Is Technology the Only Driver of Change?

Talk to Global Business Network, London
18 May 2000

Barbara Heinzen PhD

Outline

I. Opening question

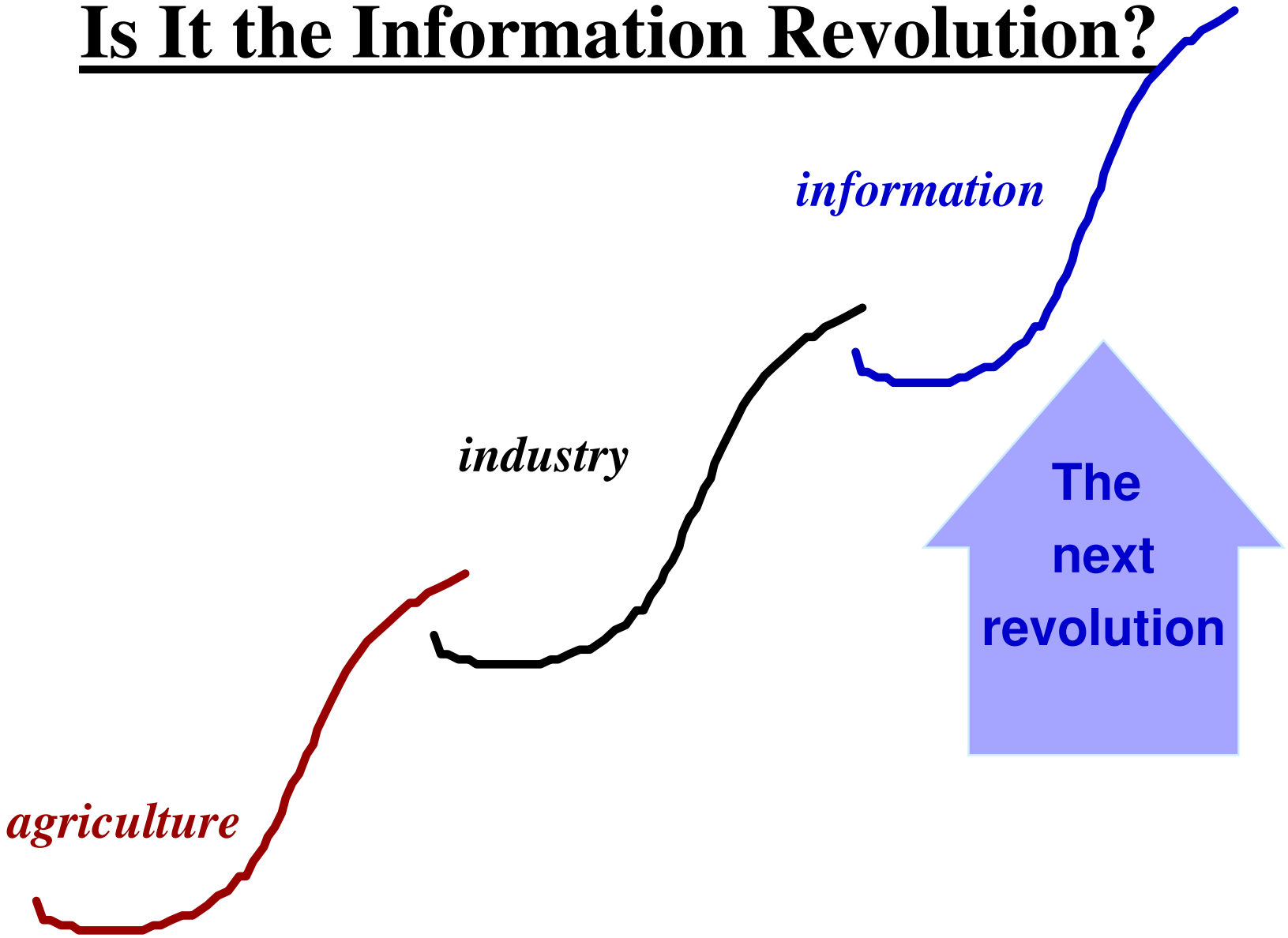
II. Origins of the industrial curve
Lessons of English history

III. What are the analogies?

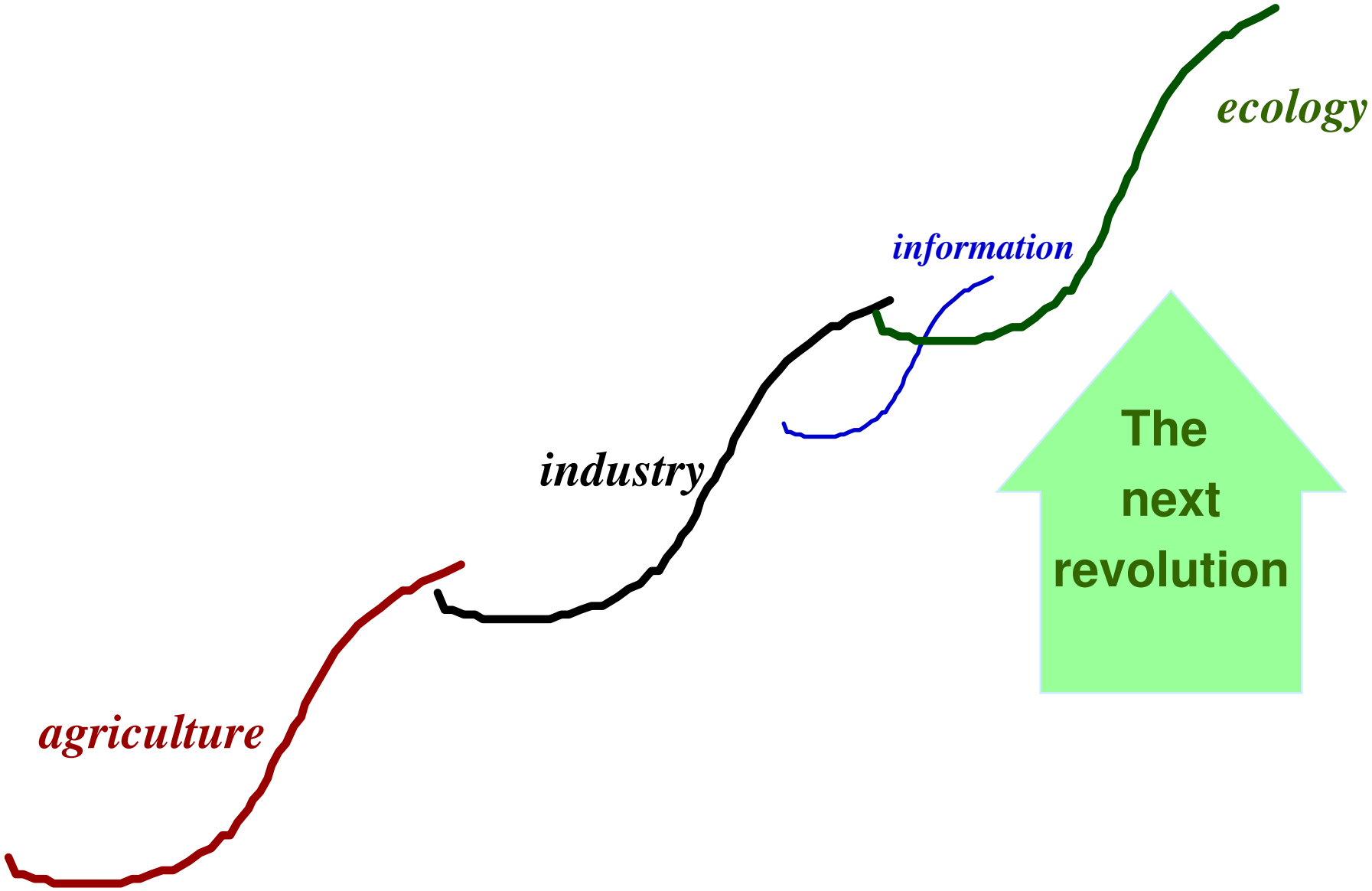
I. Opening Question

What is the “Third Curve”?

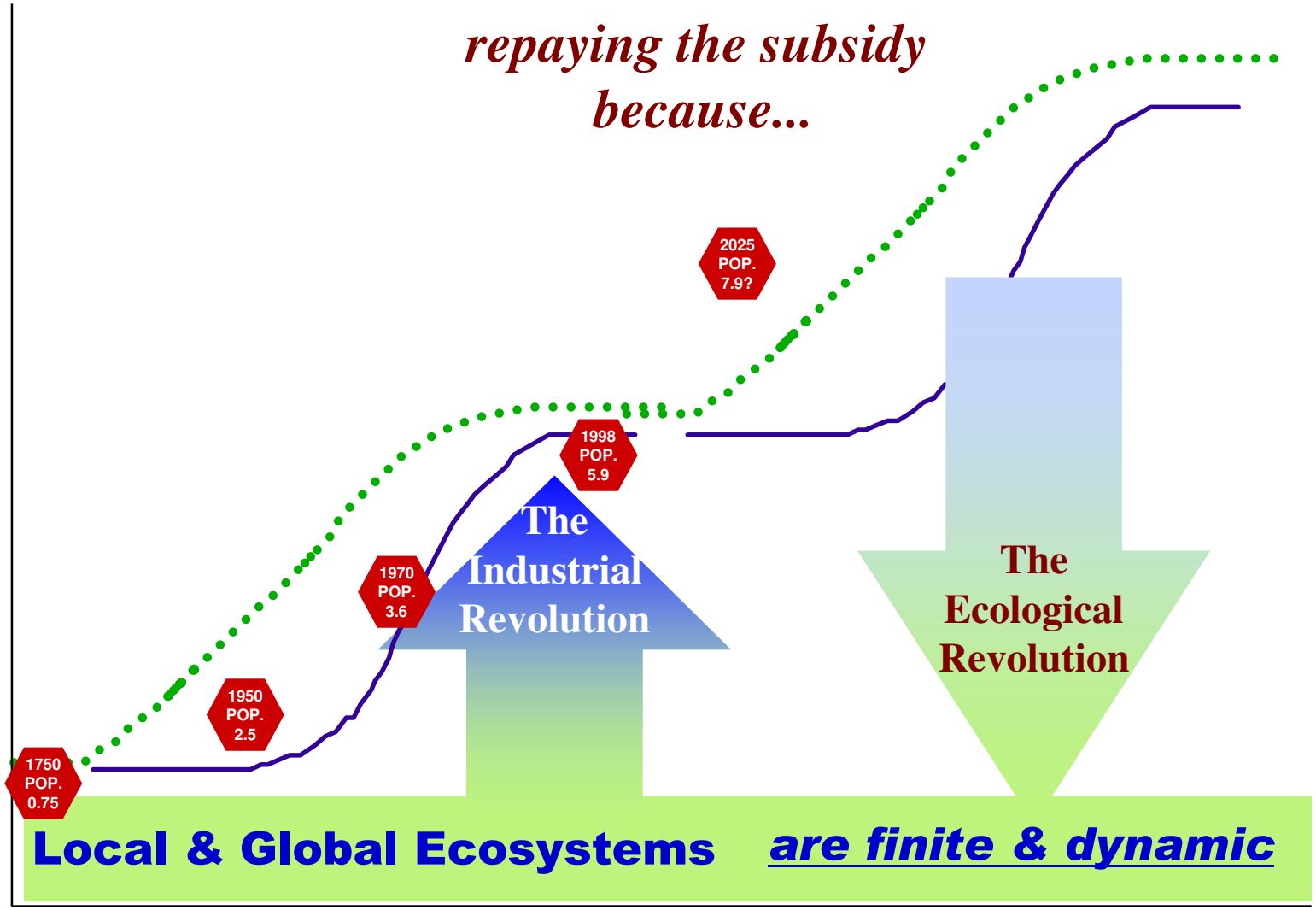
Is It the Information Revolution?



Is It the Ecological Revolution?

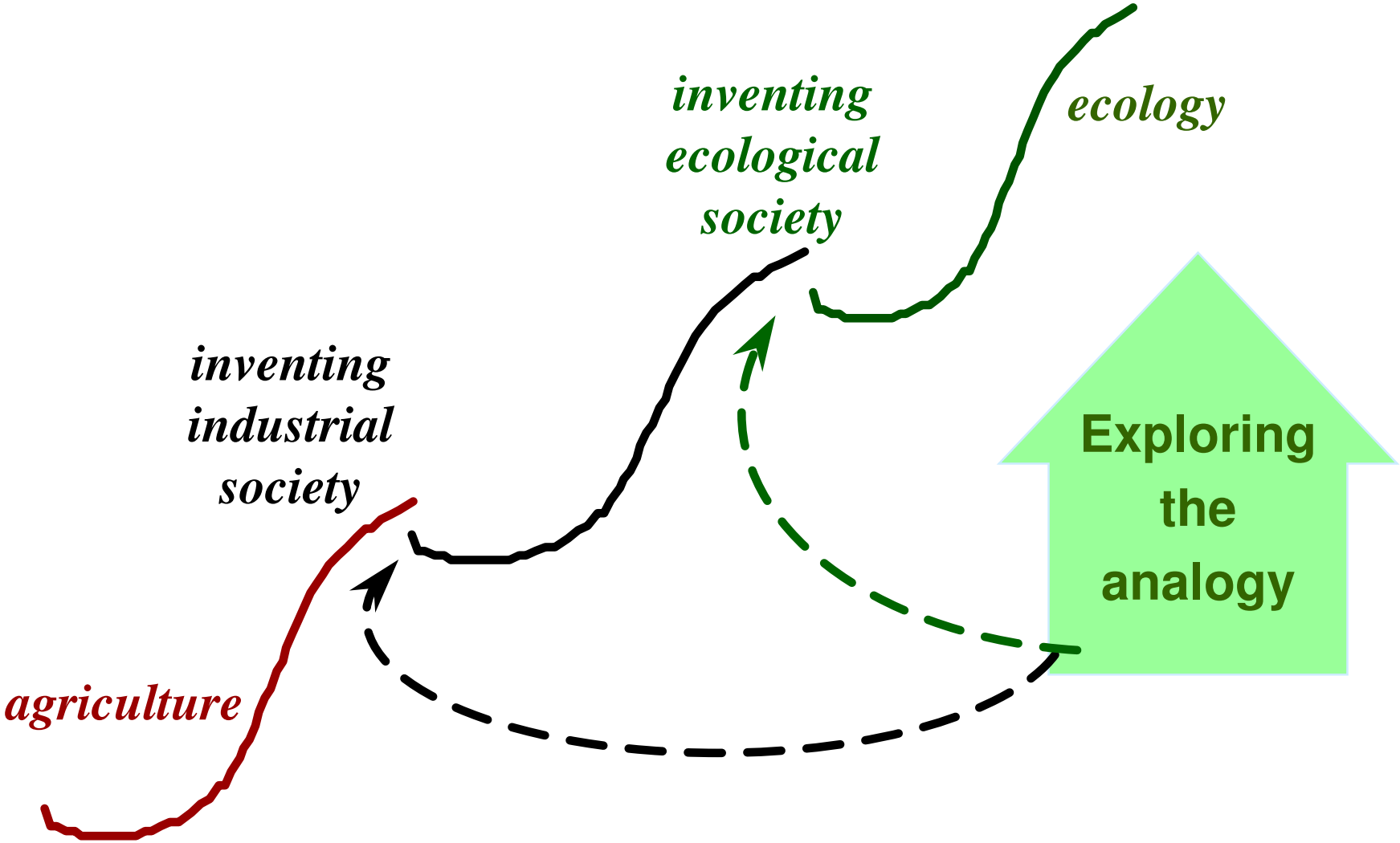


Will Ecological Change = Industrial Change?



1750 0.75bn POP. *global population, in billions*

What Are the Parallels?



