

# Impacts of E-Commerce and Information Technology on Global Agricultural Markets

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## **Digital Information Technology and Entrepreneurship in the Agro-Food Industry**

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<http://www.agric-econ.uni-kiel.de/Abteilungen/II/>

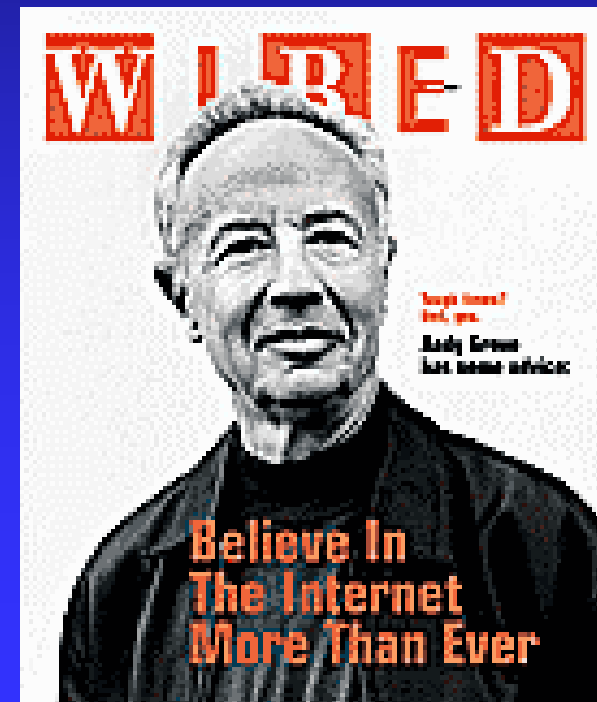
# Introduction > Times of ambivalence

## The Peculiar Ruins of the New Economy

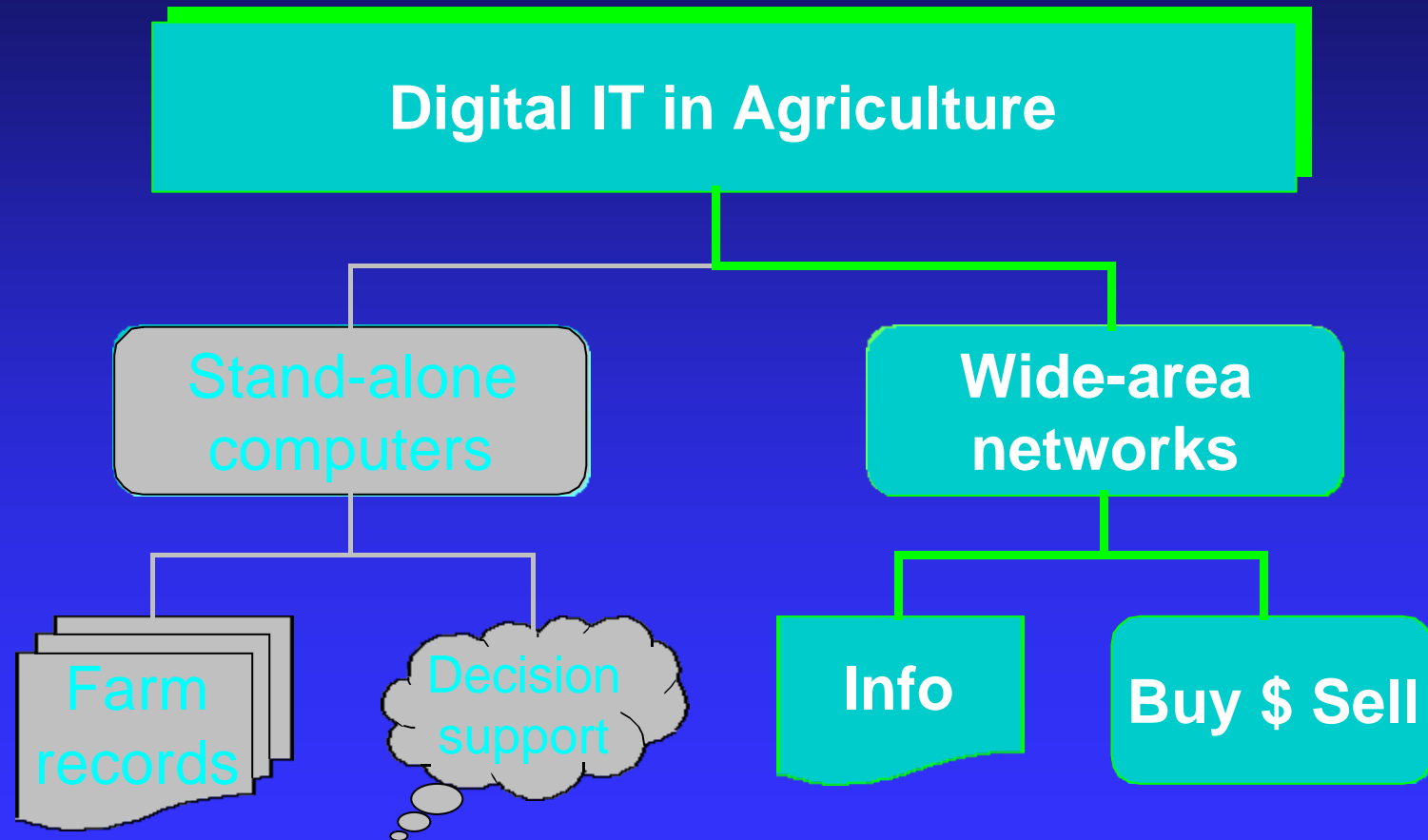


New York Times Magazine,  
May 13, 2001.

