e-Planning Core

•The ICT Qualitative Jump

2007-2021

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UA - UL - UNL

Programa Doutoral Conjunto e-Planning

Are recent ICT developments a Qualitative Jump?

ICT-Information & Communication Technologies

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ICT Qualitative Jump:

1. The Nature of Information Technologies

2. The Nature of Last Generation of ICT: "enabling factor" and social decision models

3. The ICT impact on economy, sovereignty, regulation and administration

ICT-Information & Communication Technologies

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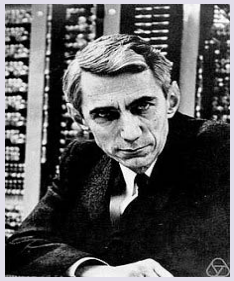
ICT Qualitative Jump:



1. The Nature of Information Technologies

- Thermodynamics and information theory (negative entropy)

1948 1906

(**$I = \log_2 1/P$; $S = K \log_e P$** ***K -> Ct. Boltzman***)

- Engine eficiency gains / energy transfers (heat transfer & feedback/regulated systems, Watt)

- Extension of brain vs. Extension of muscle.

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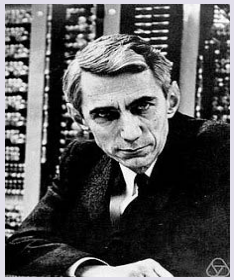

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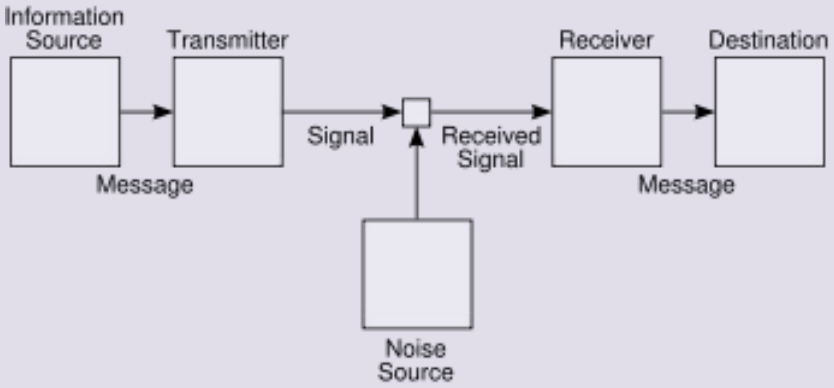

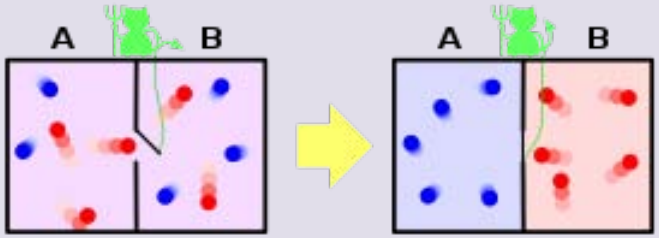

Maxwell's Demon

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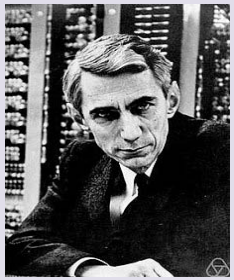

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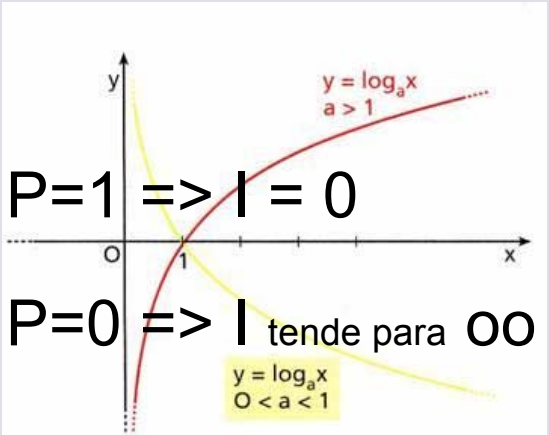

Entropy of an information source [edit]

Based on the probability mass function of each source symbol to be communicated, the Shannon entropy H, in units of bits (per symbol), is given by

$$H = -\sum_i p_i \log_2(p_i)$$

where p_i is the probability of occurrence of the i-th possible value of the source symbol. This equation gives the entropy in the units of "bits" (per symbol) because it uses a logarithm of base 2, and this base-2 measure of entropy has sometimes been called the "shannon" in his honor. Entropy is also commonly computed using the natural logarithm (base e, where e is Euler's number), which produces a measurement of entropy in "nats" per symbol and sometimes simplifies the analysis by avoiding the need to include extra constants in the formulas. Other bases

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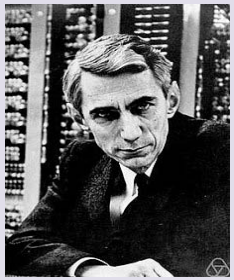

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If all the microstates are equiprobable (a microcanonical ensemble), the statistical thermodynamic entropy reduces to the form, as given by Boltzmann,

$$S = k_B \ln W,$$

where *W* is the number of microstates that corresponds to the **macroscopic** thermodynamic state. Therefore S depends on temperature.