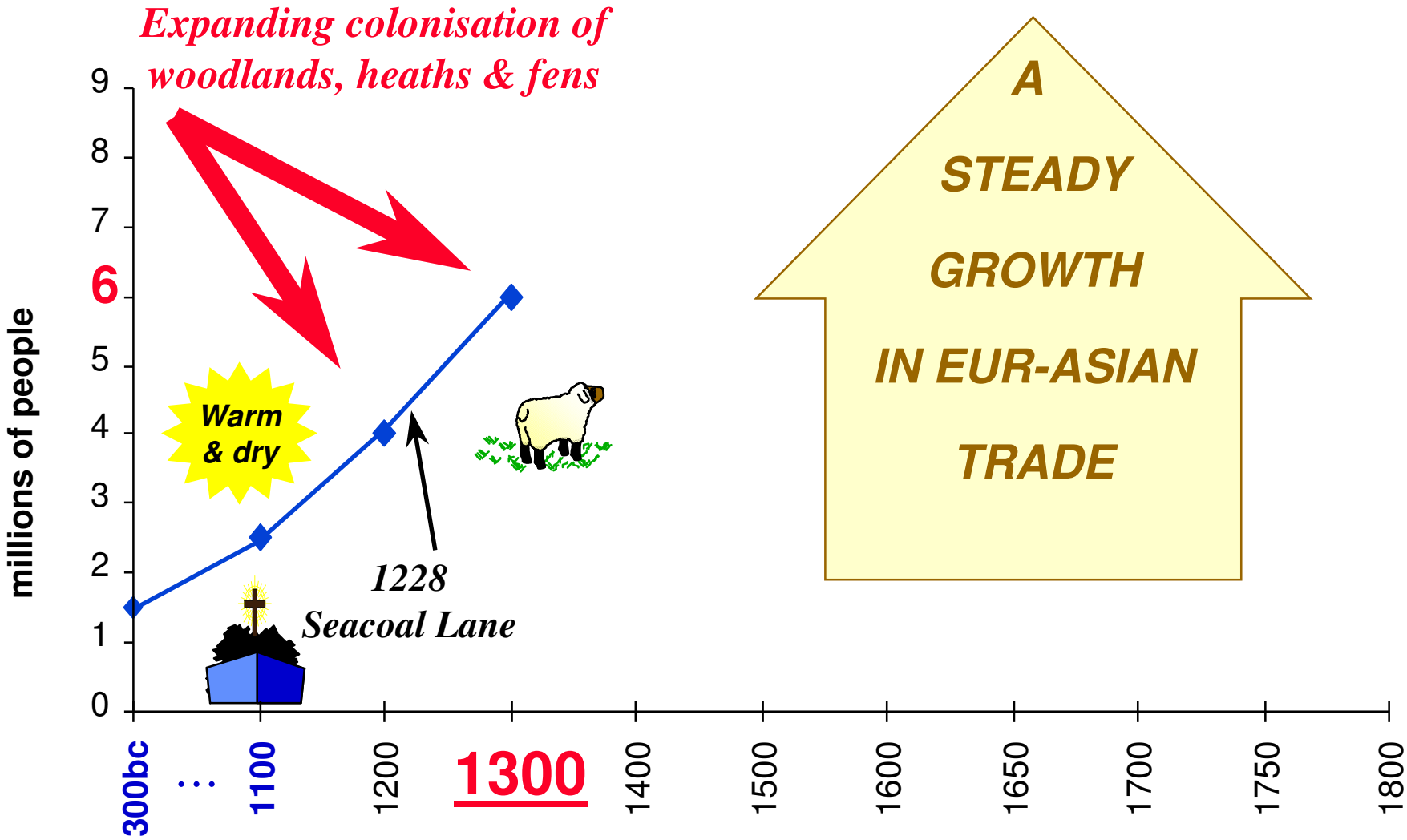
II. Inventing Industrial Societies

The Example of English History

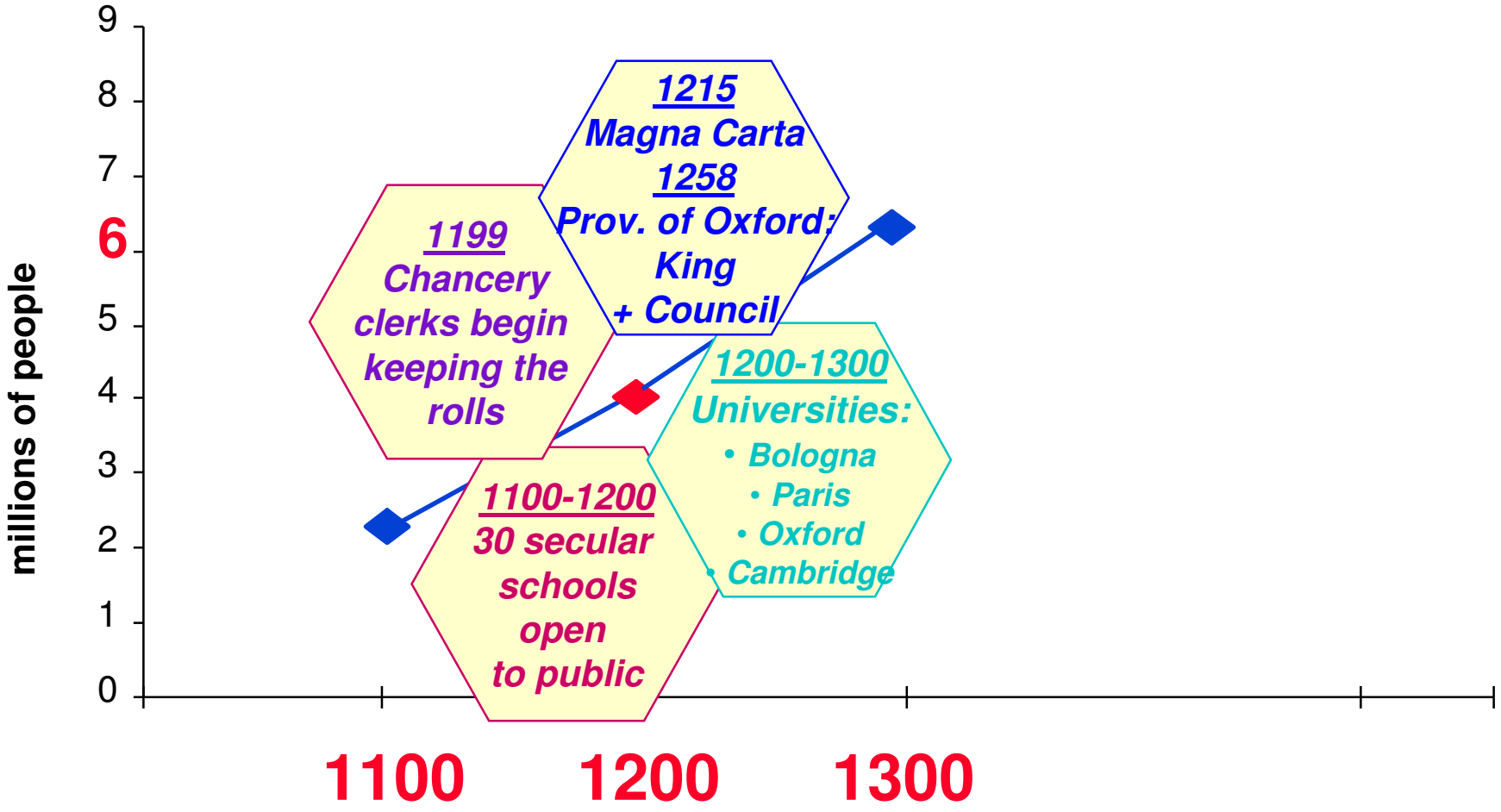
- Necessity
- Disease
- Learning & engagement
- Where technology fits in

Necessity

An Age of Expansion & Innovation



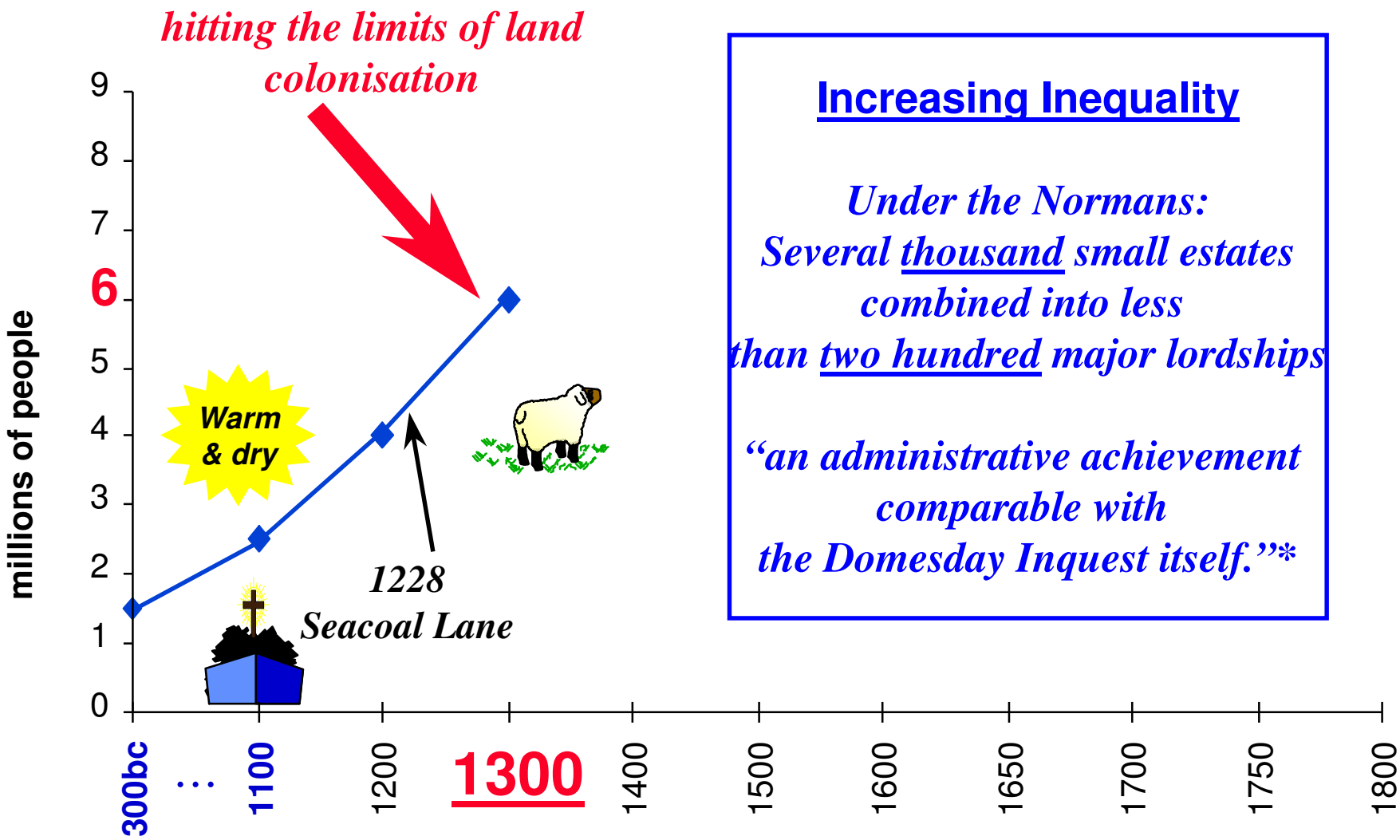
Educational & Political Experiments



Two Prosperous, Successful Centuries

- *Growing trade*
- *Growing population*
- *Expanding croplands*
- *Growing political sophistication*

Entering the Malthusian Trap



Increasing Inequality

Under the Normans:
Several thousand small estates
combined into less
than two hundred major lordships

"an administrative achievement
comparable with
*the Domesday Inquest itself."**

* *Sir Frank Stenton, quoted in Christopher Brooke, From Alfred to Henry III 871-1272. W.W. Norton, New York 1969 printing, p.107.*

Growing Peasant Hardship

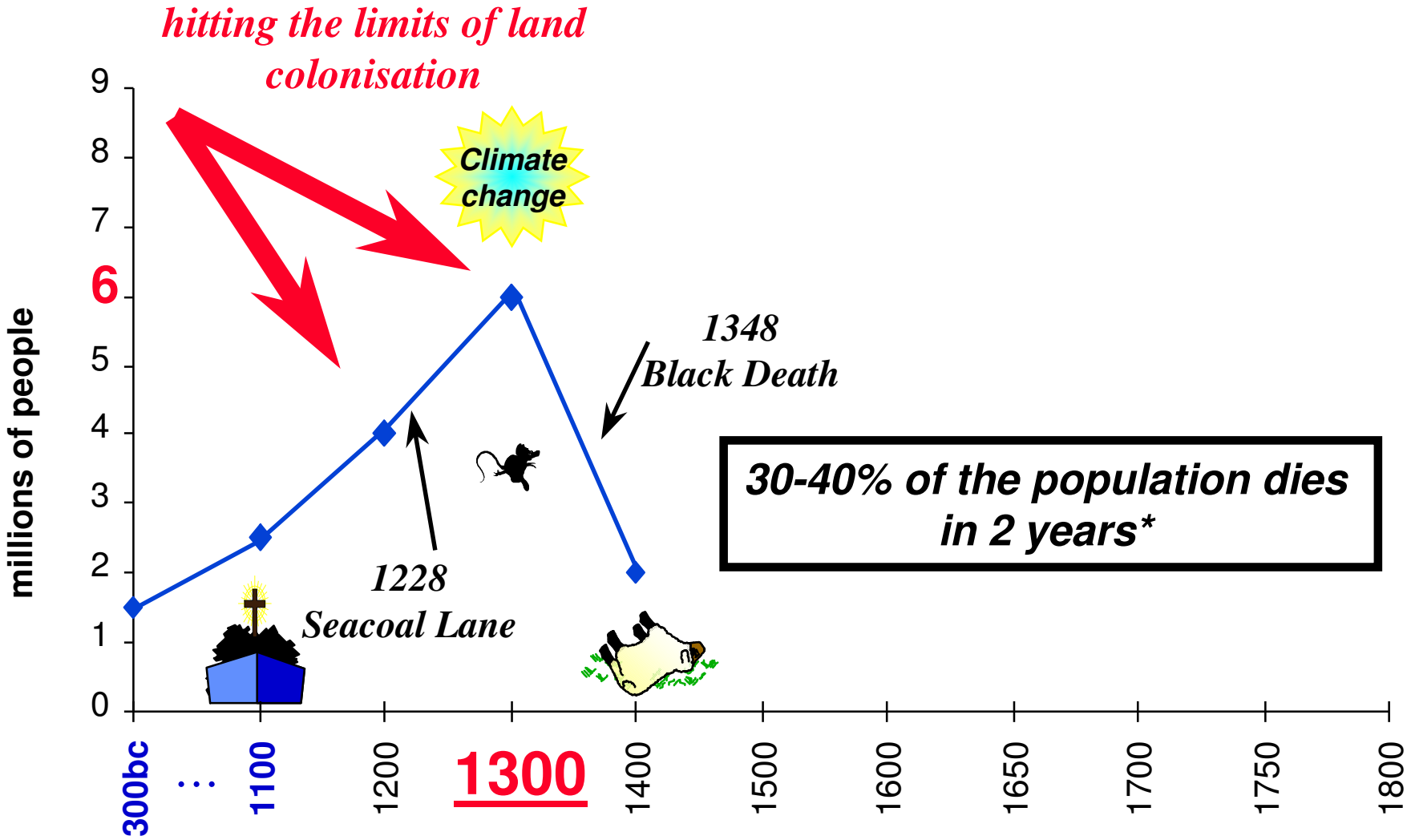
"The tale of the villager's fortunes
in this period is one of
the progress of poverty."

Famines in England: 1272, 1277, 1283, 1292, 1311

1316-17:
"grain liveries were suspended
altogether by the Bishop of Winchester
'on account of the dearness of corn.'"

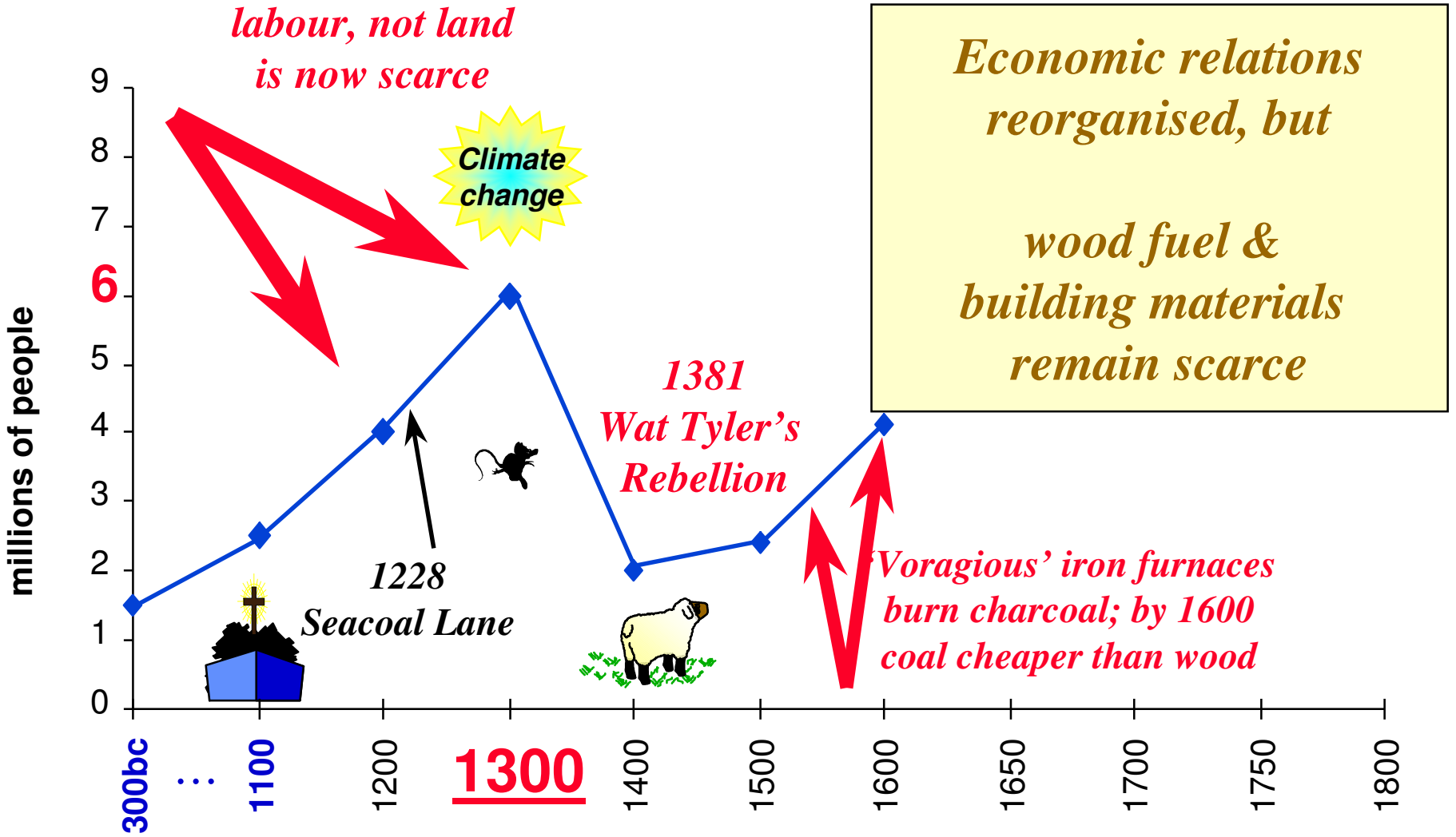
Edward Miller, John Hatcher, Medieval England: Rural Society & Economic Change 1086-1348. 1978, reprinted 1999, Longman. Famines dates from Philip Ziegler, The Black Death, new edition, Penguin, 1998., 32