## Tough times? Hell, yes Andy Grove has some advice



# Introduction > IT in agriculture



# Ecommerce

## > Definition & evidence

- ❖ **”... trade that actually takes place over the Internet, usually through a buyer visiting a seller’s website and making a transaction there.”**

(Economist, March 2000)

- ❖ Evidence in agriculture
  - Web sites owned by farmers
  - Classified ads and directory services
  - Match makers
  - Market place providers
  - Auctioneers
  - Service integrators
  - Support service

# Ecommerce

## > Driving forces

### ❖ Technology?

- the Internet has been around since more than 30 years!

### ❖ Government?

- is it true that Al Gore has invented the Internet?

- is TCP/IP an ASCII-standard?

### ❖ Spontaneous & emergent?

- is the Internet a complex system?

- does the Internet evolve according to its own laws?

### ❖ Entrepreneurs?

- the guys that hyped up the dot.coms?

- the VC-people that take 35% cuts from IPOs?

- the personification of the unexplained rest in production functions?

# Entrepreneur

> Outcast in economic theory

**"... the entrepreneur has virtually no status in contemporary economic theory.**

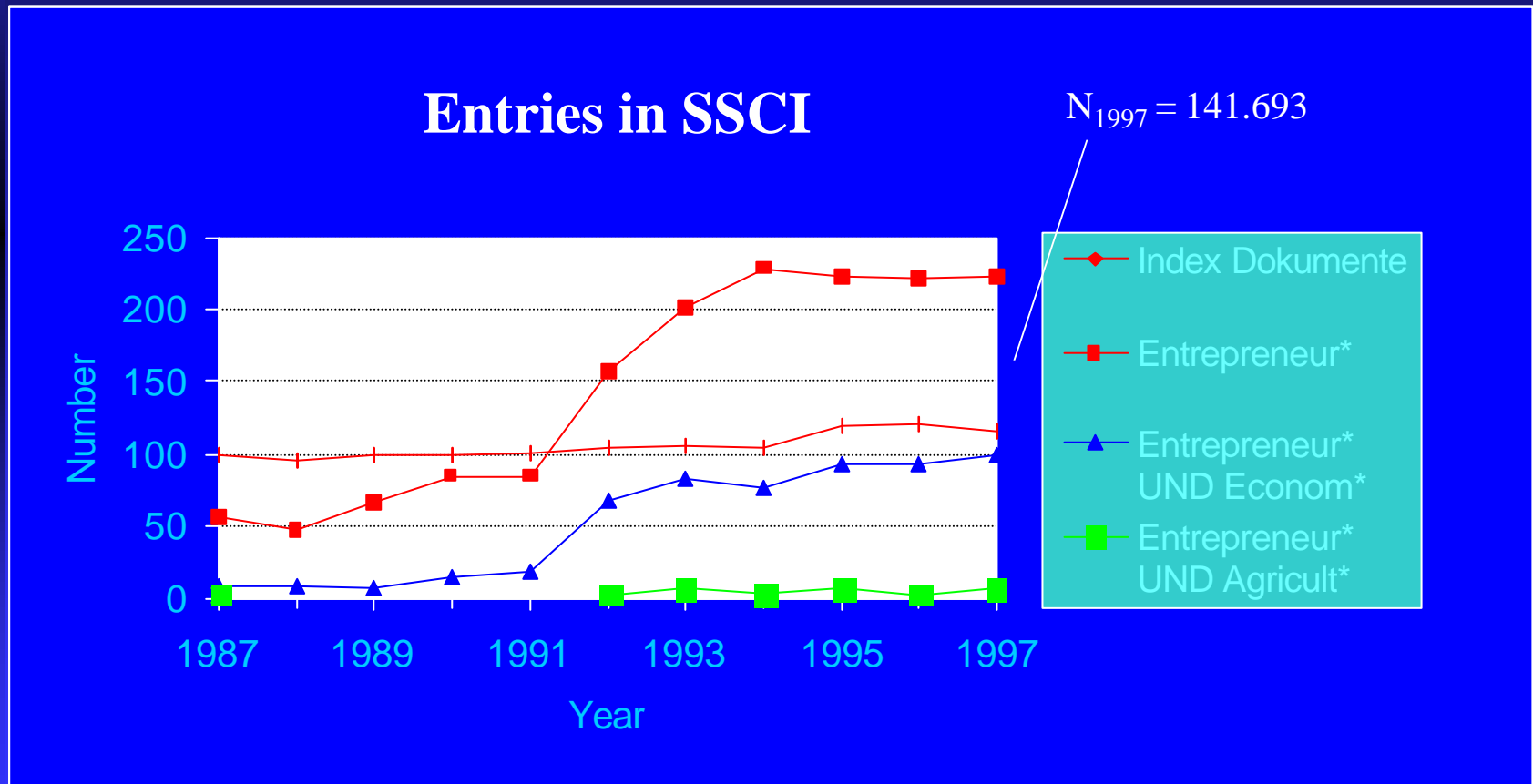
...

**The problem is plainly one of theory, not of fact."**

*Sherwin Rosen 1983*

# Entrepreneur

> Rare bird in the research literature



# Entrepreneur

## > Semantic net





# Entrepreneur > à la T.W. Schultz

## Entrepreneurial ability

- ❖ " ... represents the competence of people to perceive a given disequilibrium and
- ❖ to evaluate its attributes properly in determining whether it is worthwhile to act,  
and if it is worthwhile,
- ❖ people respond by reallocating their resources."