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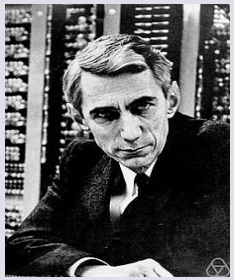

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2. The Nature of Last Generation of ICT: "enabling factor" and social decision models

Democracy cannot extend beyond the reach of a man's voice

(Plato, according to Wriston)

Who will serve (the state) has its herald unless he has the lungs of a Stentor?

(Aristotle, Polit, VII, 1326 b, 7-11)

to know each other [personal character] therefore it is clear that is / for it to be a state limiting principle the best the expansion [dimension, size] of the population / multitude the largest / hiperbole / expansion so that city (autarcy) life can be taken in at one view (sinoptic)

In (Ferraz de Abreu) , 2002"New Information Technologies in Public Participation: A Challenge to Old Decision-making Institutional Frameworks"

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Table 7.3.1.-1 - Period before broadcasting

>600 BC	The abacus (=arithmetic unit of CPU) is invented in China
387 BC	Foundation of Plato's Academy
1450	Printing press invented (Johannes Gutenberg)
1876	First telephone patent (Alexander Bell)

Table 7.3.1.-2 - Period between broadcasting and microcomputer + world wide network

1906	First broadcast of human voice, AM radio (Reginald Fessenden)
1930	18 million radios owned by 60% USA households
1936	Regular TV broadcast begins in UK
1956	72 % USA households own a TV
1968	First ARPANET (IMP), installed at UCLA (precursor to INTERNET)

Table 7.3.1.-3 - Period after microcomputer + world wide communications network

1971	First microcomputer in USA
1972	Created the InterNetwork Working Group, creating the INTERNET
1975	First Personal Computer (PC) introduced
1991	First Internet Web Server and Web Browser (CERN)
2001	529 million people on-line (Internet)

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Participatory Science

CITIDEP PROGRAMS Citizenship & ICT

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- ICT & participatory science
- ICT & participatory democracy
- ICT, inclusion & cooperation
- ICT, policy & strategy

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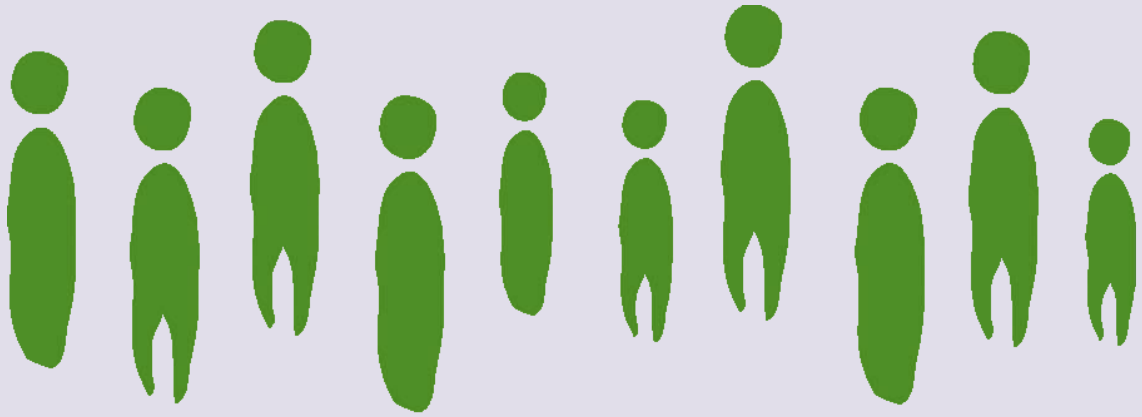

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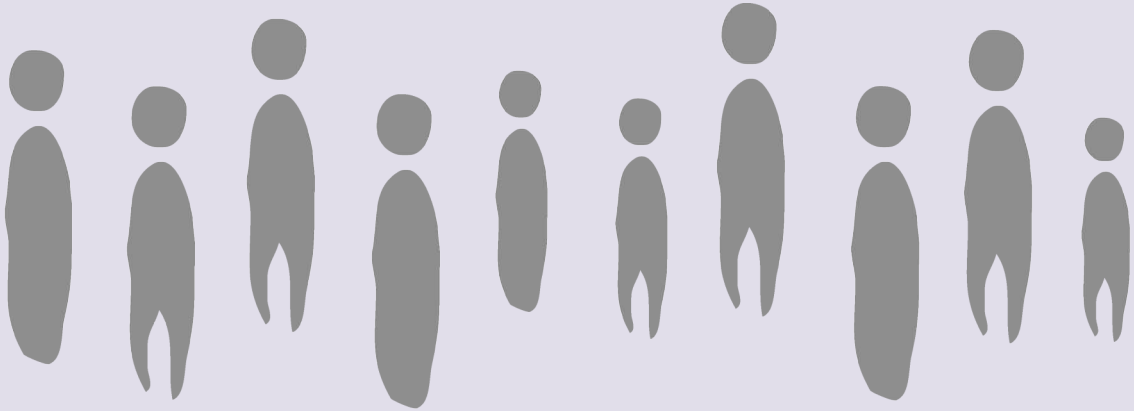

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2019-2021

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Prof. Catedrático Convidado

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