The Calamitous 14th Century

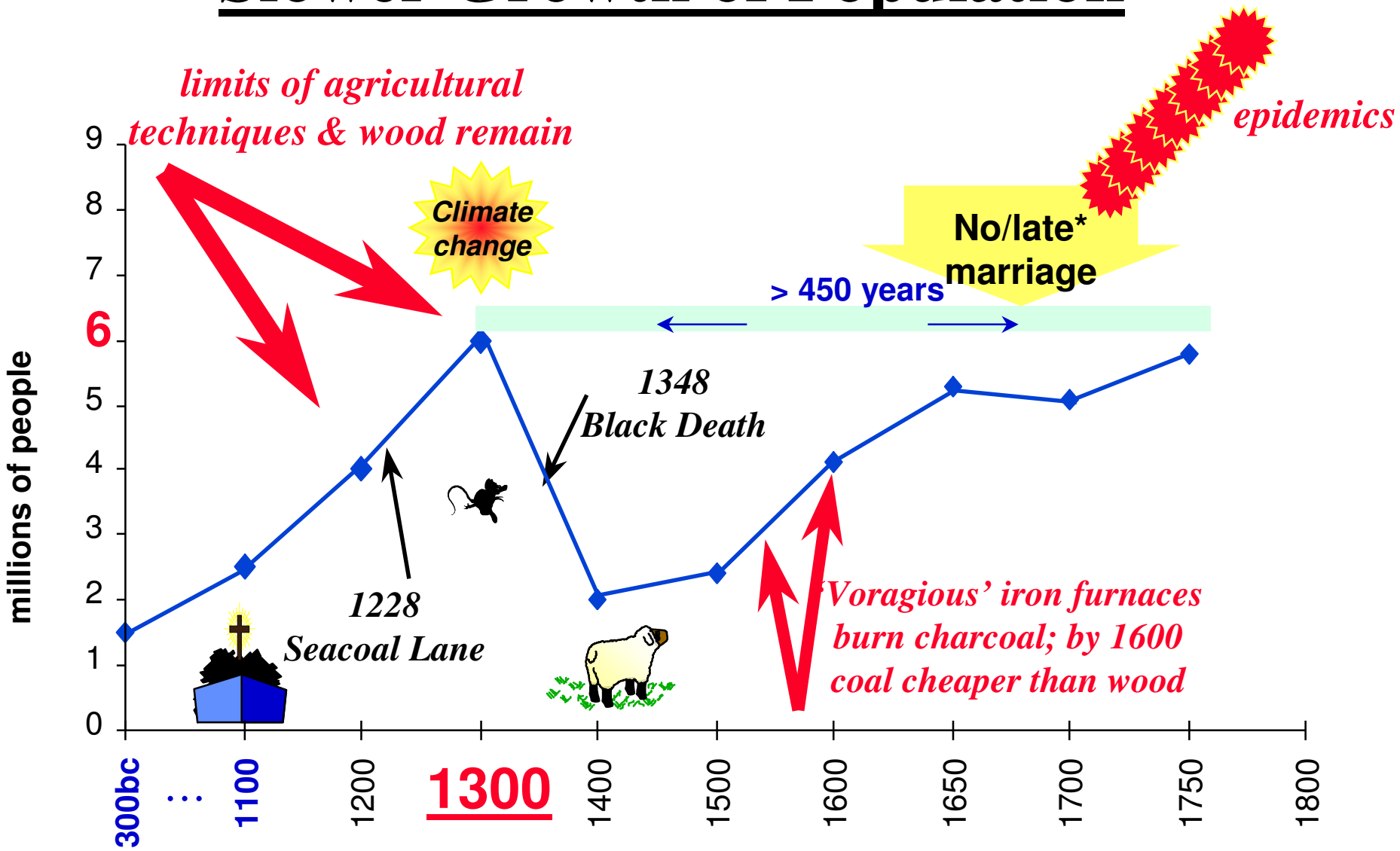


* various sources

Recovery & Reorganisation Begins

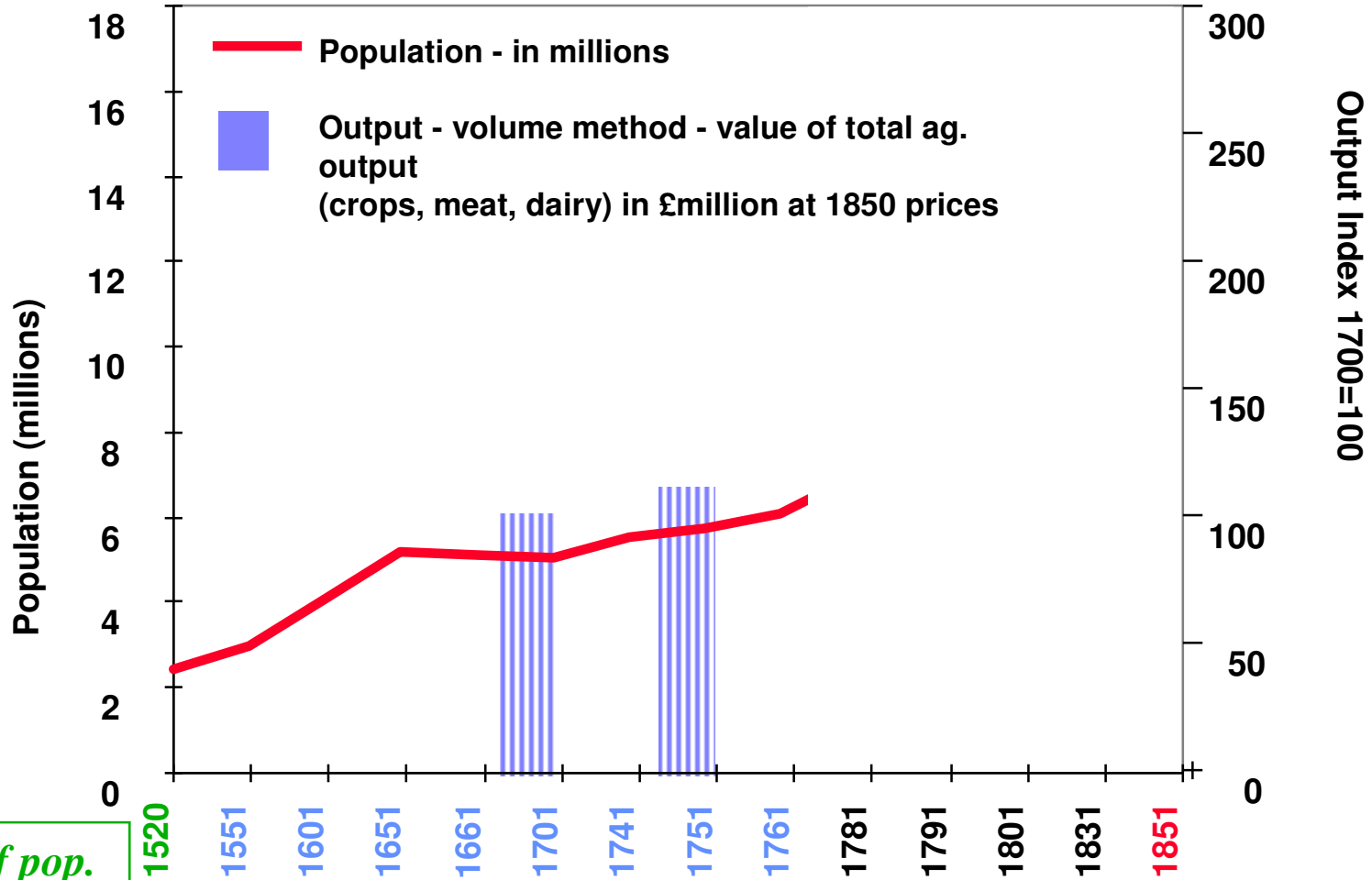


Slower Growth of Population



* Lawrence Stone, The Family, Sex and Marriage in England 1500-1800, Harper Torchbooks, 1979, chap. 2, passim. 1625-1825: 15-25% of peers' daughters never married; 15-20% of peers's sons never marrried. 1695 Lichfield, 9% of women > age 30 unmarried.

Estimates of English Agricultural Output



80% of pop. in agric. for own family

Mark Overton, Agricultural Revolution in England ... 1500-1850, 1996, p.75 & p.8

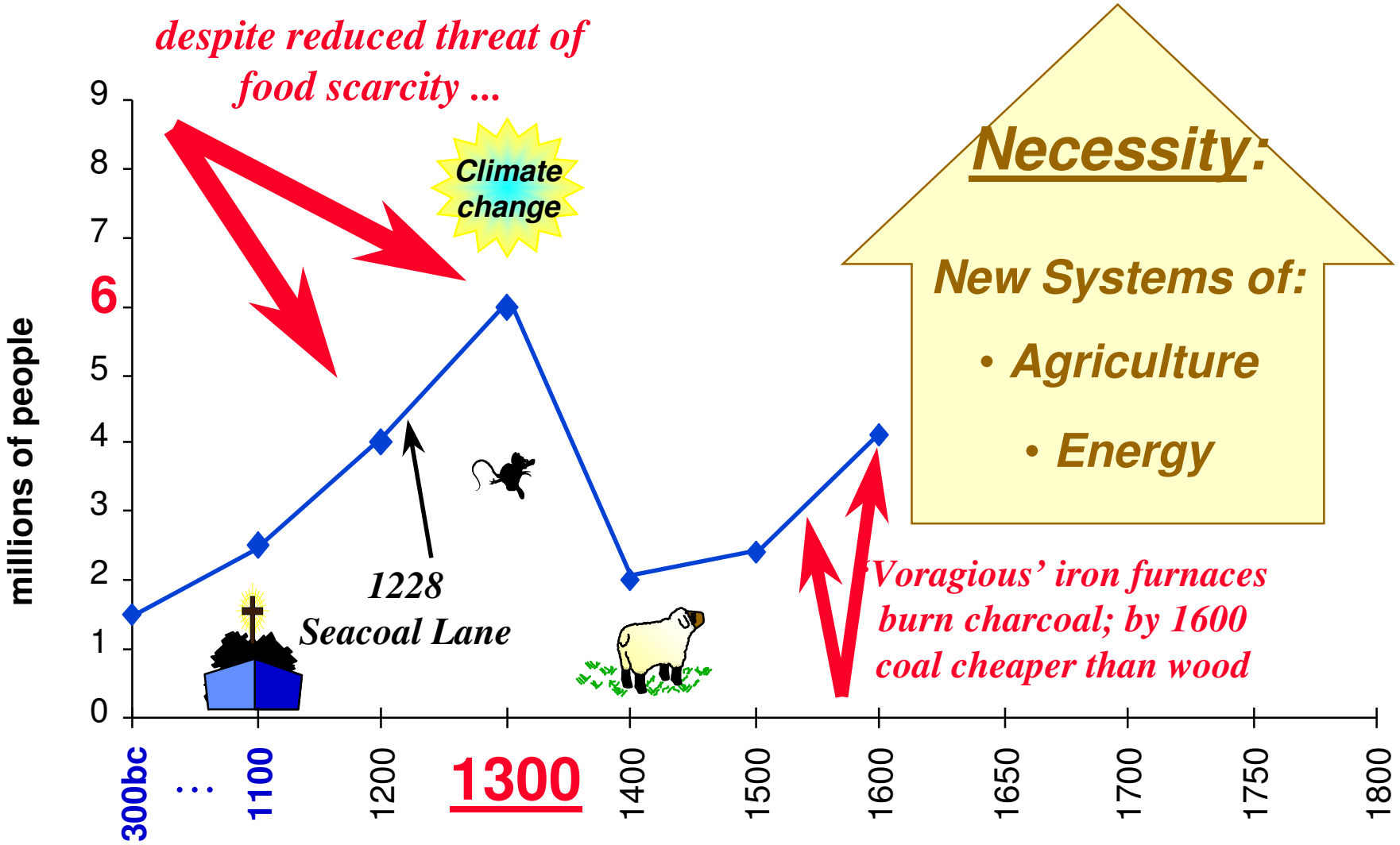
1630 - A New England Indian's View

"Why come the Englishmen hither?

It is because [they] want firing:
for ...
having burnt up the wood in one place ...
they are faine to follow the wood ..."

William Cronon, Changes in the Land: Indians, Colonists and the Ecology of New England. New York 1983, 1988, p. 49, quoting a letter from Roger Williams dated 1630

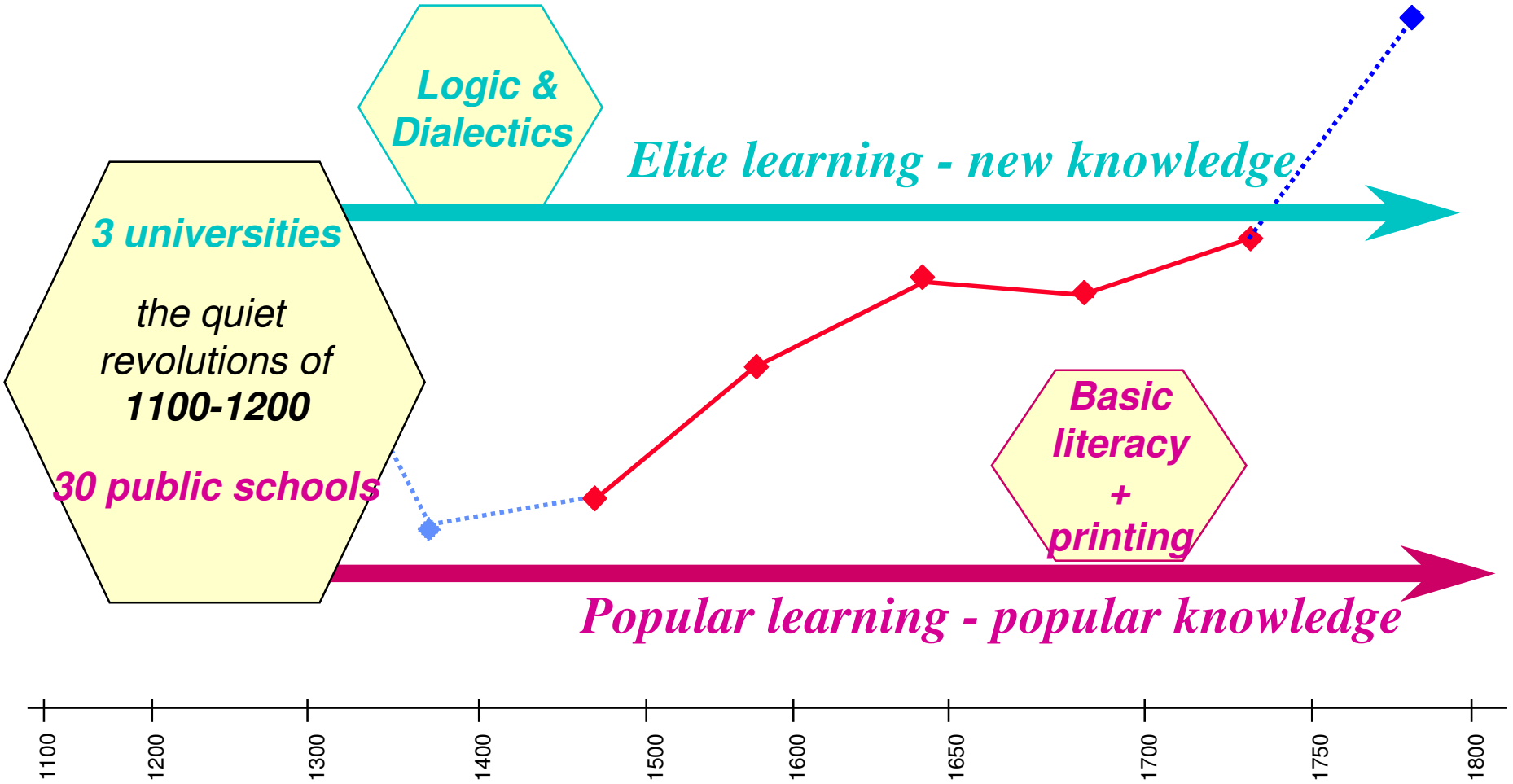
Necessity & the Origins of Invention



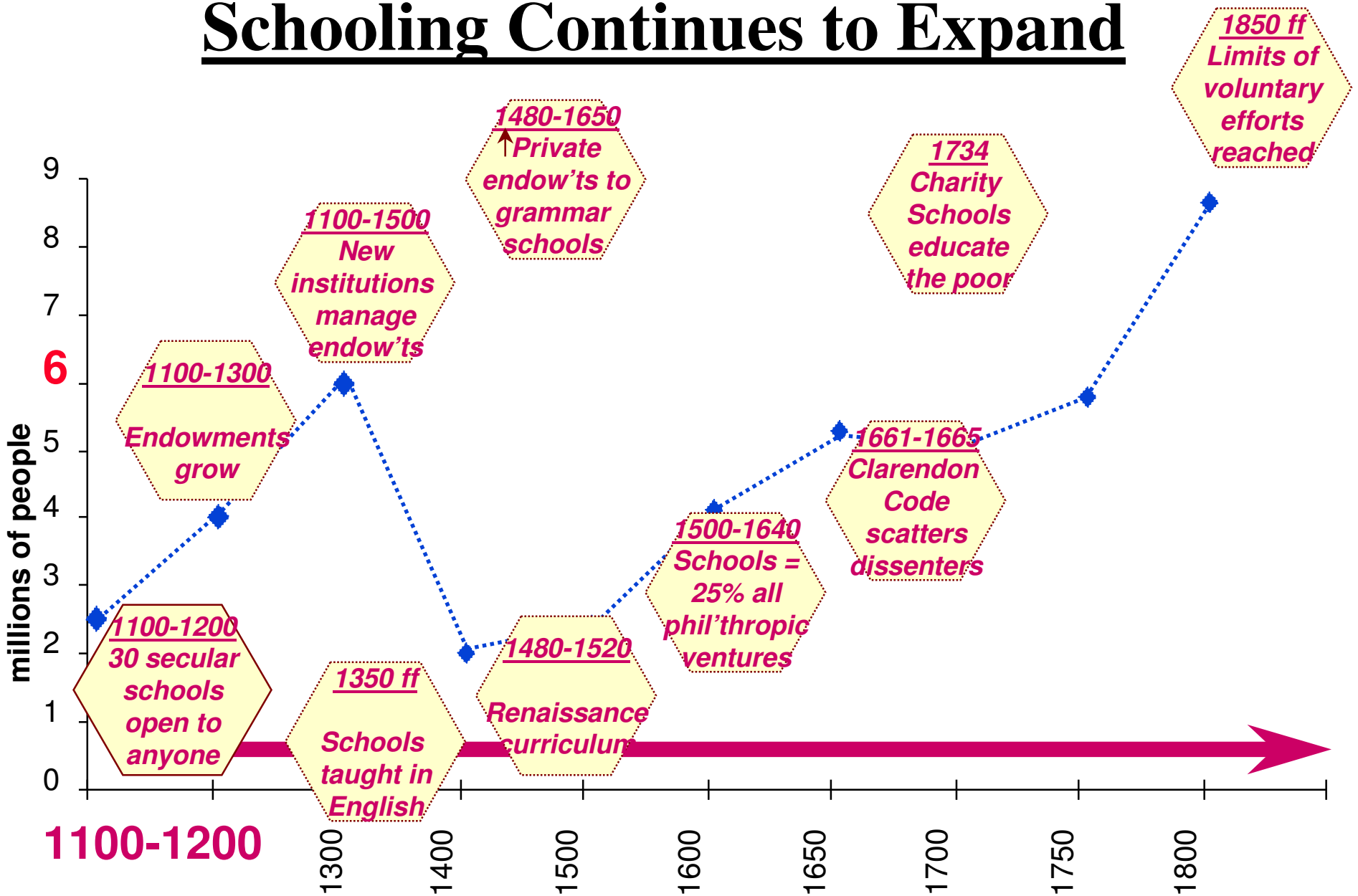
Learning:

Entering the Age of Learning

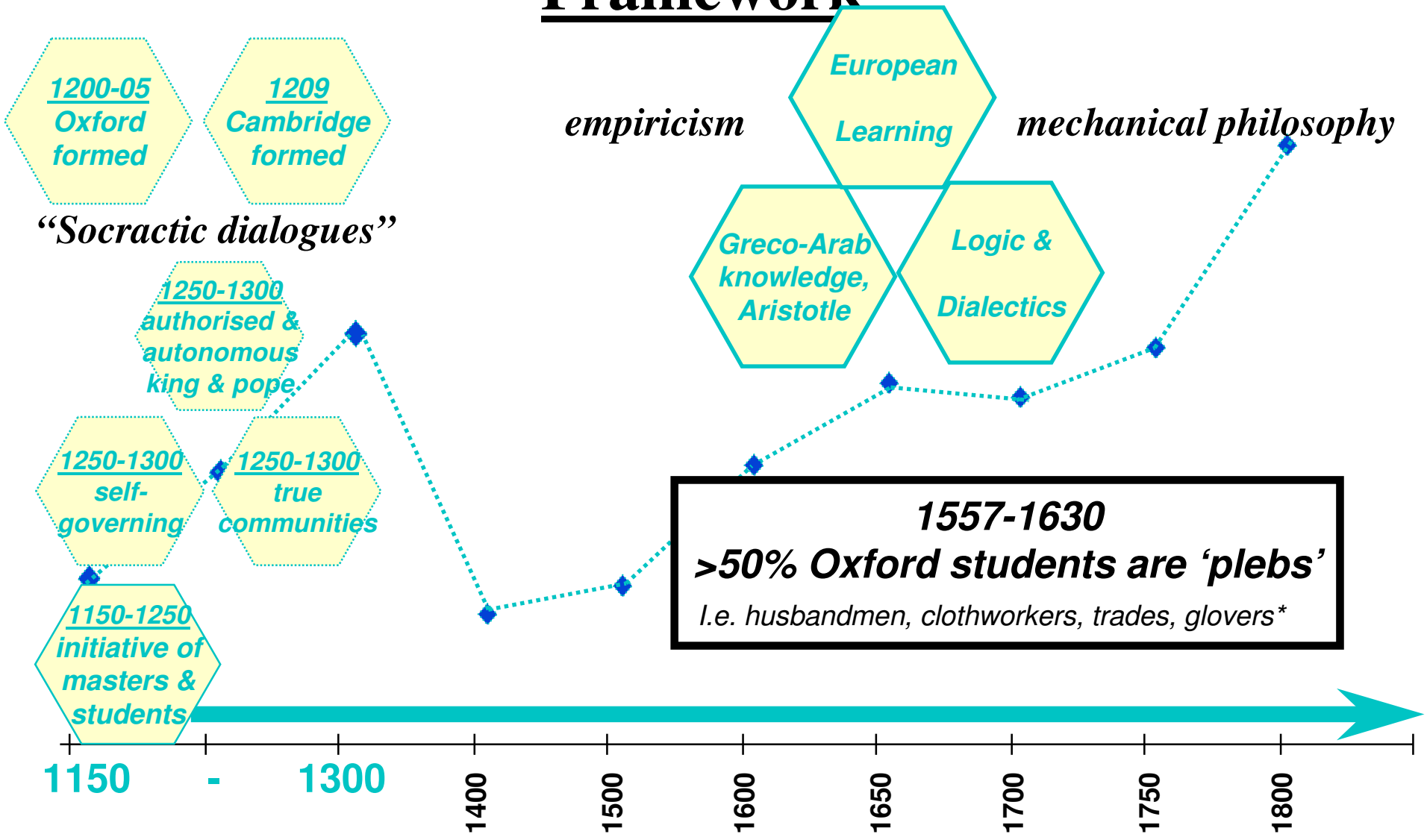
2 Important Drivers in the Age of Learning



Schooling Continues to Expand



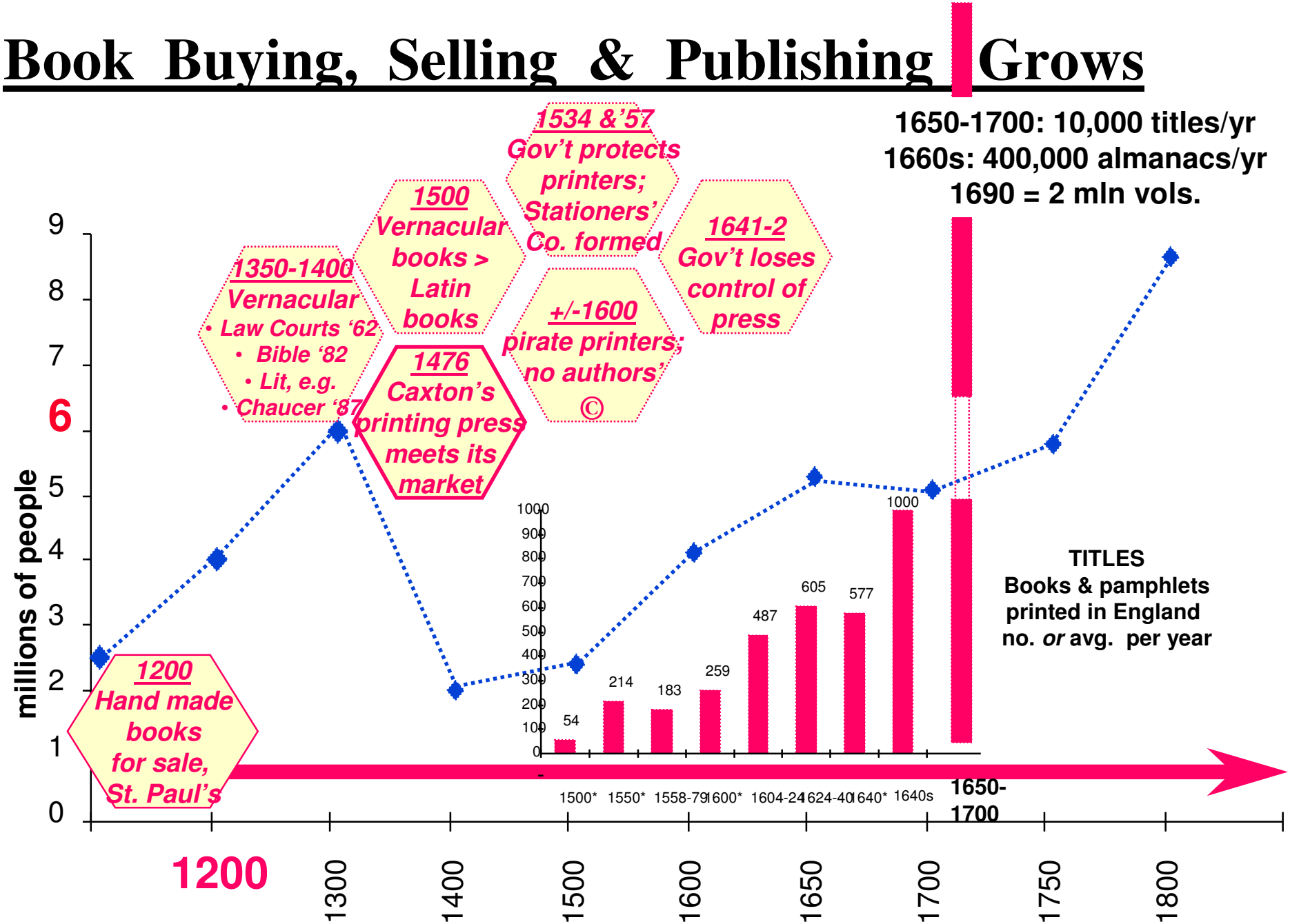
Spread of a New Method & Conceptual Framework



Re plebs: Nigel Whealey, *Writing and Society: Literacy, print and politics in Britain 1590-1660.* Routledge, London and New York, 1999, p. 37.

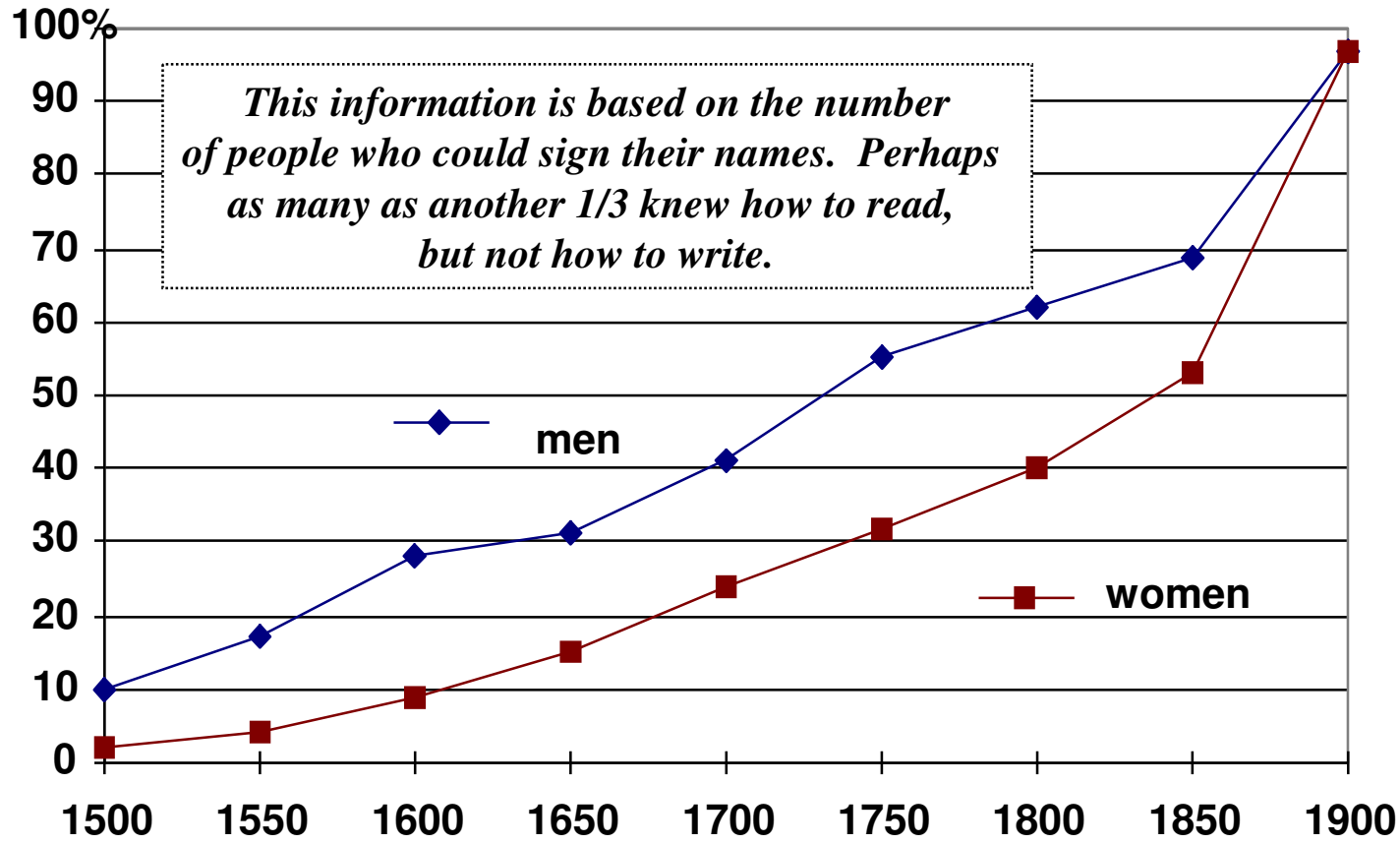
rest: from: Jacques Verger, "The Universities and Scholasticism", ch. 10 in The New Cambridge Medieval History, vol. 5, CUP, 1999, passim.

Book Buying, Selling & Publishing Grows



Average no. of titles from: Nigel Whealey, *Writing and Society: Literacy, print and politics in Britain 1590-1660.* Routledge, London and New York, 1999. *No. of titles from: Cecile M. Jagodzinski, Privacy and Print: Reading and Writing in Seventeenth-Century England. University*

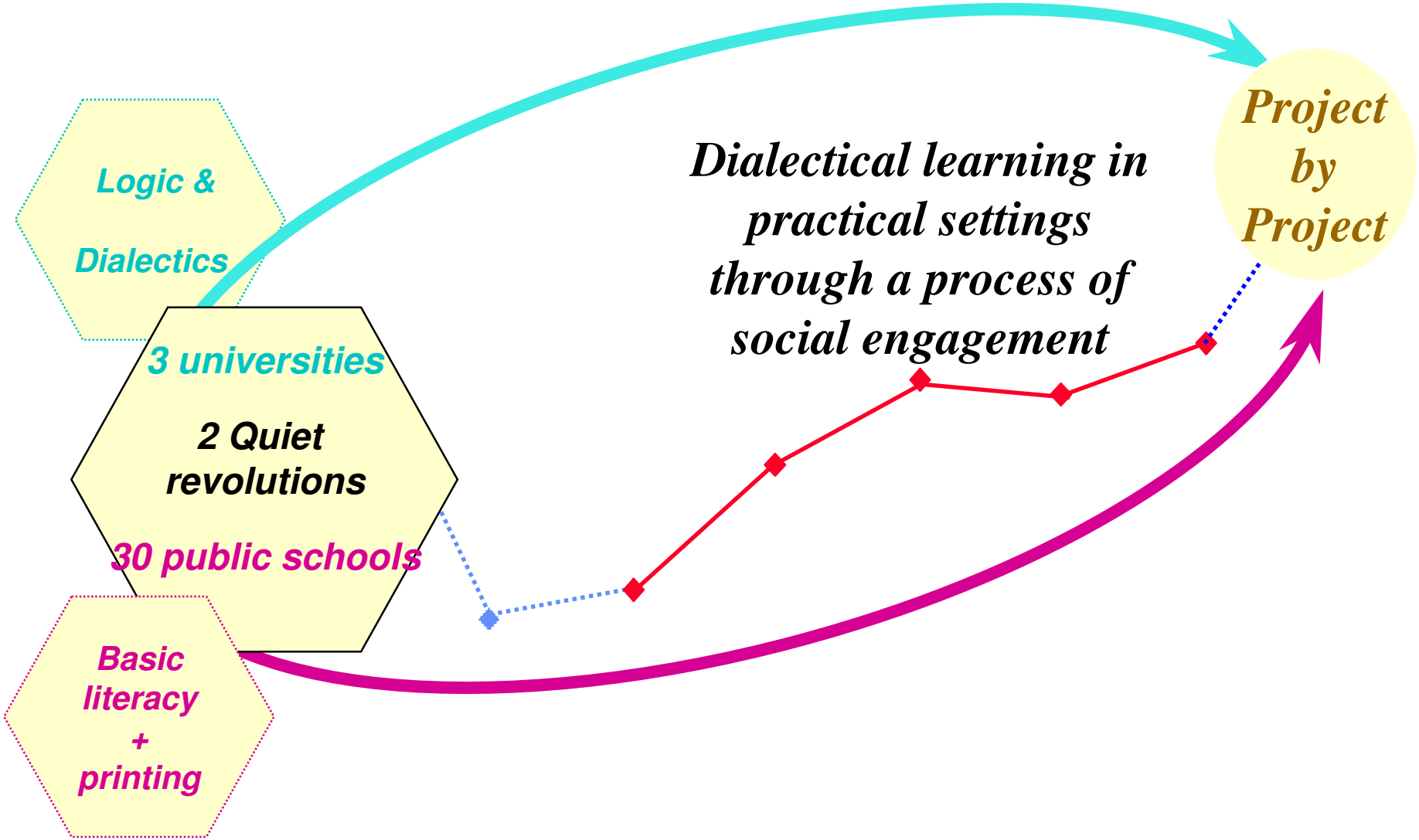
Englishmen & Women Learn to Sign



Literacy data from Literacy and the Social Order by David Cressy, Cambridge University Press, numbers read off graph on p. 177

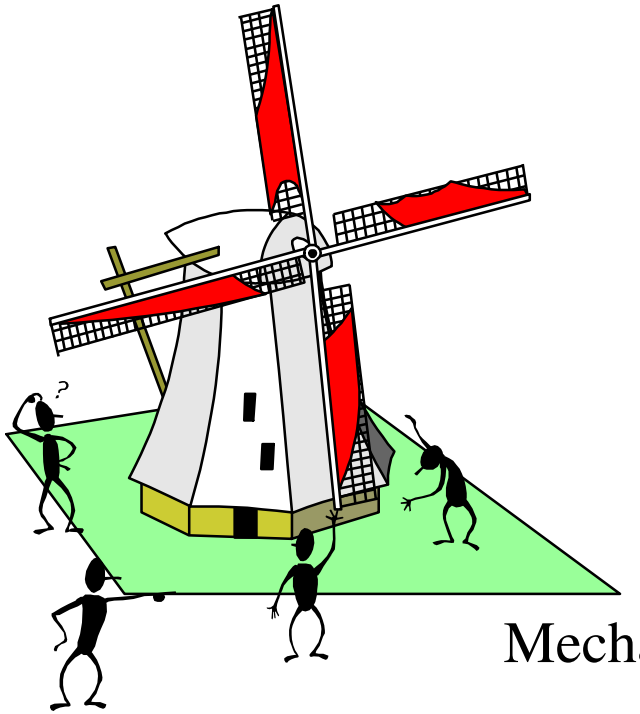
Estimate of reading from: Nigel Whealey, *Writing and Society: Literacy, print and politics in Britain 1590-1660.* Routledge, London and New York, 1999, p. 22.