**Entrepreneurs "restore equilibrium in their own microeconomic environment."**

# Entrepreneur

## > à la I.M. Kirzner

- ❖ The market is a process
  - driven by profit opportunities
  - that arise from valuation errors
- ❖ Alert entrepreneurs somehow discover unexploited profit opportunities
- ❖ Types of entrepreneurial activity
  - arbitrage
  - speculation
  - innovation
- ❖ Problem:
  - heavy on concepts,
  - light on empirical evidence

# Entrepreneur > à la Shervin Rosen

## Events that give rise to entrepreneurial activities

- ❖ "... the creation of new markets,
- ❖ new goods,
- ❖ new services, and
- ❖ new ways of doing things.

- ❖ there are no markets for new markets

**entrepreneurs are market makers**

- ❖ "entrepreneurial activity occurs in a society that is constantly in a state of flux, forever changing."

**"Invention is the mother of entrepreneurship"**

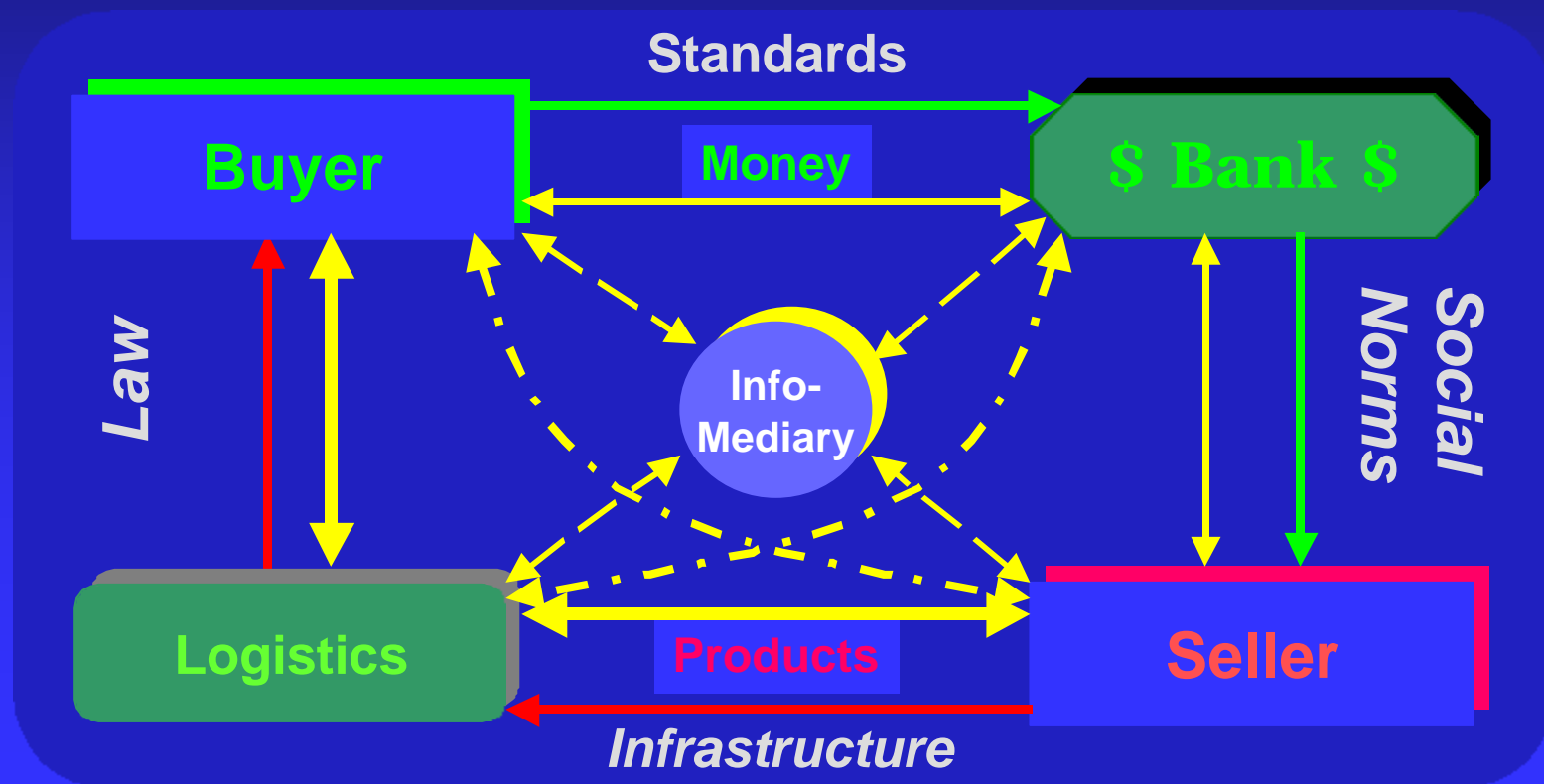
Rosen, S. 1983.

