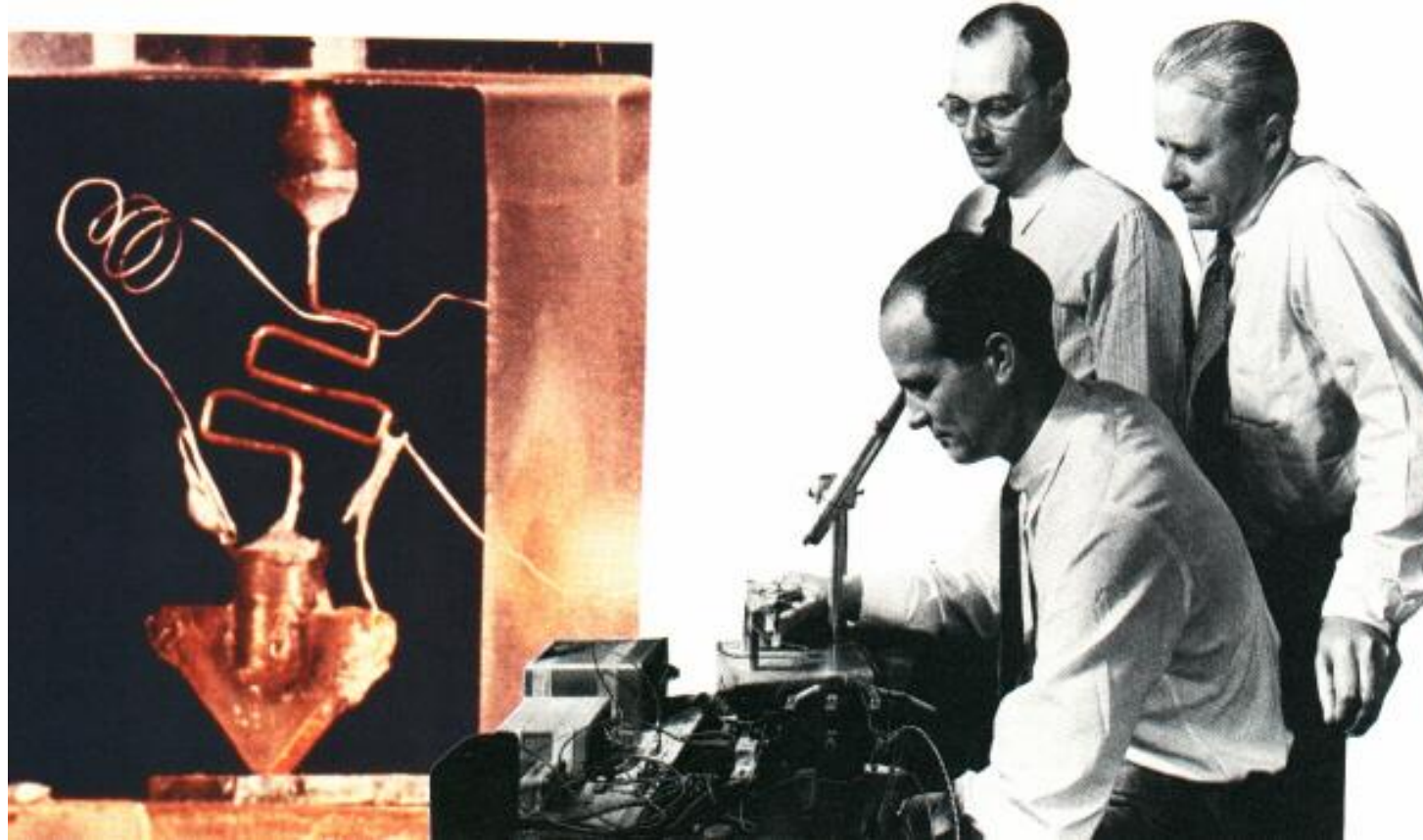
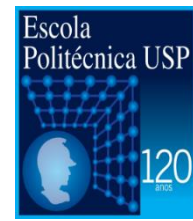
**ENIAC (1944)**  
**Univ. Pennsylvania**



**Mark I (1944)**  
**Harvard (IBM)**



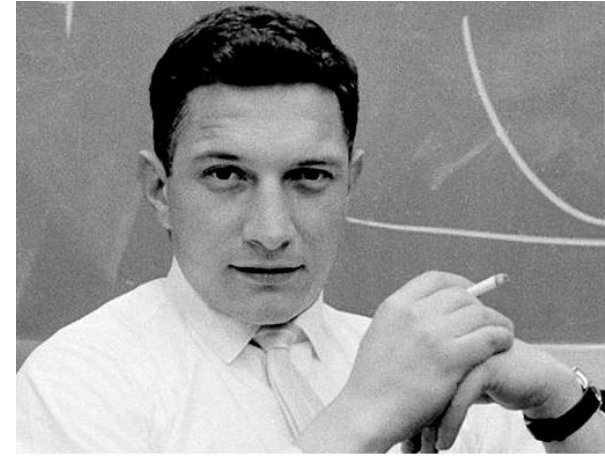
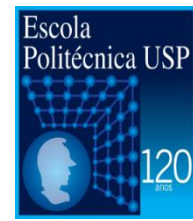
## Revolução do Silício (´50) - Transistor