Novelty: Creation of Shared Knowledge



Engagement

Engagement = Creative Societies



London

Knowledge of ideas

Chemists

Intimacy
&
Diversity
over the
Long Term
working
Project by Project

Mechanics

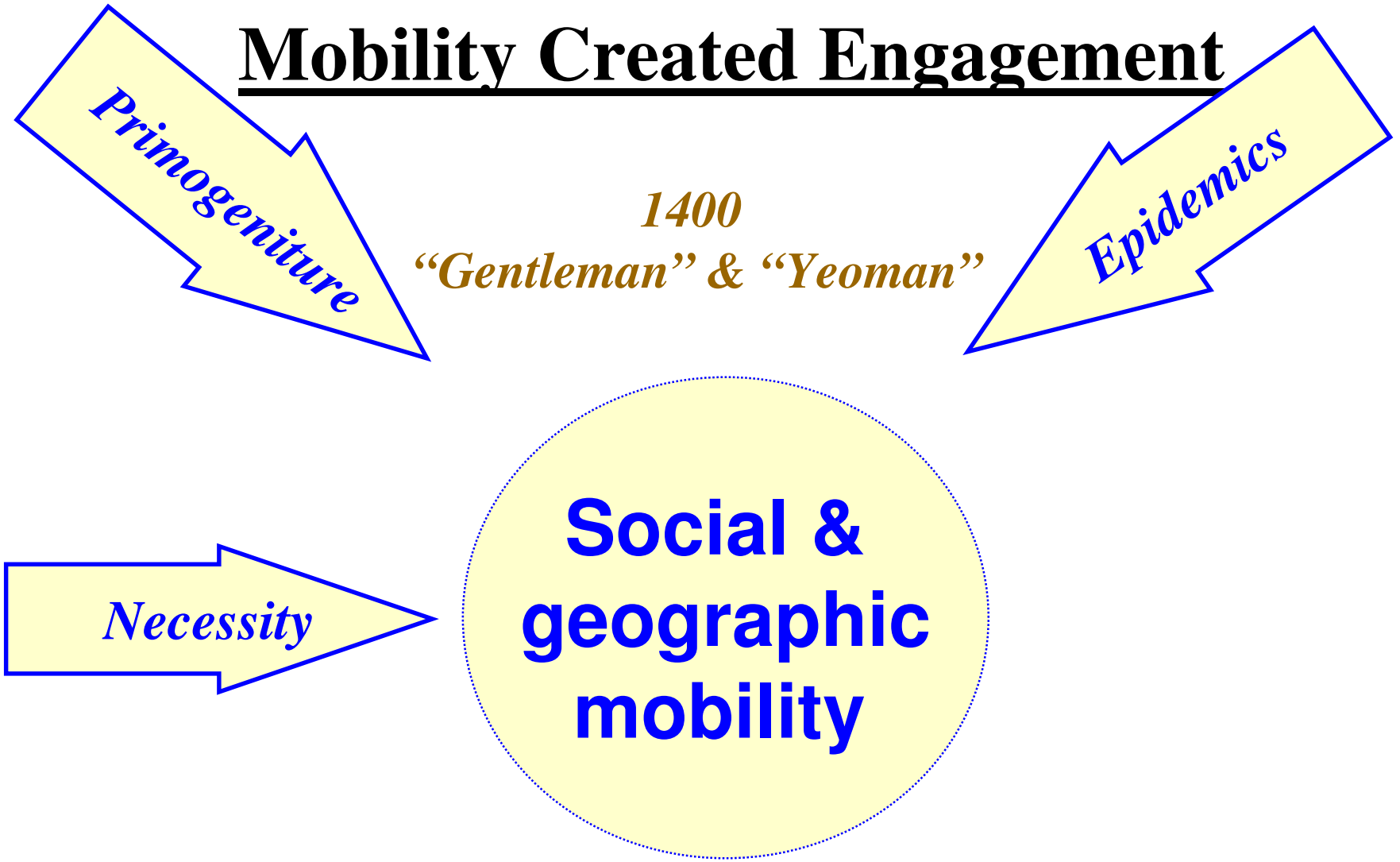
Explorers

Playwrights

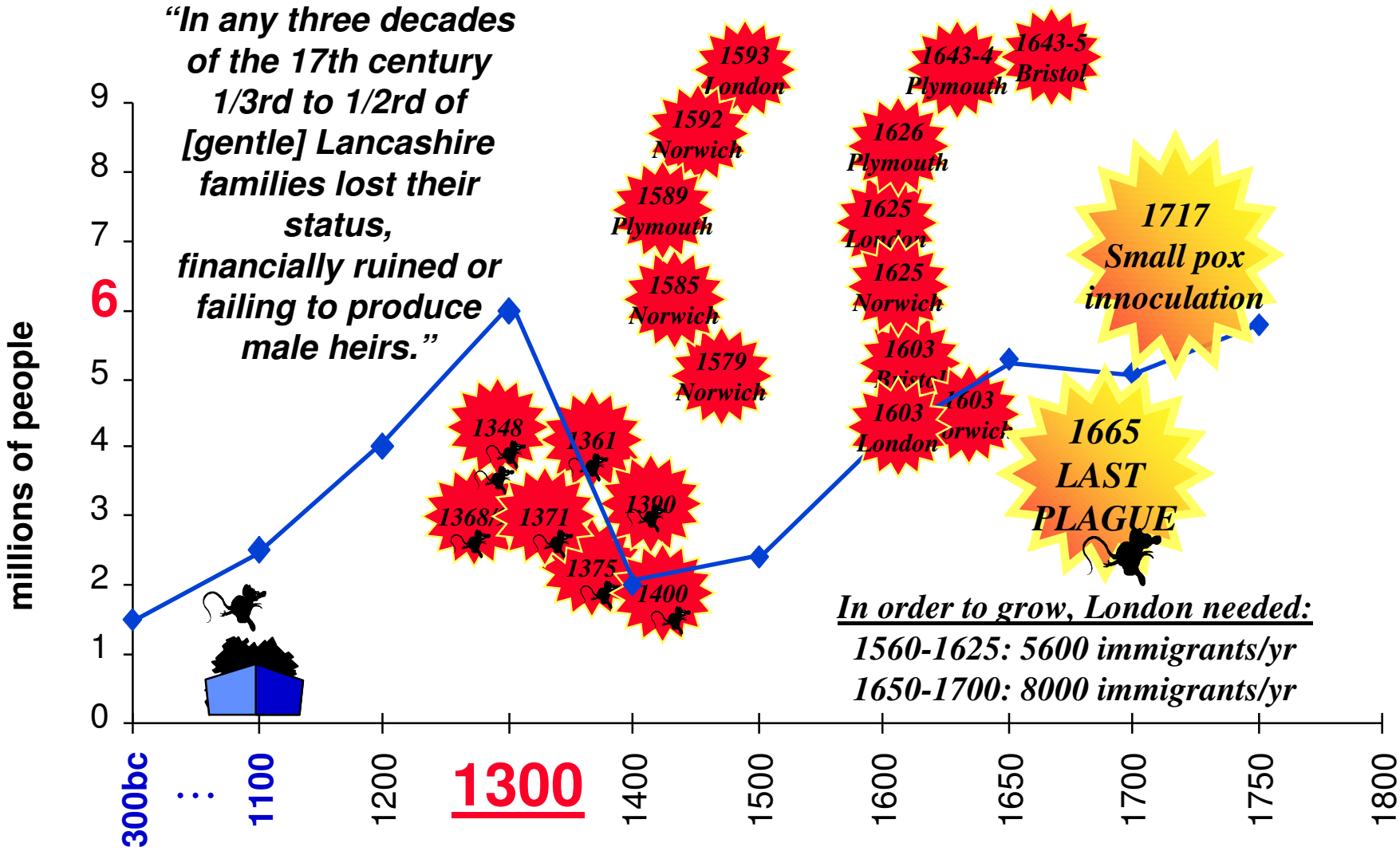
Knowledge in hands

Myddle

Mobility Created Engagement

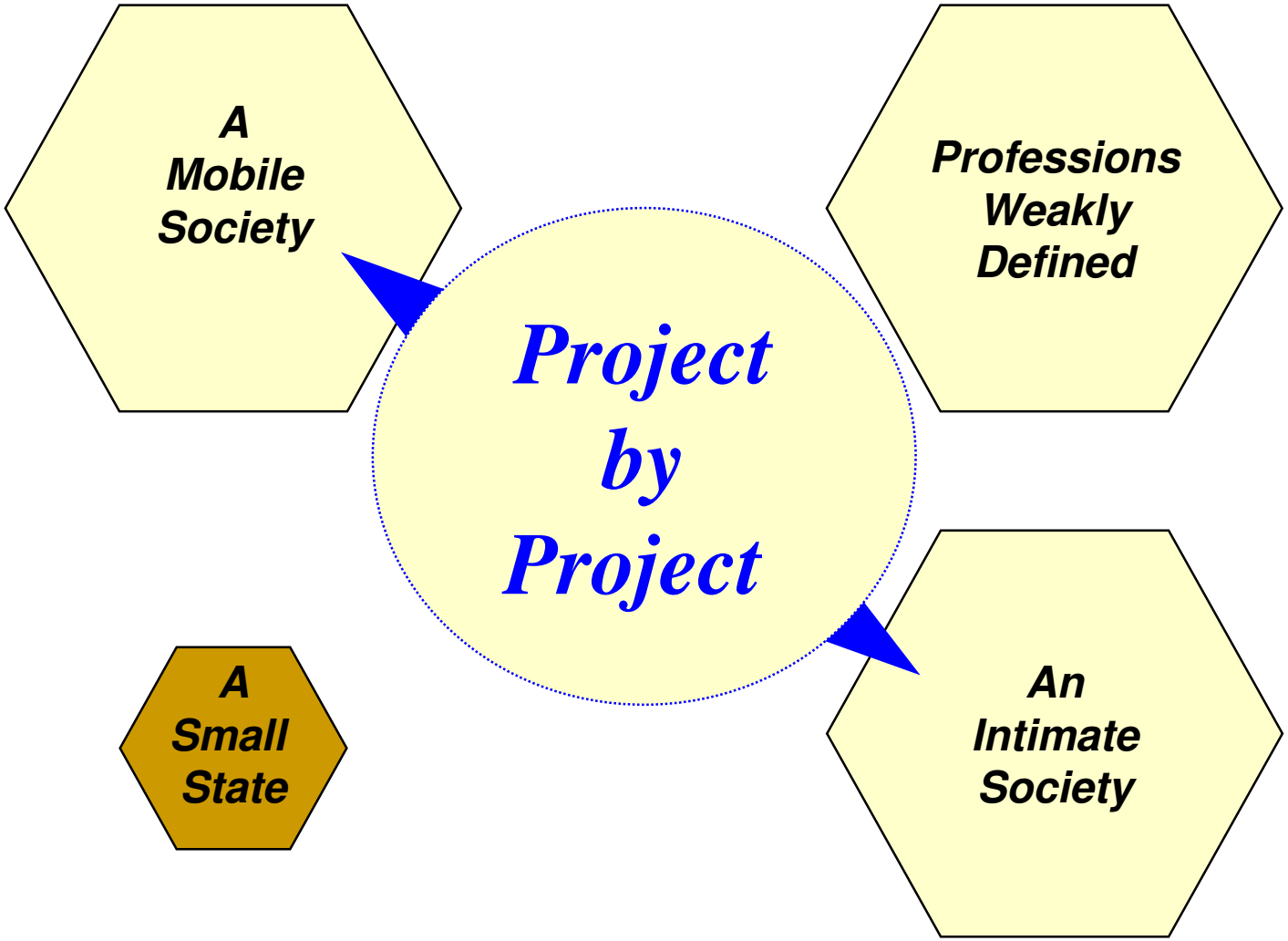


Primogeniture, Epidemics & Mobility

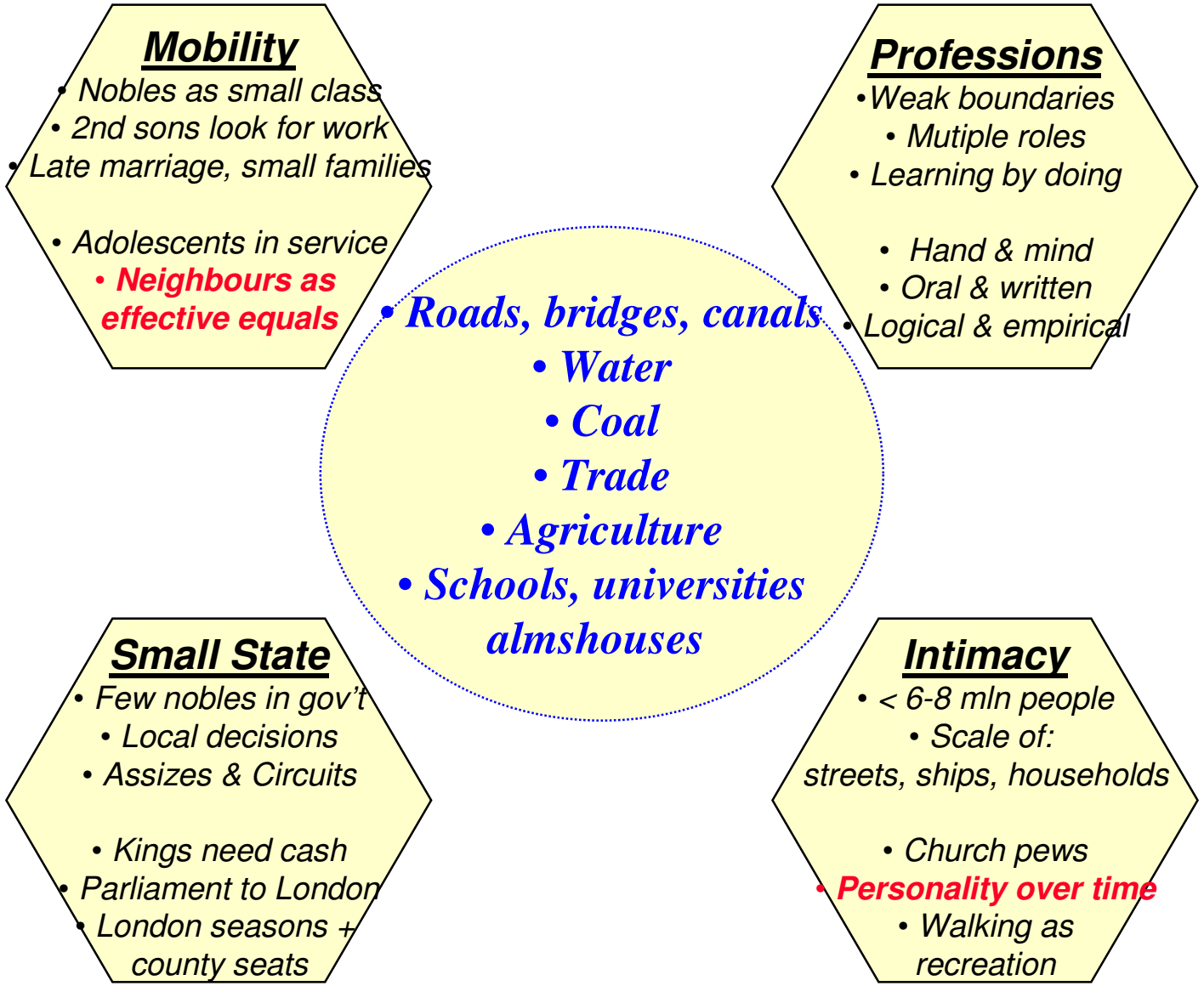


dates of epidemics & London population from: Keith Wrightson, English Society, 1580-1680, Routledge, 1982, p. 128; epidemics of 14thC. from "Health, Diet, Medicine & the Plague" by Simone, Macdougall in Chris Given-Wilson, An Illustrated History of Late Medieval England, Manchester University Press, 1996, p. 97; Lancashire quote from Nigel Whealey, Writing & Society, Routledge, 1999, p. 26

Engagem't thru Openness, Projects & Gossip



Face to Face Projects on a Human Scale



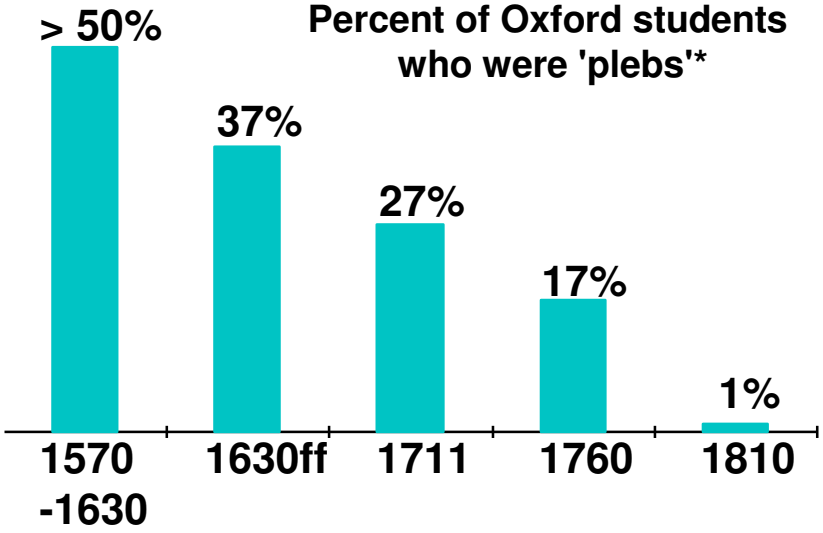
Creation of the "Dispersed University"

1660ff: Decline of Oxbridge & Inns

- ***higher fees***
- ***no dissenters allowed***
- ***loss of reputation at Inns of Court***

"Intellectual life was concentrated outside the universities and merged with practical affairs.