# Environment for entrepreneurs

## > agents and flows in ecommerce

Ideally, only bits flow in e-commerce

- agriculture and food industry are not ideal
- products have physical and informational attributes



# Environment for entrepreneurs > Exponential digital IT

## Moore's law

## Hard-disc prices

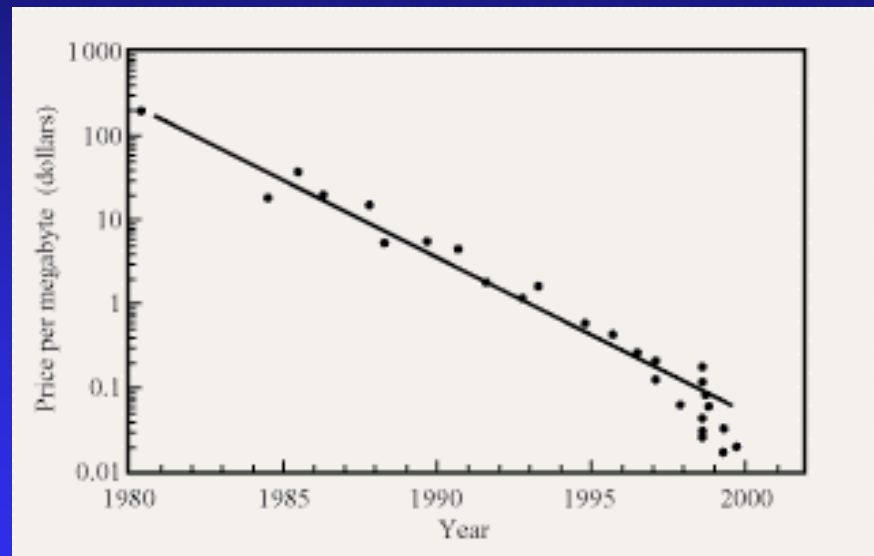
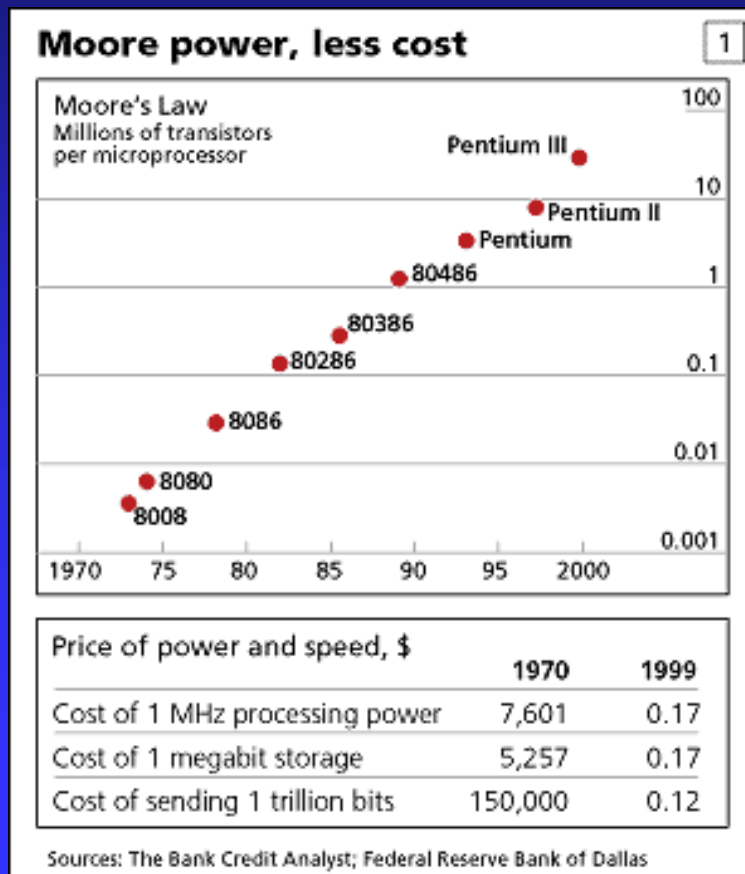


Figure 2

Price history of hard disk products vs. year of product introduction.

Thompson, D.A. and Best, J.S. 2000. The future of magnetic data storage technology. IBM Journal of Research & Development 44(3). [www.research.ibm.com/journal/](http://www.research.ibm.com/journal/)

# Environment for entrepreneurs > Network growth

## ❖ **Gilder's Law of (fiber) bandwidth**

- Communication power doubles every 6 month  
=> Use bandwidth to simplify everything else!

## ❖ **Metcalf's Law**

- The value of a network to its users is approximately proportional to the square of the number of its users  
=> increasing network effect!

## ❖ **de Long's Law**

- In building a network, you tend to do the most valuable connections first

# Environment for entrepreneurs

## > Ecommerce readiness

**E-readiness = f (level of connectivity, online business culture)**

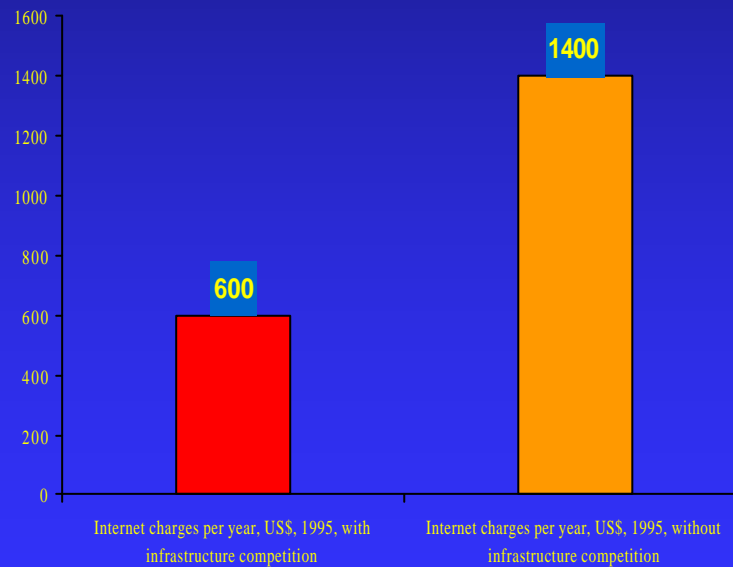
- ❖ **1- United States**
- ❖ 2- Sweden
- ❖ 3 - Finland
- ❖ 4 - Norway
- ❖ 5 - Netherlands
- ❖ 6 - United Kingdom
- ❖ 7 - Canada
- ❖ 8 - Singapore
- ❖ 9 - Hong Kong
- ❖ 10 - Switzerland
- ❖ 11 - Ireland
- ❖ 12 - Denmark
- ❖ **13 - Germany**
- ❖ 14 - France
- ❖ 15 - Belgium
- ❖ 16 - Australia
- ❖ 17 - New Zealand
- ❖ 18 - Austria
- ❖ 19 - Italy
- ❖ 20 - Israel

Source: Economist Intelligence Unit 2000  
in ITTA 2000.