**Transistor (1947) ATT – Bell Labs  
John Bardeen, Willian Shockley, Walter Brattain**



## Revolução do Silício (´60) – Circuitos Integrados



**FAIRCHILD**  
SEMICONDUCTOR®







## Enquanto isso ....



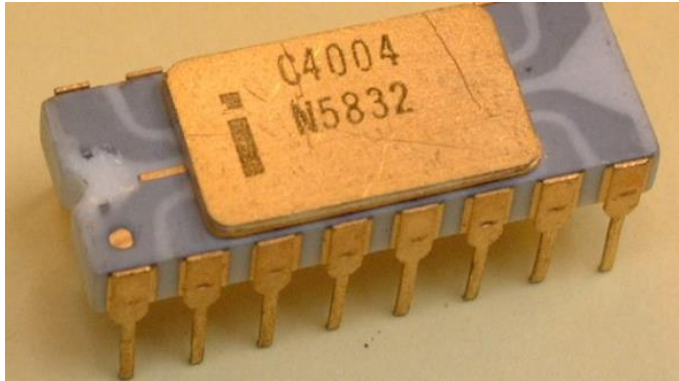
**Yuri Gagarin (12 Abril 1961)**



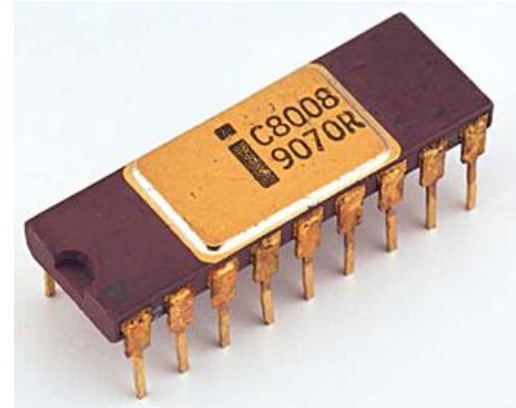
**Apolo 11 (20 de julho 1969)**



## Chega o Microprocessador ('70)



**Intel – 4004 (1971)**



**Intel – 8008 (1972)**



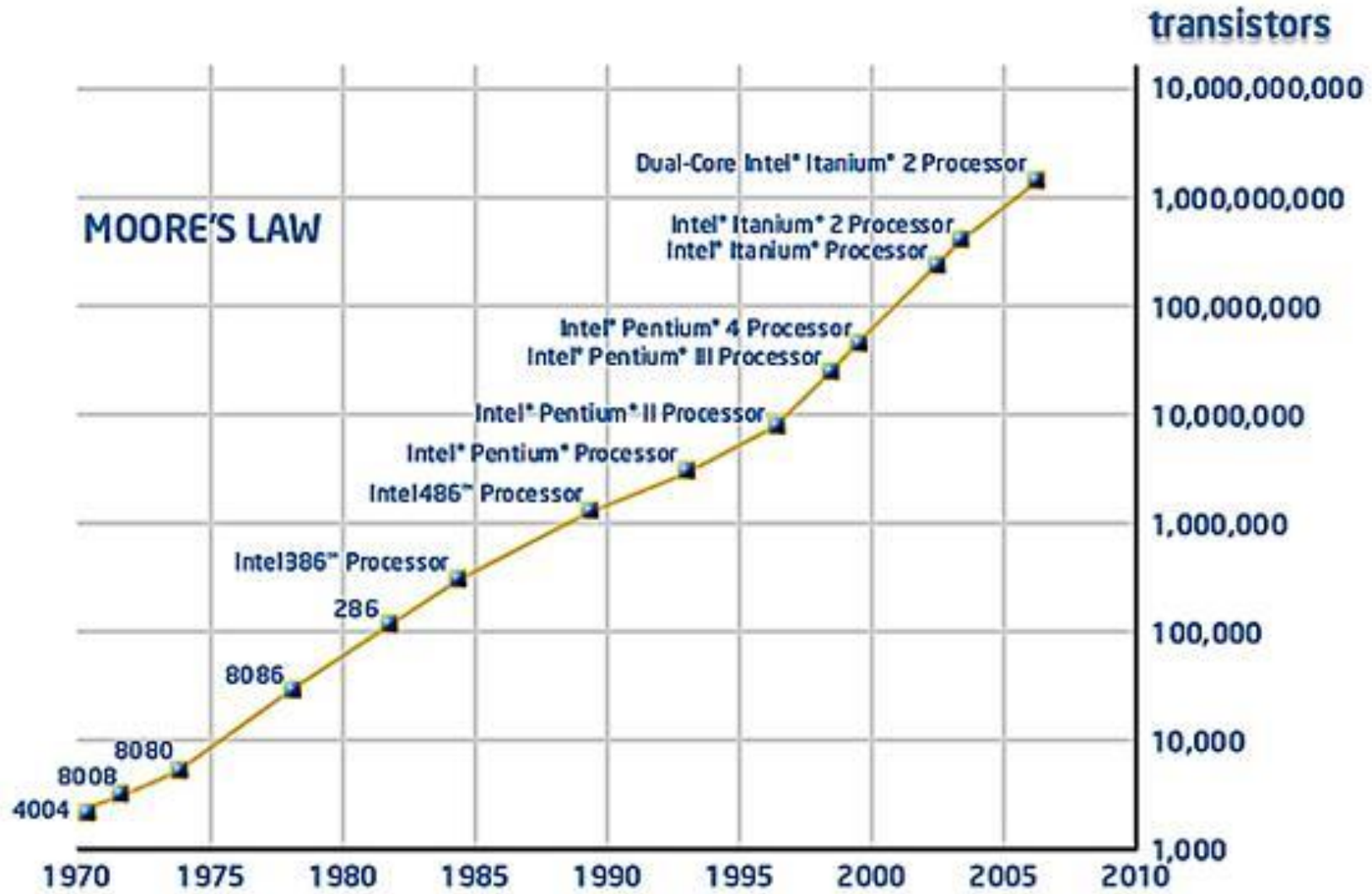
**Intel 8080 (1974)**



**Intel 8086 (1976)**



# Revolução do Silício Lei de Moore



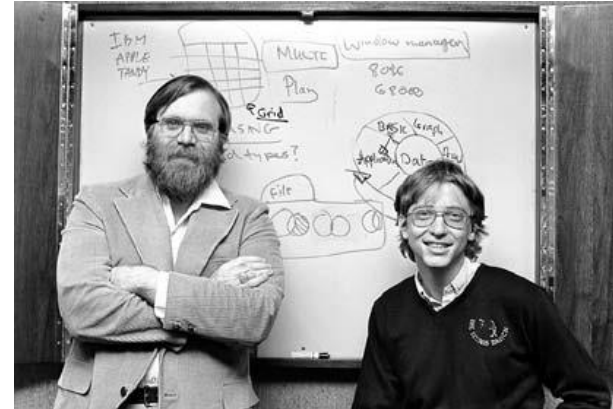




## Revolução dos Microcomputadores ('74 ~ )



**Altair 8800 (1974)**



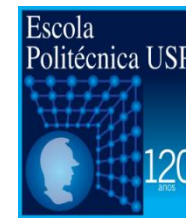
**Paul Allen & Bill Gates  
(Microsoft, 1975)**



**Aple I (1976)**



**Steve Jobs & S. Wosniak**



## World Wide Web ( ' 90 ~ )



**Microcomputador NeXT  
Utilizado pelo Tim Berners-  
Lee no CERN (1989)**

### World Wide Web

The WorldWideWeb (W3) is a wide-area [hypermedia](#) information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [Mailing lists](#) , [Policy](#) , November's [W3 news](#) , [Frequently Asked Questions](#) .

#### [What's out there?](#)

Pointers to the world's online information, [subjects](#) , [W3 servers](#), etc.

#### [Help](#)

on the browser you are using

#### [Software Products](#)

A list of W3 project components and their current state. (e.g. [Line Mode](#) , [X11 Viola](#) , [NeXTStep](#) , [Servers](#) , [Tools](#) , [Mail robot](#) , [Library](#) )

#### [Technical](#)

Details of protocols, formats, program internals etc

#### [Bibliography](#)

Paper documentation on W3 and references.

#### [People](#)

A list of some people involved in the project.

#### [History](#)

A summary of the history of the project.

#### [How can I help ?](#)

If you would like to support the web..