*The most remarkable was the **Lunar Society of Birmingham** in which men such as Watt, Boulton, Wedgewood, Joseph Priestley and Erasmus Darwin met and exchanged scientific, philosophical and technical information. Many of these societies started in coffee houses which served not only as centres of business an the spreading of news, but as potential learned societies."*



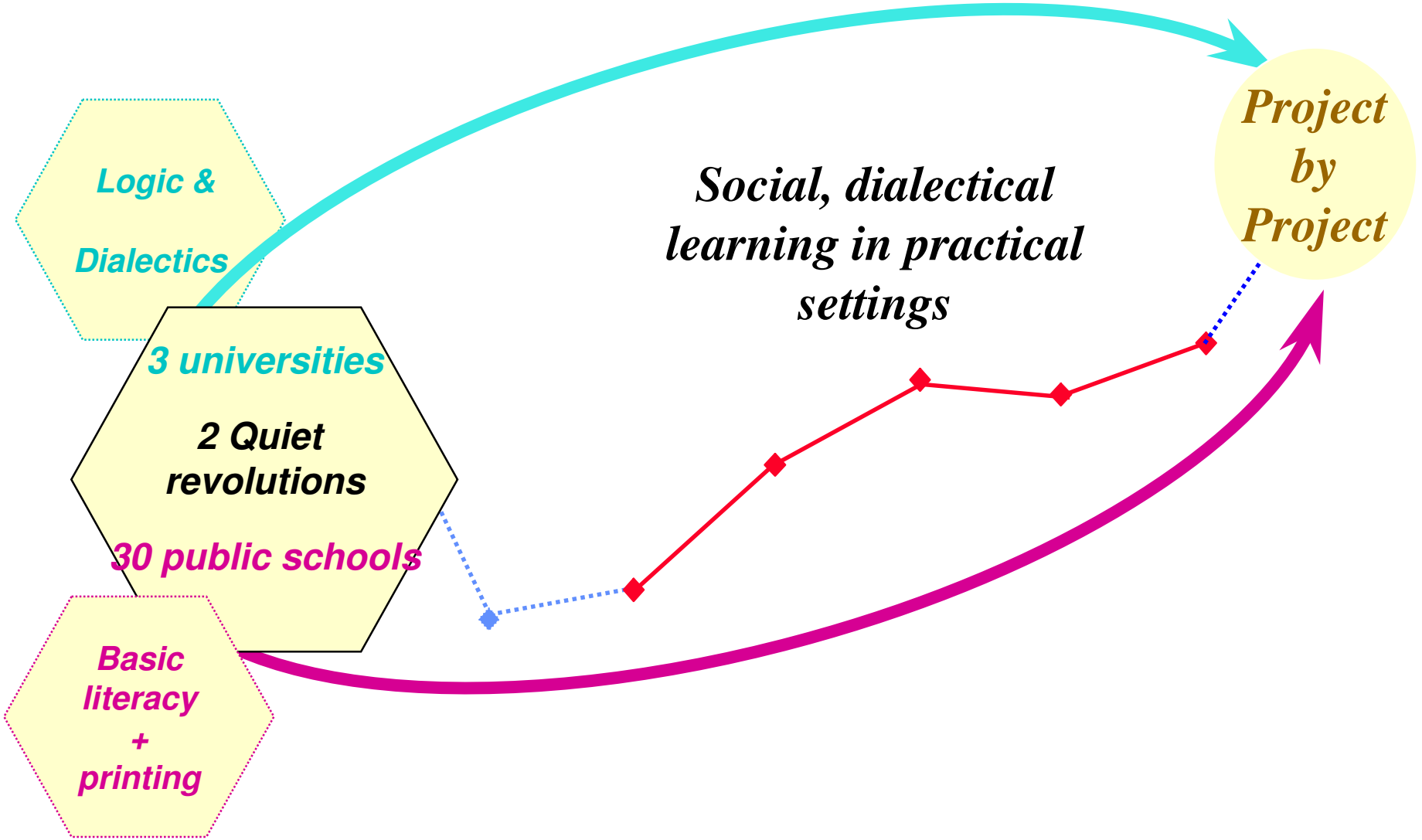
*husbandmen, clothworkers, trades, glovers

Oxford data from: Nigel Whealey, Writing & Society, Routledge, 1999, p.37, quotation from: M.D. Shipman, Education & Modernisation. Faber & Faber, 1971, p. 100.

To be a 'gentleman':

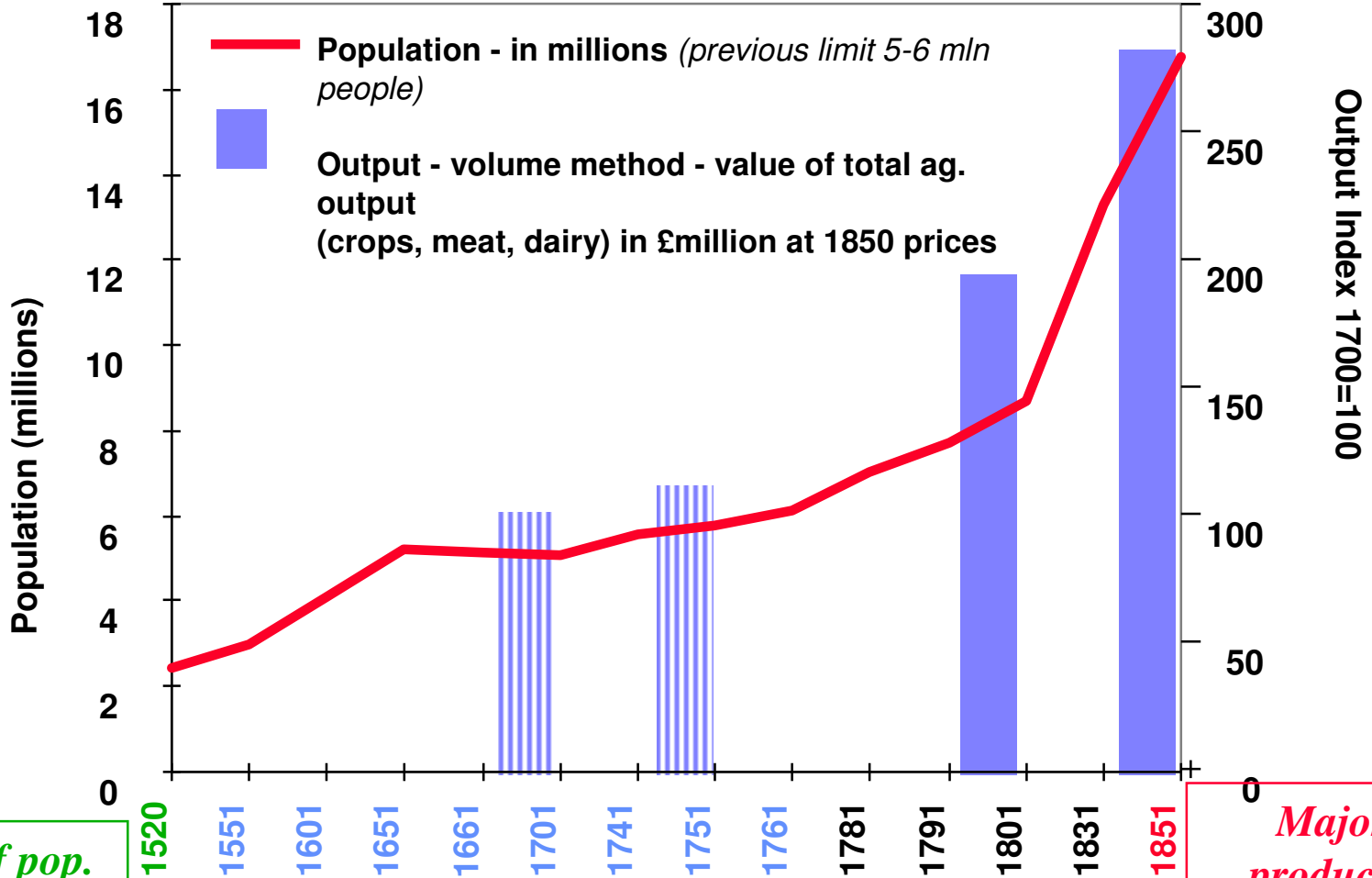
Leisure, wealth & learning

Learning & Engagement: Drivers of Change



Where Technology Fits In...

Estimates of English Agricultural Output 1520--1850



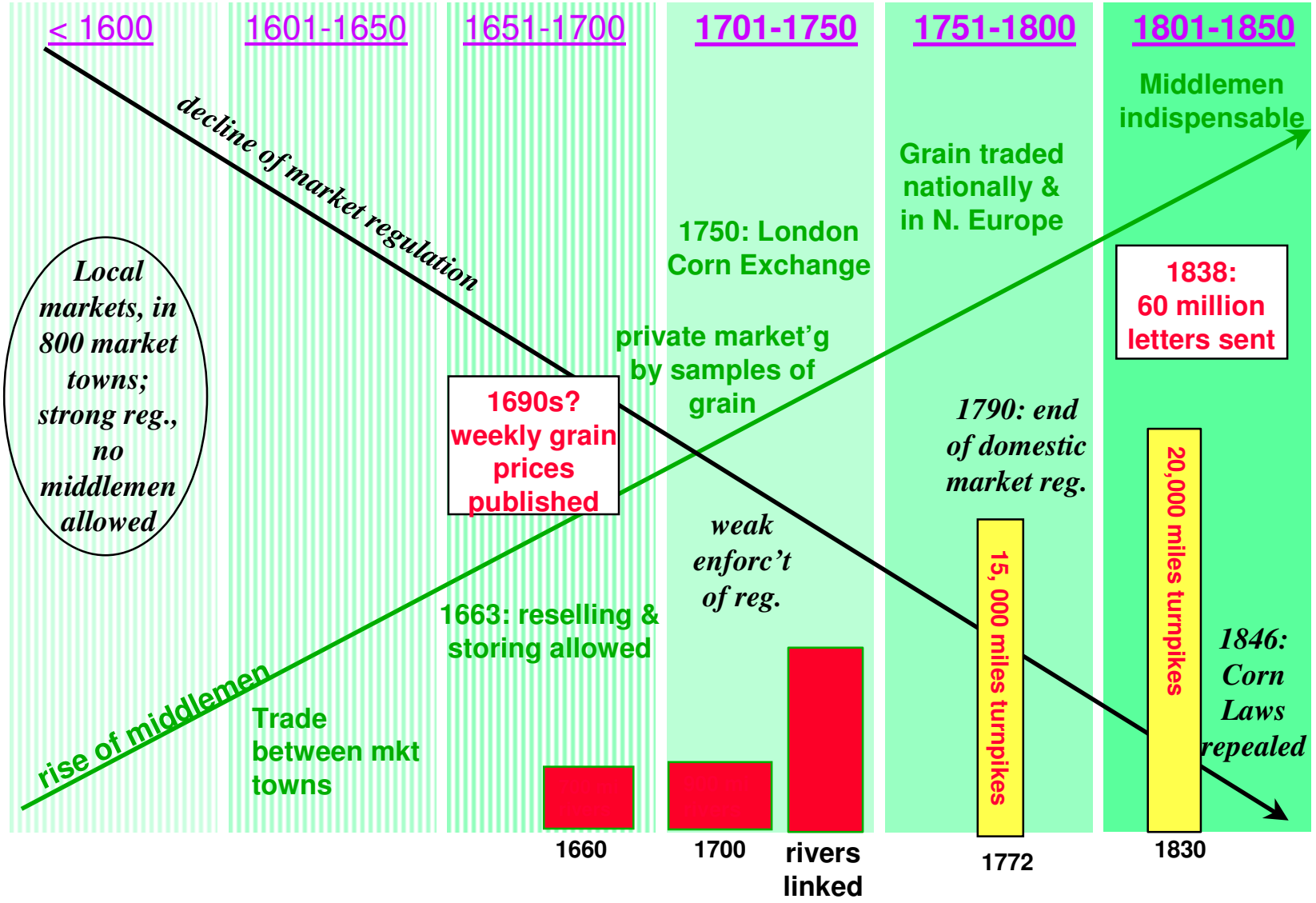
80% of pop. in agric. for own family

Majority produce for family & markets

Mark Overton, Agricultural Revolution in England ... 1500-1850, 1996, p.75 & p.8

Development of Markets: 1701-1750

Middlemen, transport & prices that signal necessity



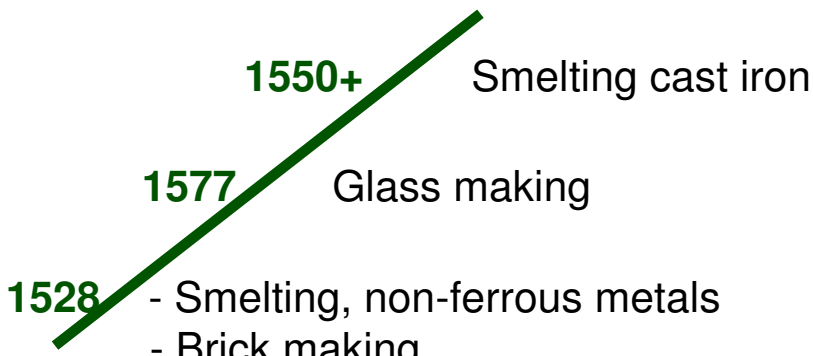
Mark Overton, Agricultural Revolution in England ... 1500-1850, 1996, 137-47 passim

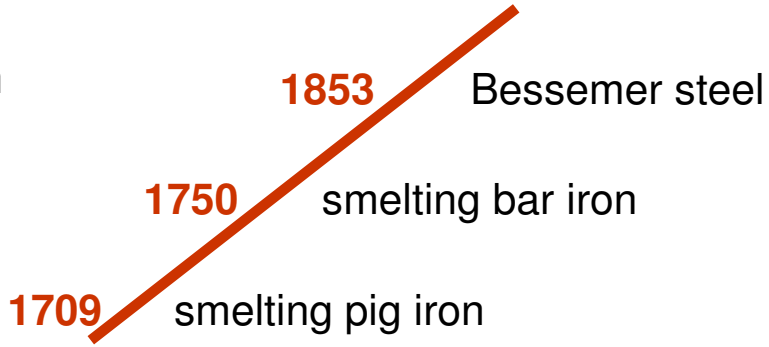
Development & Diffusion of Technology

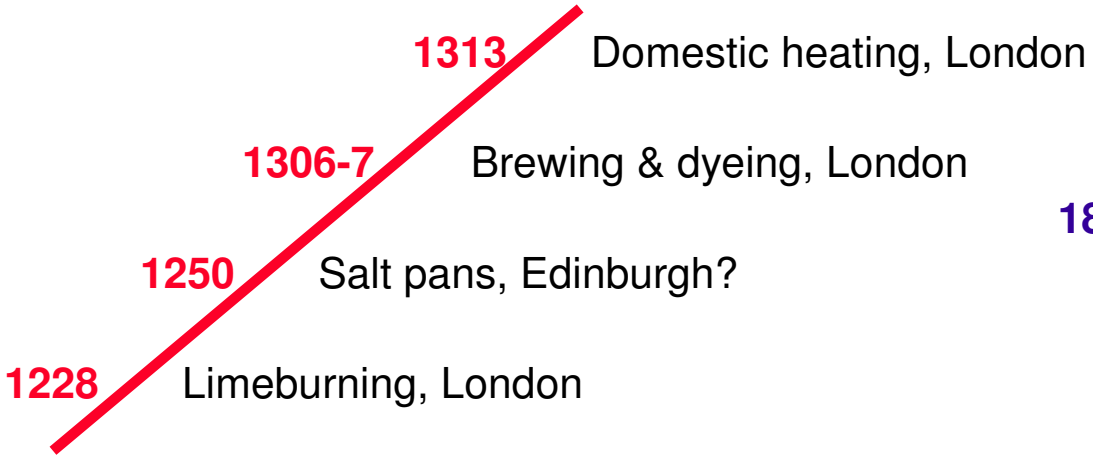
	< 1600	1601-1650	1651-1700	1701-1750	1751-1800	1801-1850	1851-1900
DIFFUSING					1770s Jethro Tull seed drill imitated 1790s R'm plough made in local foundaries	Norfolk system* spreads widely 1835 scythes widespread 1830s ag. engin'g indus. dev'd	1870 80% of wheat harvest'd with scythes 1850s seed drill widely used
LEARNING			Upsurge in ag. writing 1664 Royal Society studies ag. practices		1767 Royal Lancashire Ag. Society 1770s 1st local farmers' assoc.	1845 Circencester Ag'l College 1838 Royal Ag. Society of Eng. 1803 23 local farmers' assoc.	1850s wide range of farm'g journals: 17,000 readers 1855 700 local farmers' assoc.
INTRODUCING	1500s designs for seed drills published	1630 turnips* known as fodder crop	1650s clover* appears as fodder crop	1731 Jethro Tull's seed drill 1730 new R'm plough patented	1799 scythes introduced in S. Engl'd		

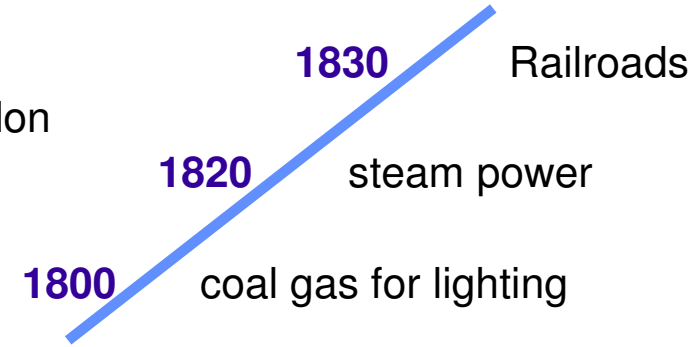
Mark Overton, Agricultural Revolution in England ... 1500-1850, 1996, 122-32, passim