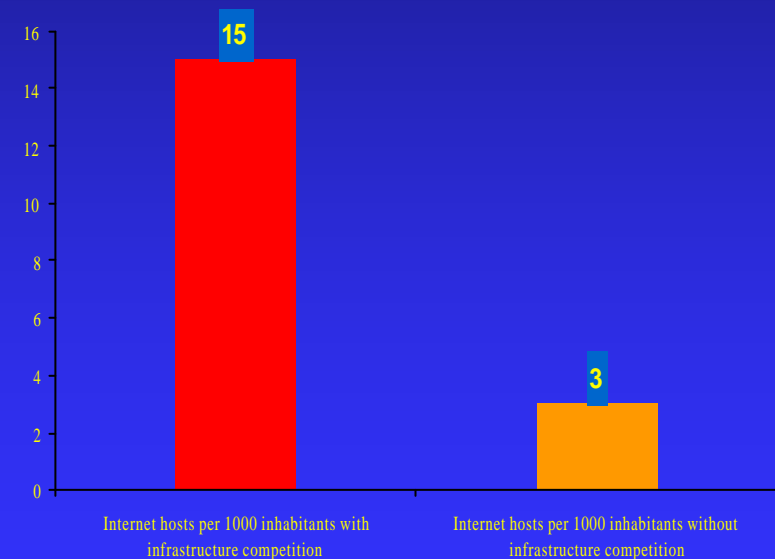
# Environment for entrepreneurs > Infrastructure

## Competition, Internet access fees, and penetration

### Internet access fees, p.a. 1995



### Internet hosts per 1000 inhabitants



**with competition**

**without competition**

Source: WTO, 1998



# Environment for entrepreneurs

## > Constraints

What help would have been most useful to you in setting-up in business? (%)

**Do something!  
Inherit your  
own money!**



What was your biggest concern with becoming self-employed? (%)

<b>Money/finance</b>	<b>26,3</b>
<b>No help desired</b>	<b>32,5</b>
Tax advice	9,1
How to start up	7,8
General advice	5,3
Others	5,1
No. of observations	243

<b>Where to get finance</b>	<b>20,1</b>
No guaranteed income	14,4
Understanding tax	14,4
Cash flow	10,8
Finding clients	10,1
Others	8,0
No. of observations	139

# Entrepreneurial opportunities > changes in transaction costs

## Transaction cost savings of banks

		Bank transaction	Paying a bill
Conventional	US\$	1.08	2.22 – 3.32
by telefon	US\$	0.54	n. D.
on the Internet	US\$	0.13	0.65 – 1.10
Saving	%	89	71 - 67

Source: OECD 1999.  
The economic and social impact  
of electronic commerce. p. 63.

- Farmpartner.com expects "process costs" savings of 3-7%
- Südzucker expects to reduce purchasing costs from 350 DM to 50-100 DM per transaction

# Entrepreneurial opportunities

## > German farmers' ecommerce readiness

### Adoption of Internet applications

	n	All users	
		No.	%
E-Mail	688	628	91.3
WWW	671	650	96.9
Online-banking & financial transactions	680	523	76.9
Weather reports & forecasts	665	525	78.9
Price information	670	582	86.9
Acquisition of other farming information	681	633	93.0
Decision support	643	434	67.5
Chat /Forum with other farmers	653	196	30.0
<b>Purchasing inputs on the Web</b>	<b>654</b>	<b>183</b>	<b>28.0</b>
<b>Sale of produce on the Web</b>	<b>651</b>	<b>125</b>	<b>19.2</b>

# Entrepreneurial opportunities

## > German farmers' ecommerce readiness by commodity group

**Would you be willing to sell produce on the Internet?**

	n	regularly		rarely		never	
		n	[%]	n	[%]	n	[%]
Grains	496	132	26.6	229	46.2	135	27.2
Rapeseed	435	115	26.4	186	42.8	134	30.8
Fruits	54	11	20.4	14	25.9	29	53.7
Speciality crops	226	35	15.5	46	20.4	145	64.2
Potatoes	241	32	13.3	55	22.8	154	63.9
Cattle	340	101	29.8	67.6	19.9	171	50.4
Pigs	153	32	20.9	43	28.3	78	50.9
Chicken	52	5	9.6	16	30.8	31	59.6
Machinery services	435	73	16.8	139	32.0	223	51.3

# Entrepreneurial opportunities

## > arbitrage

Vendor	min. purchase value	cost delivery	free delivery	price 1 l milk	price 1 kg bananas
www.einkauf24.de	40 DM	5 DM		1,39 DM	4,29 DM
www.einkaufsfreun.de	20 DM	6,3 DM	200 DM	1,19 DM	2,99 DM
www.freude-am-kaufen.de	50 DM	9,9 DM	100 DM	1,20 DM	3,90 DM
www.kaisers.de	30 DM	10 DM		1,39 DM	2,99 DM
www.kaufhof.de	30 DM	10 DM	200 DM	1,99 DM	3,99 DM
www.leshop.de	50 DM	10 DM		1,19 DM	3,99 DM
www.markant-easyshopping.de	none	10 DM		1,09 DM	2,99 DM
www.mistershopping-nuernberg.de	0 o. 50 DM	0 DM		1,30 DM	» 4 DM
www.netconsum.de	none	10 DM	75 DM	1,29 DM	3,70 DM
www.neukauf-weissmann.de	50 DM	0-5 DM		1,19 DM	k.A.
www.otto-supermarkt.de	30 DM	8,95DM	300 DM	1,05 DM	2,79 DM

Source: Horenburger, M. 2001.