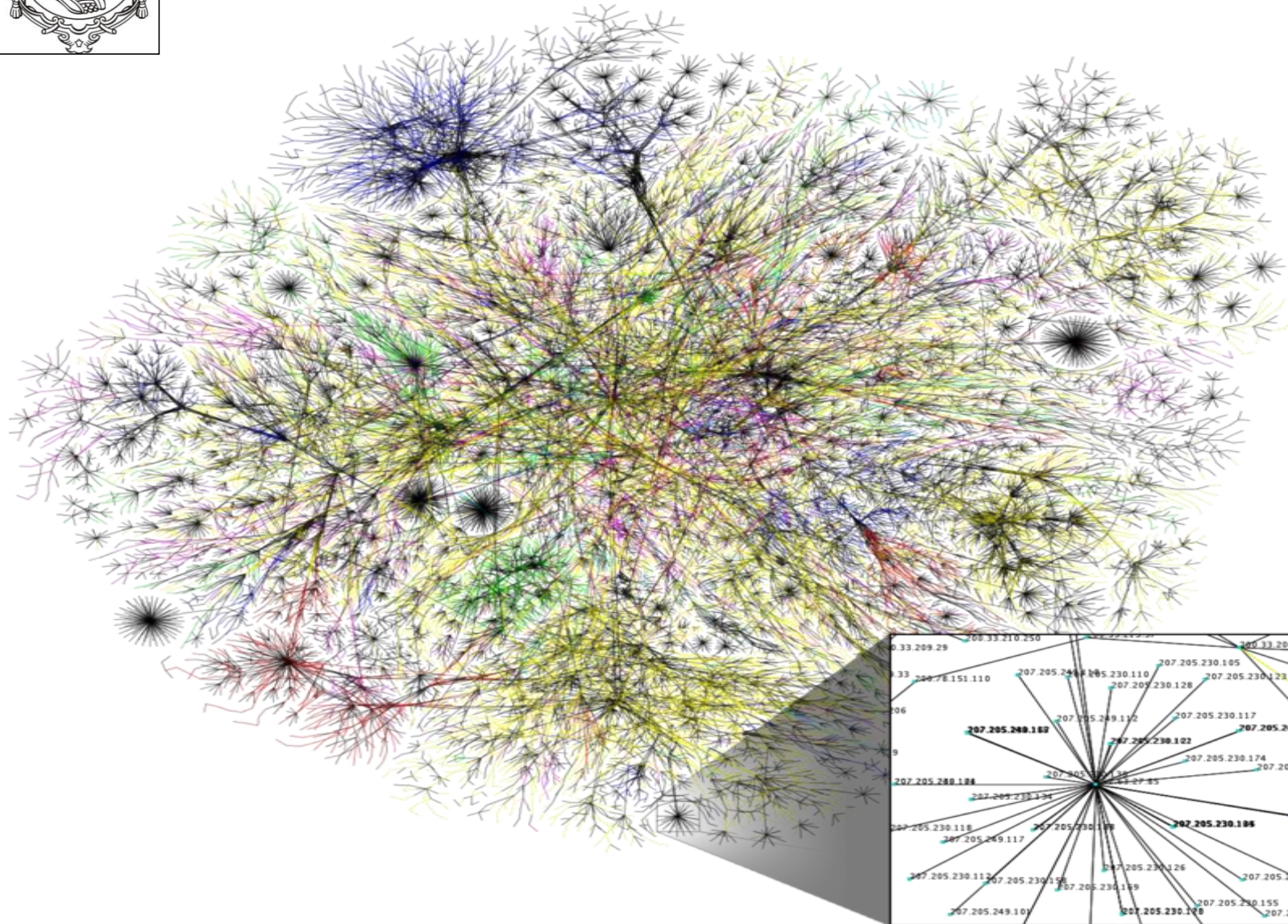
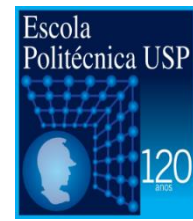
#### [Getting code](#)

Getting the code by [anonymous FTP](#) , etc.





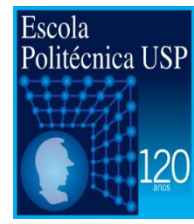
## Era da Internet ( '90 ~ )



Partial map of the Internet based on the January 15, 2005 data found on [opte.org](http://opte.org).



# Era dos Dispositivos Móveis ( 2000 ~ )







# Era dos APPs ( 2007 ~ )

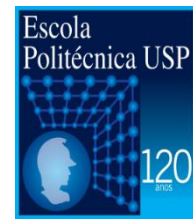


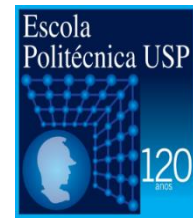




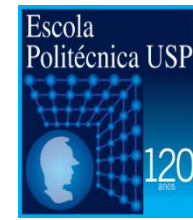
QUIZ # 7

O que têm em comum?





# Reflexão



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**Sala C2-19**

**Tel. 3091-5536**