Uses of Coal in England Over Time









Rise of Coal in Iron & Steel

Invention

1650
Dud Dudley
New ironworks
nr Bristol
=> law suit
(fails)

1709
A. Darby smelts
pig iron using
coke

1709
Profits from
pots
not bar iron

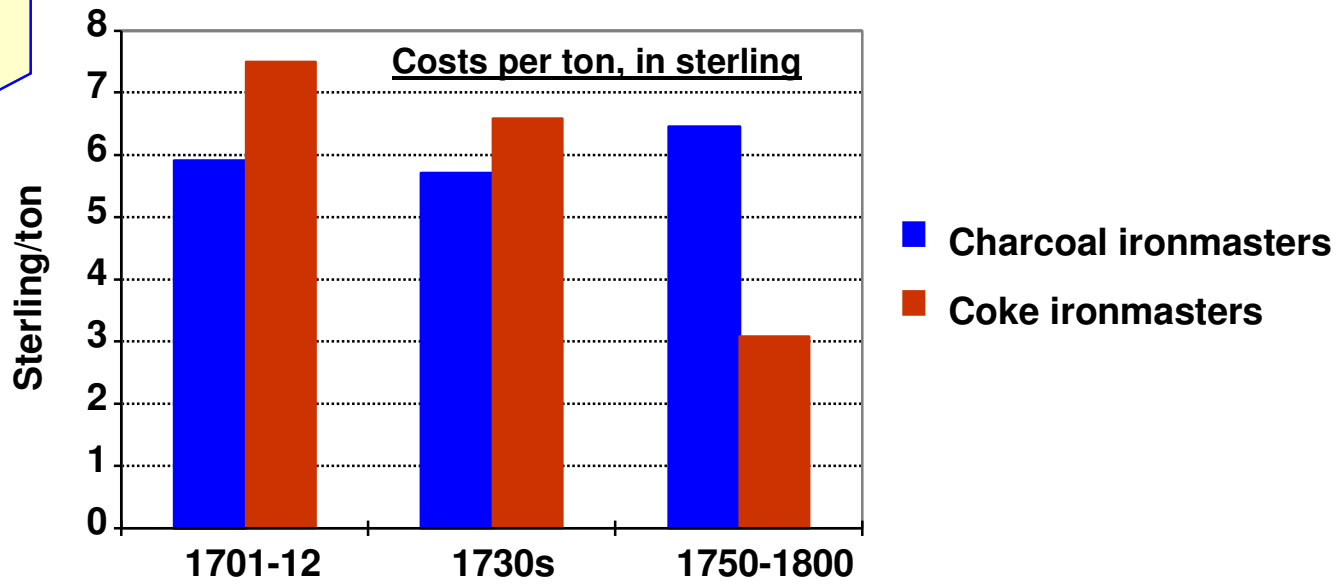
Diffusion

1750-1800
Coke replaces
charcoal
in ironmaking

Improvement

1828
Neilson's hot
blast furnace
in Scotland

1853
Mr.
Bessemer's
demonst'n



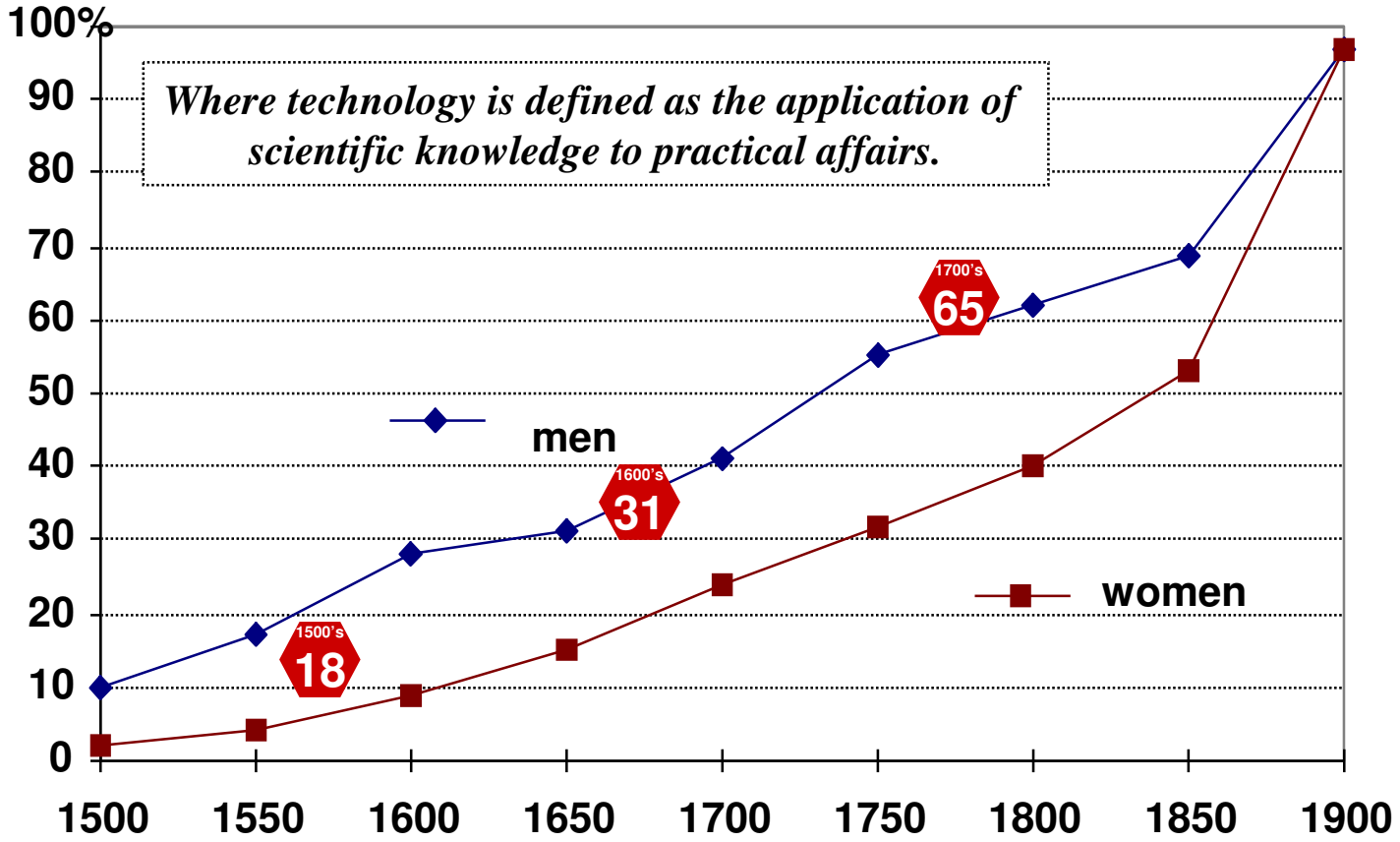
1750-1800: Prices signal necessity
differential largely due to rise in charcoal prices + fall in coked coal prices

Charles K. Hyde, Technological Change & the British Iron Industry, 1700-1870, Princeton U. Press, 1977, chapters 2 & 3..

1800's
152

Technology Tracks Social Learning

pulled along by price signals of necessity



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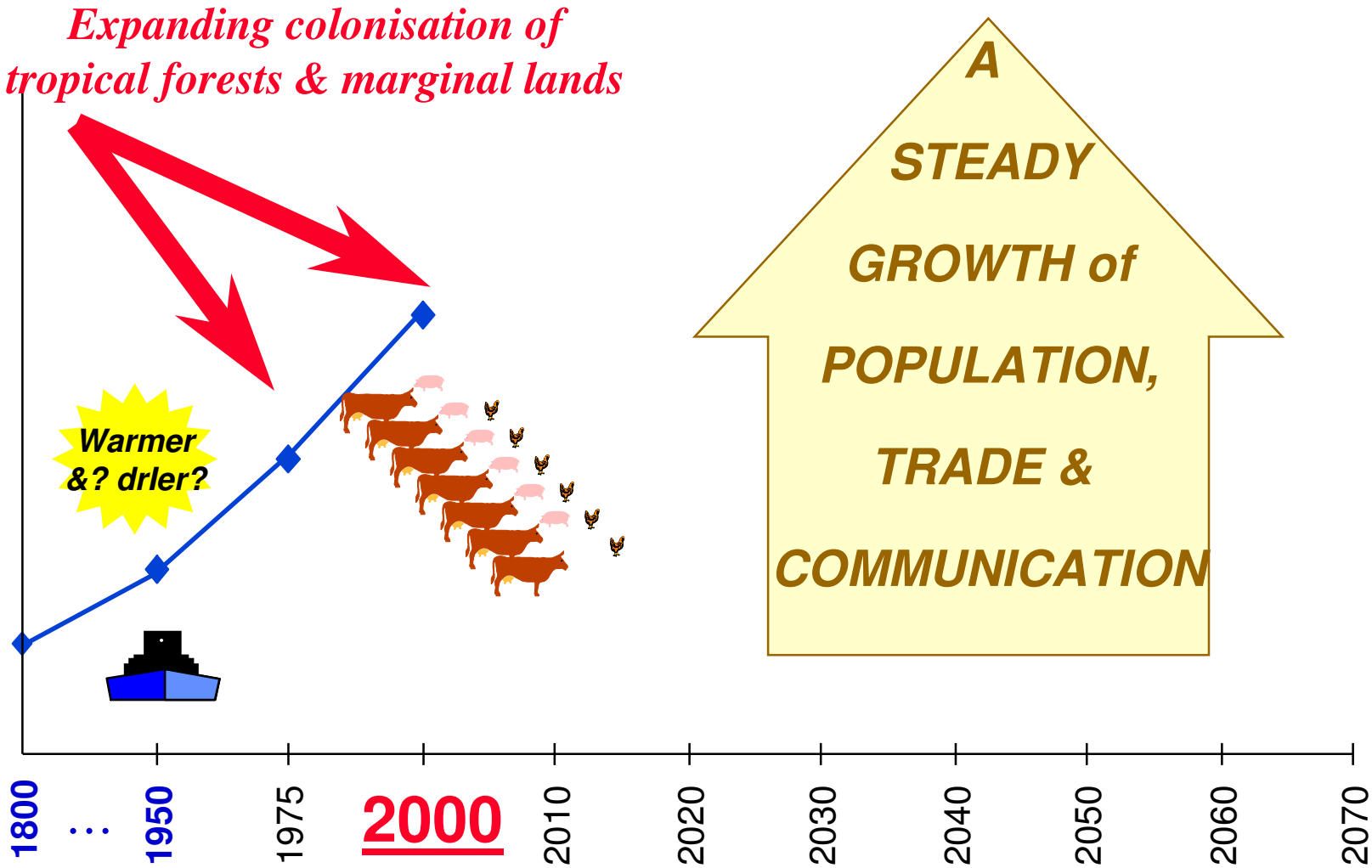
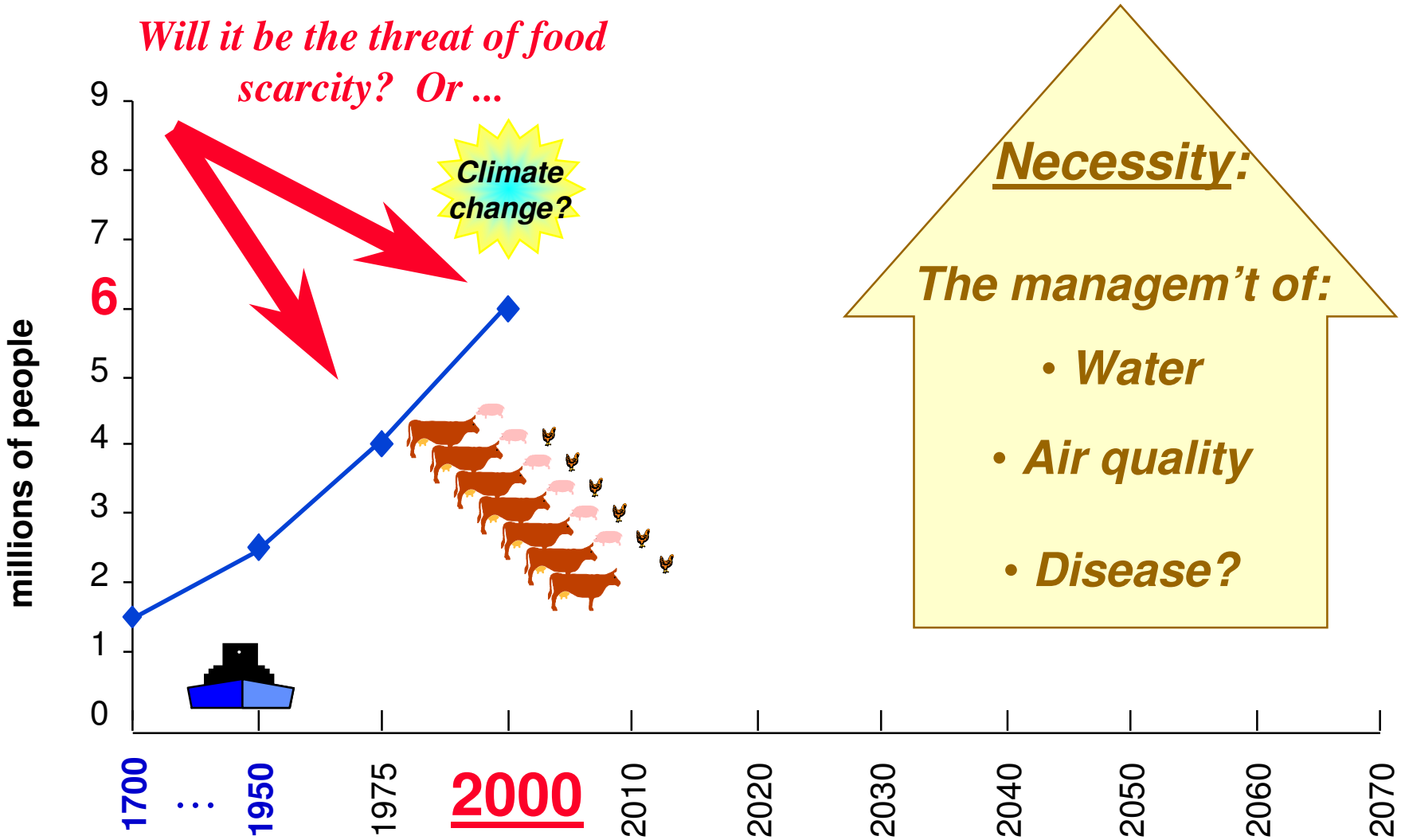
Technology data from The Timetables of History by Bernard Grun. Simon & Schuster, New York, 1979, from the column 'Science, Technology, Growth' passim.

III. What Are the Analogies?

200 Years of Expansion & Innovation,



What Might Be the New Necessity?

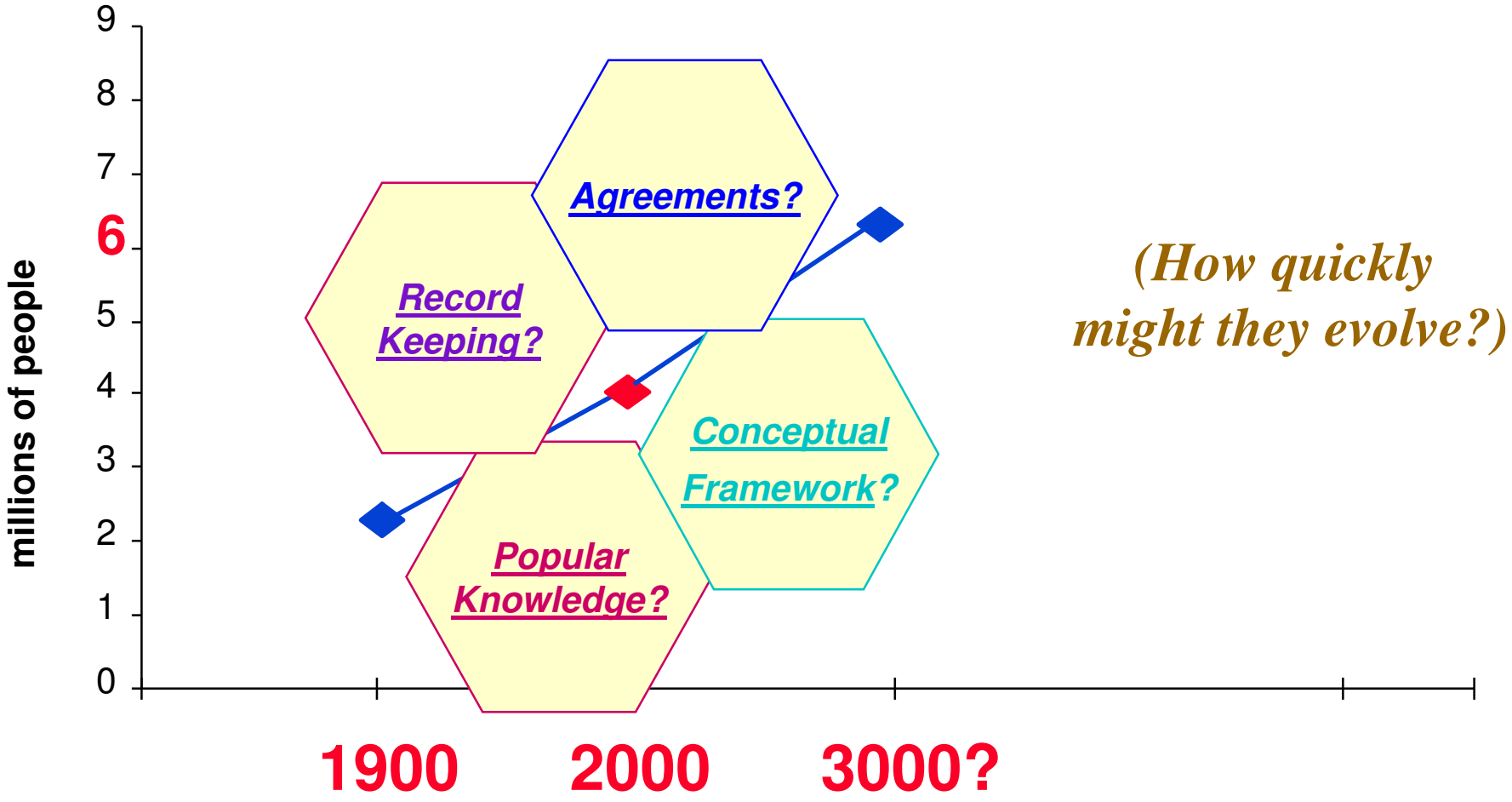


Necessity:

The managem't of:

- *Water*
- *Air quality*
- *Disease?*

What Are Today's Experiments?