# Entrepreneurial opportunities

> Unshackling information from products

Natural

Info about reality



Cultural

Info for reality



Technological

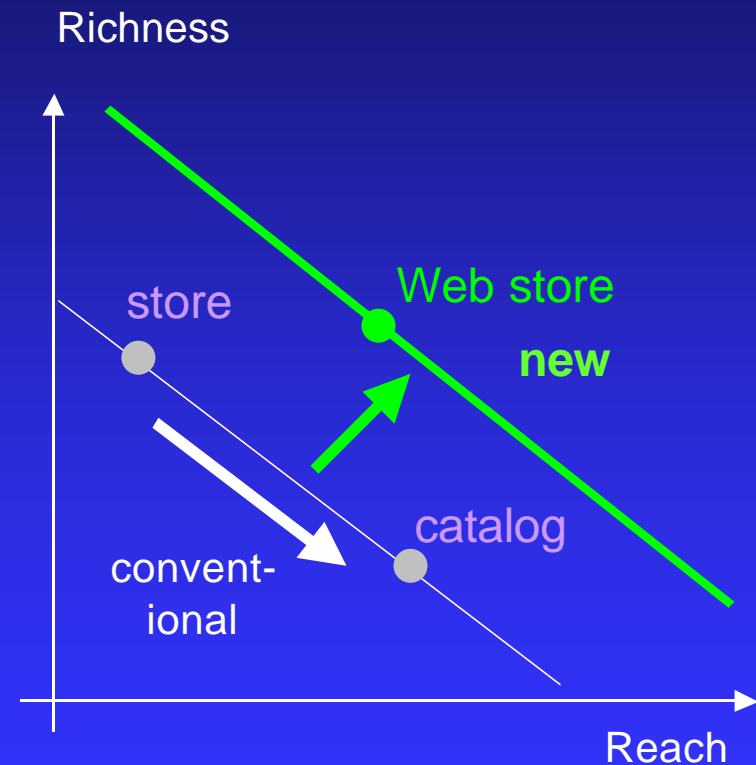
Info as reality



# Entrepreneurial opportunities > Re-intermediation

## Causes of disintermediation

- ❖ **conventional:**  
**more reach for less richness**
  - catalog-business
  - telephone broker
- ❖ **new:**  
**shifting the R-R-frontier**
  - photos & video on the web
  - interactive auctions
- ❖ **critical constraint:**  
**the "human interface"**



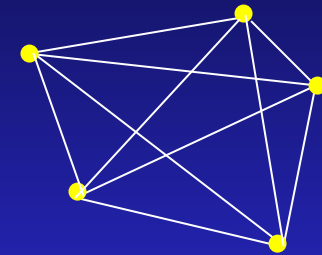
Source: Evans & Wurster 2000

# Entrepreneurial opportunities

## > Economizing on connection & attention

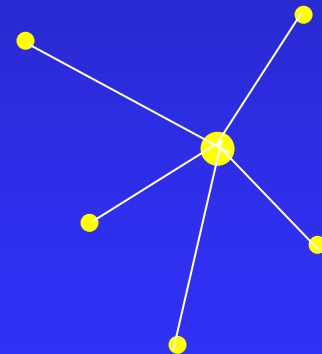
Distributed network with  $n$  agents

- ❖  $\frac{1}{2} n(n-1)$  bi-directional links
- ❖ each agent attends to  $n-1$  links



Star network with  $n$  agents, 1 center

- ❖  $n$  bi-directional links
- ❖ each agent attends to 1 link
- ❖ center attends to  $n - 1$  links
- ❖ Center is intersection of all detours!





# Entrepreneurial opportunities

## > Organization of agricultural production

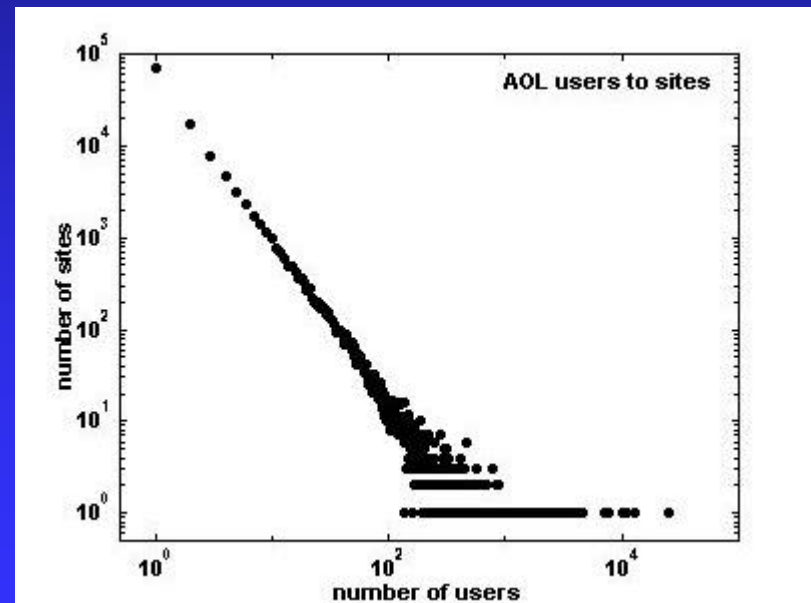
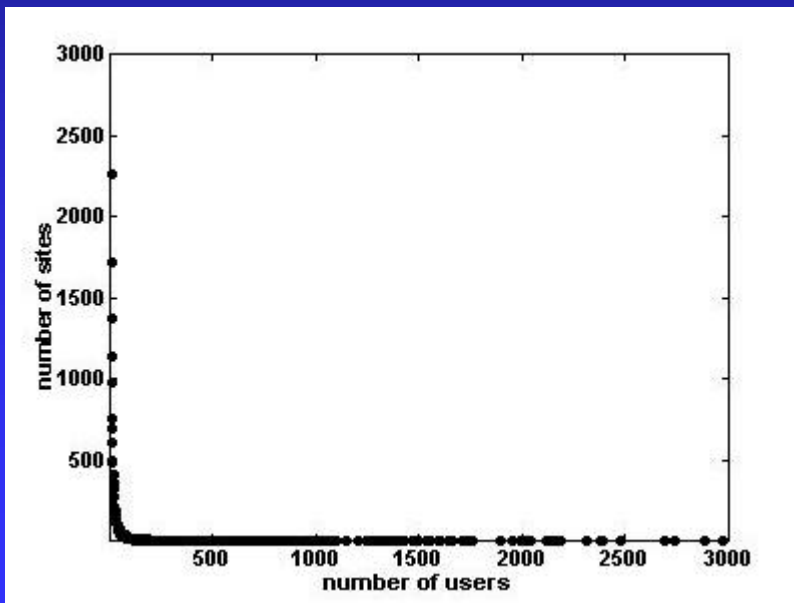
GPS, GIS, and mobile communication technology can be used for:

- ❖ **precision agriculture**
  - little or no impact on organization
- ❖ **farmers monitoring labor**
  - improved opportunities for exploiting economies of size
- ❖ **processors monitoring farming practices**
  - improved opportunities for contract agriculture
- ❖ **generating product information for consumers**
  - may require redesign of supply chains

# Entrepreneurial constraints > Winner takes most

**A small number of sites receive most visitors  
(visits by AOL users on a day in December 1997)**

No. of sites with x users - natural scale    No. of sites with x users – log scale



Source: Adamic, L.A. 2000. Zipf, power-laws, and Pareto - a ranking tutorial. [www.parc.xerox.com](http://www.parc.xerox.com)

# Entrepreneurial opportunity or threat?

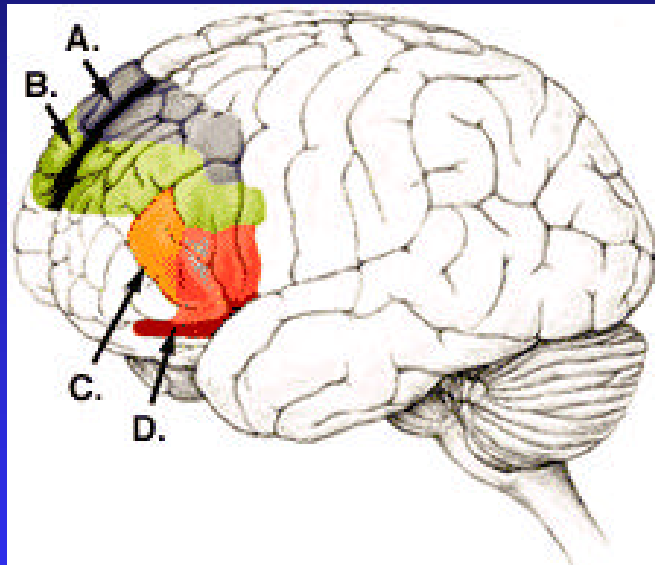
## > Agents or bots

- ❖ "On the Internet, **an agent** (also called an intelligent agent) **is a program that** gathers information or **performs some other service** without your immediate presence and on some regular schedule.
- ❖ Typically, an agent program, using parameters you have provided,
  - searches all or some part of the Internet,
  - gathers information you're interested in, and
  - presents it to you on a daily or other periodic basis."

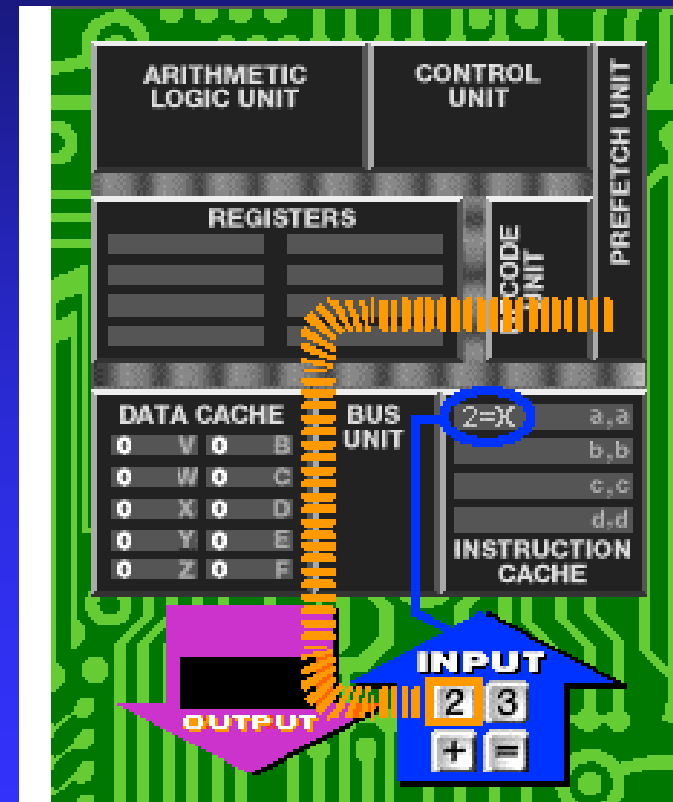
(whatis.techtarget.com)
- ❖ some ability to learn and to adapt, no common sense
- ❖ able to interact (negotiate) with other bots

# Entrepreneurial opportunity or threat?

> Technological alternatives - *not yet*

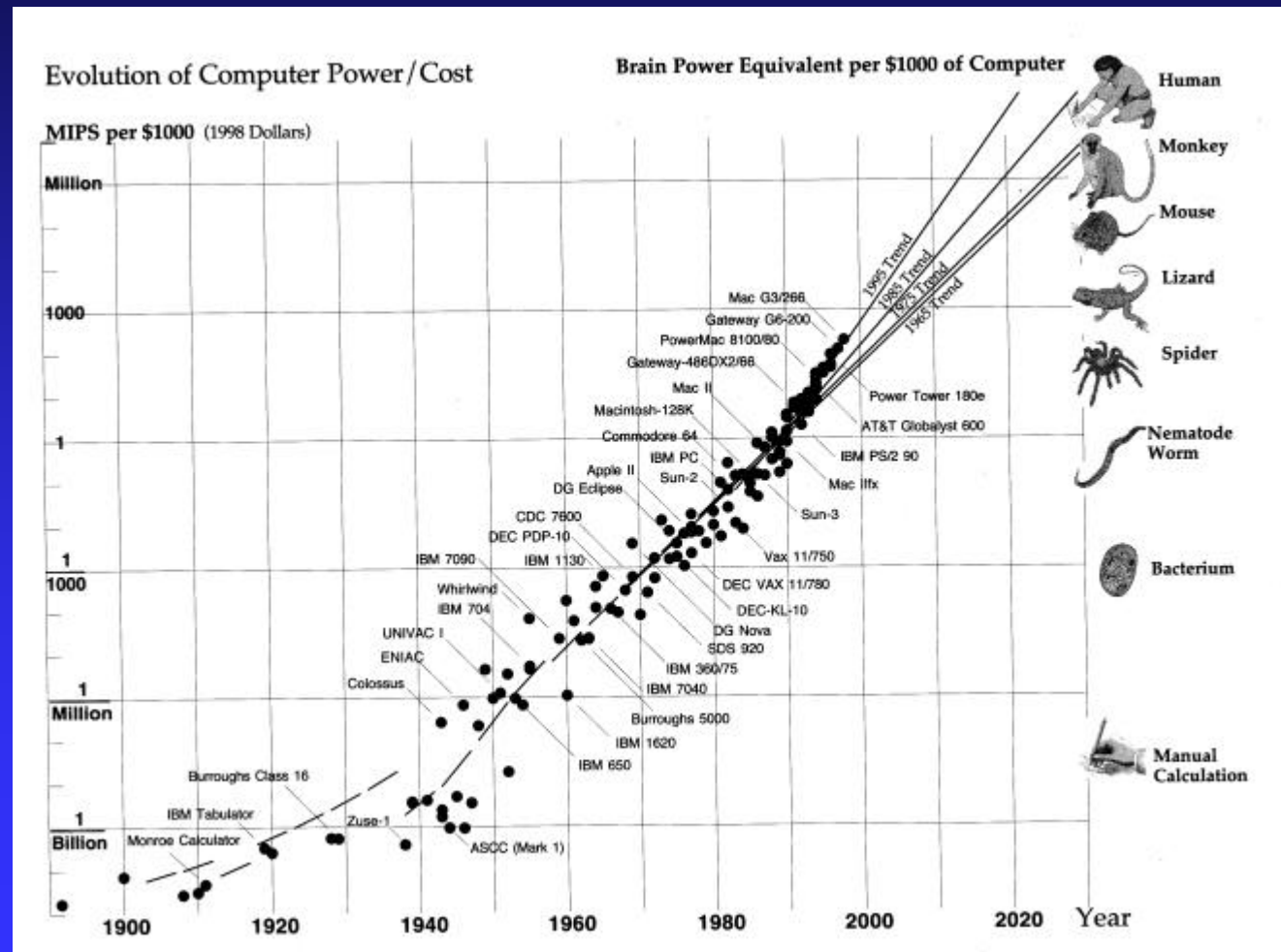


From: Beardsley, T. 1997. The Machinery of Thought  
<http://www.sciam.com/0897issue/0897trends.html>



# Entrepreneurial opportunity or threat?

## > Computer power per \$



# Close

## > predictions by entrepreneurs and implications

### ❖ Famous predictions by noted entrepreneurs:

- "I think there is a world market for maybe five computers"

Thomas Watson, Chairman of IBM, 1943

- "There is no reason anyone would want a computer in their home."

K. Olson, DEC, 1977

- "640 K ought to be enough for anybody."

Bill Gates, 1981

### ❖ Policy implications of entrepreneurship

- How to regulate what cannot be predicted?
- risk of stifling profit-seeking entrepreneurial spirits
- risk of encouraging rent-seeking entrepreneurial spirits