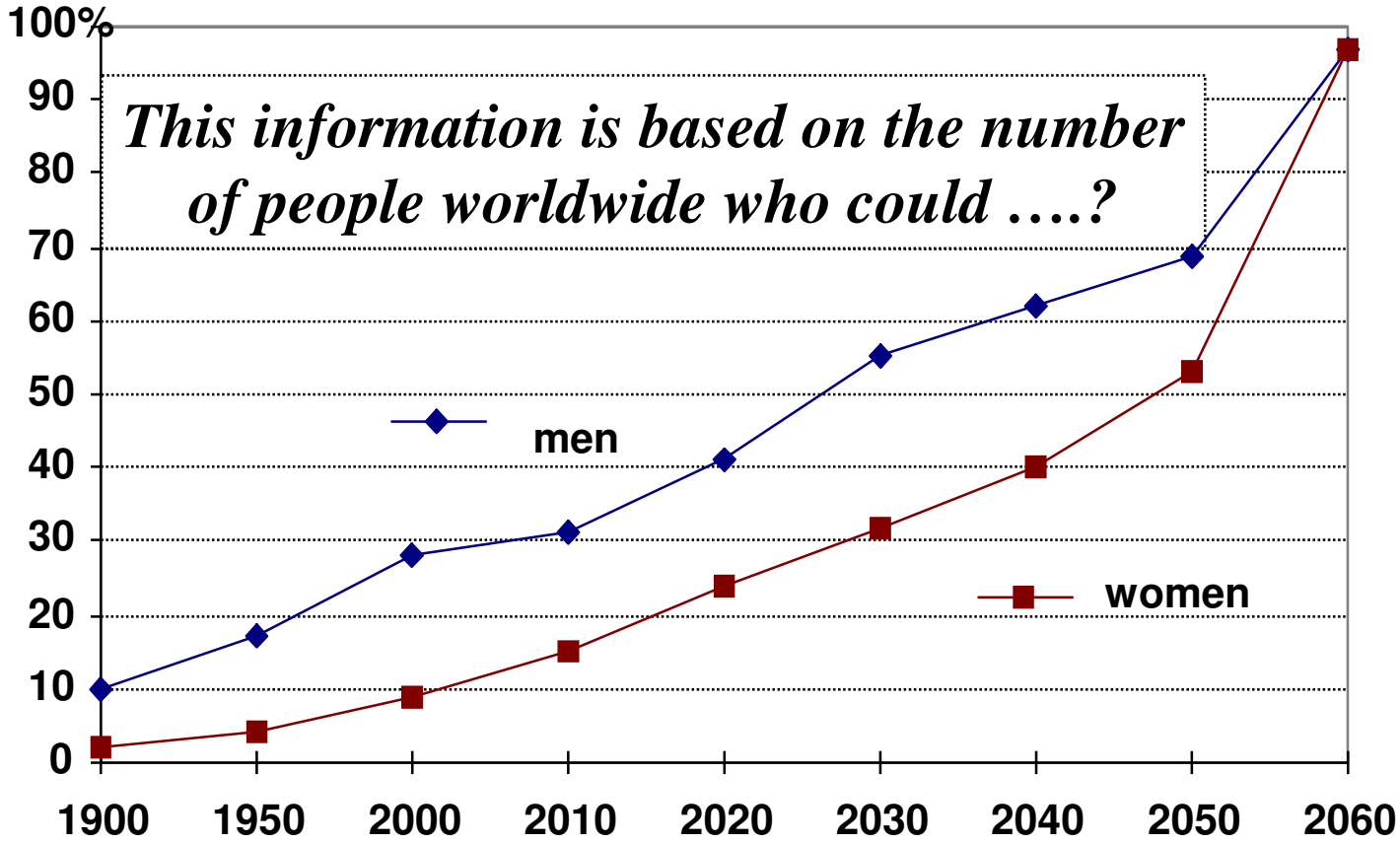
(How quickly might they evolve?)

What Will Be the Conceptual Framework?

Predictable homogeneities?

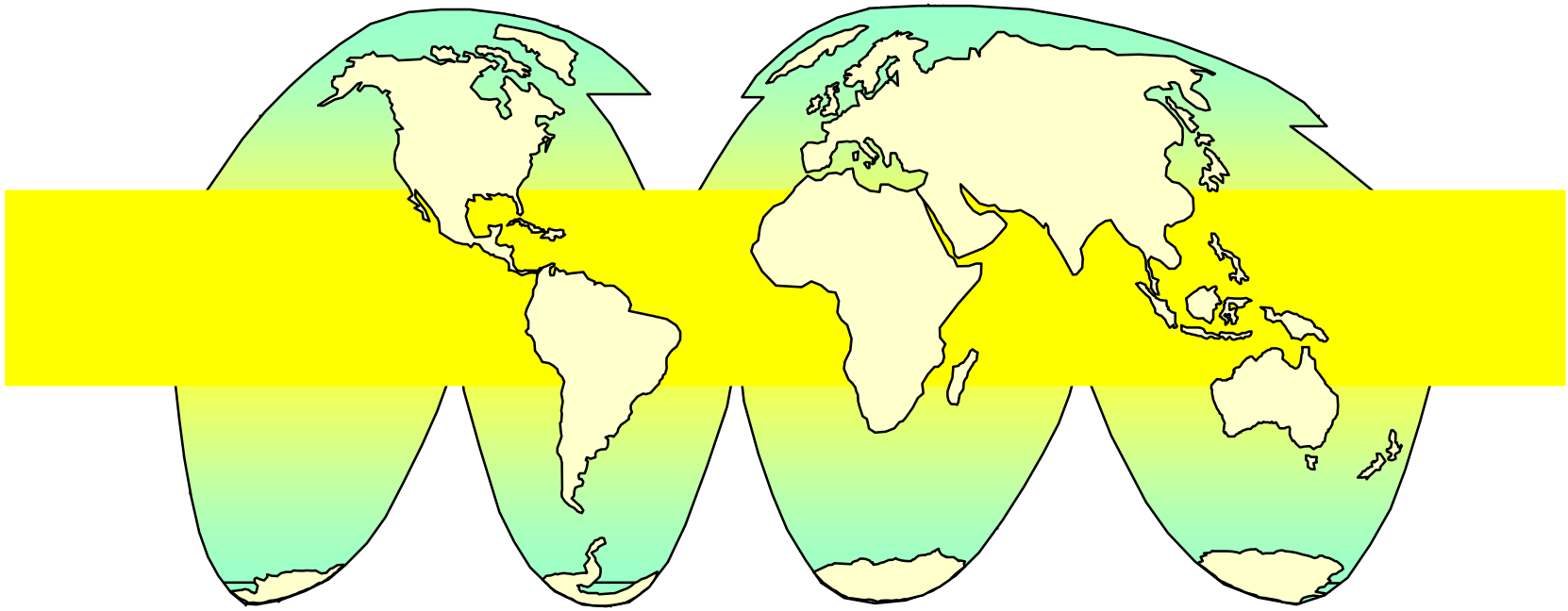
Or diverse, resilient mosaics?

What Will Be the Necessary Universal Skill?



What Will Be the Important Engagements?

Biodiversity increases in the tropics.



The most populous developing countries are also in the tropics.

Is there a form of non-industrial modernisation?

Where Will We Find a Workable Scale?

Intimacy?

- *< 6-8 mln people*
- *Scale of:*

streets, ships, households

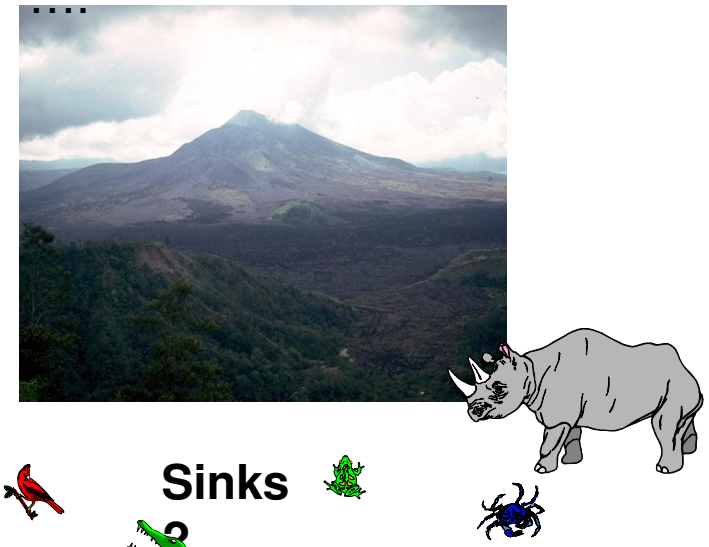
- *Church pews*
- *Personality over time*
- *Walking as recreation*

Where will we engage face to face over the long term?

What Will Be the Price Signals?

There is a clear market for eggs, fruits & vegtables

Where is the market for ….



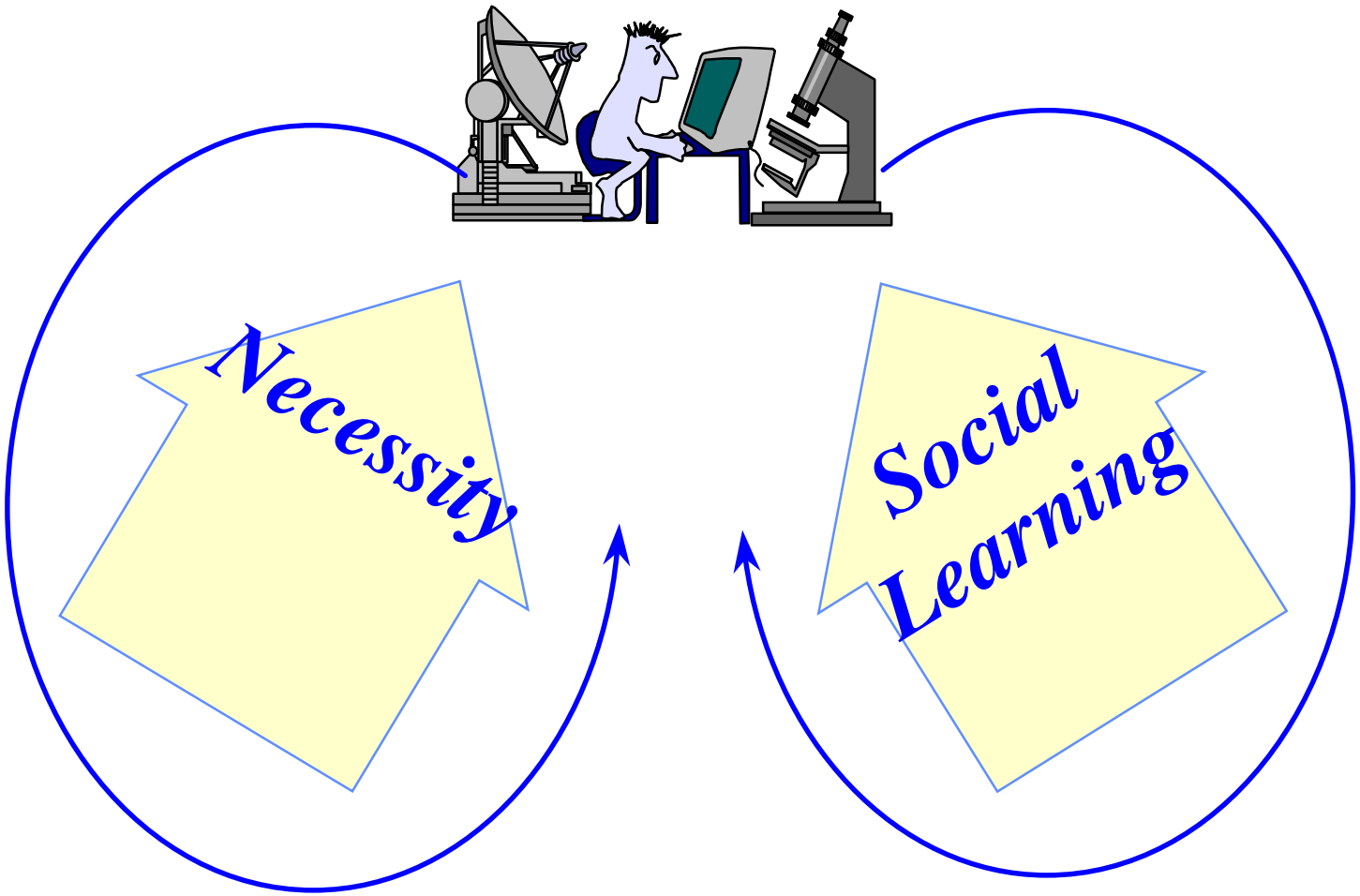
Sinks ?

Non-use of Resources ?

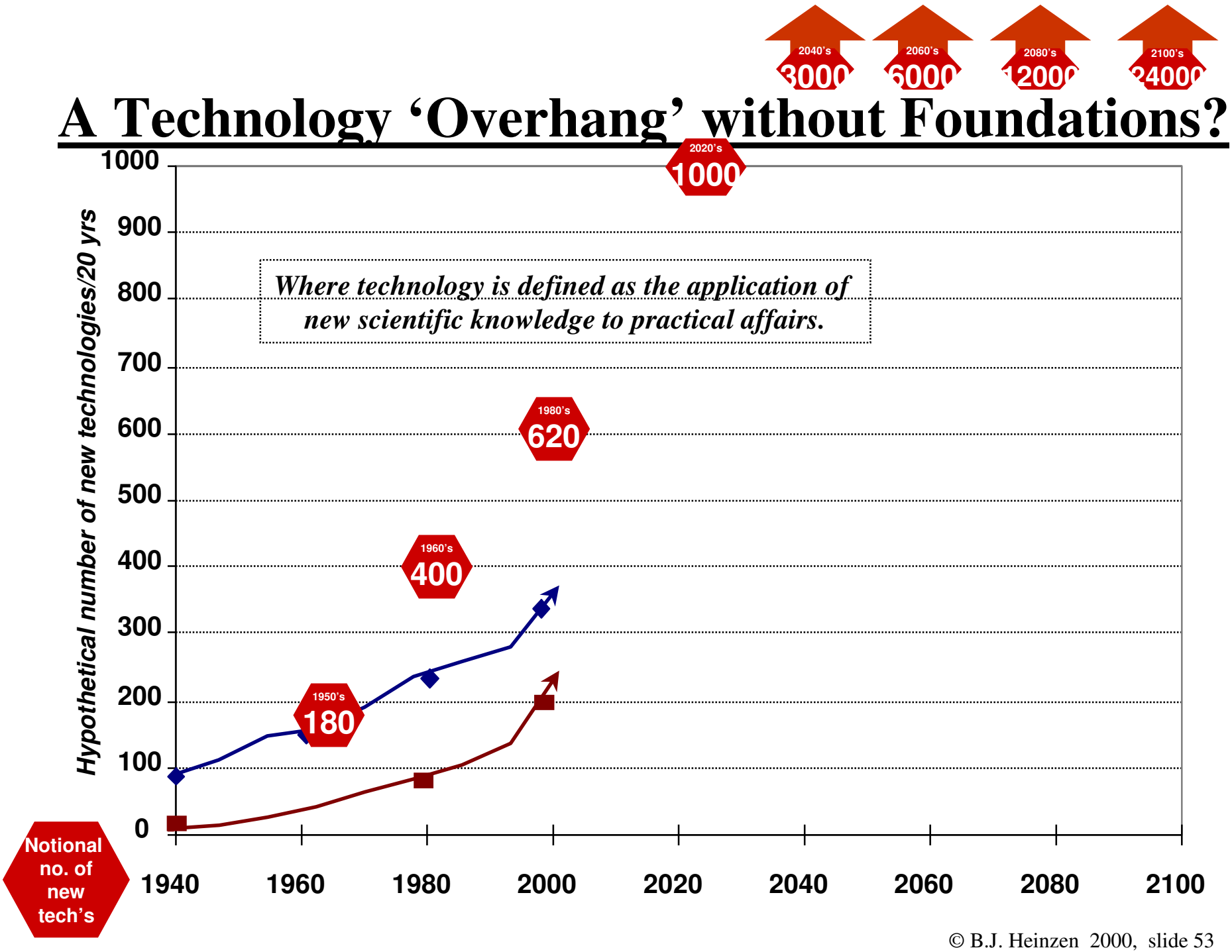
Biodiversity ?

Where are the positive incentives?

Another View of Technology



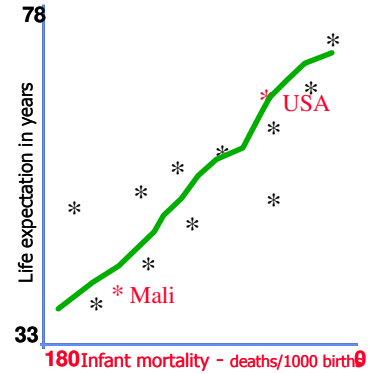
A Technology 'Overhang' without Foundations?

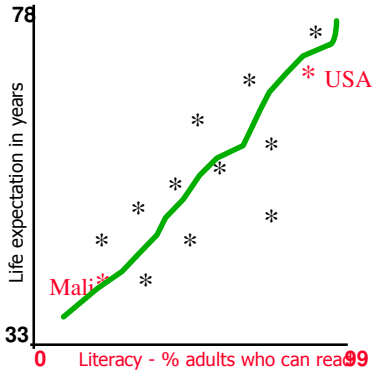


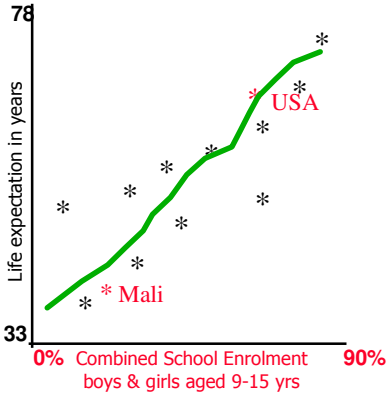
IV. Where It All Began - 1984

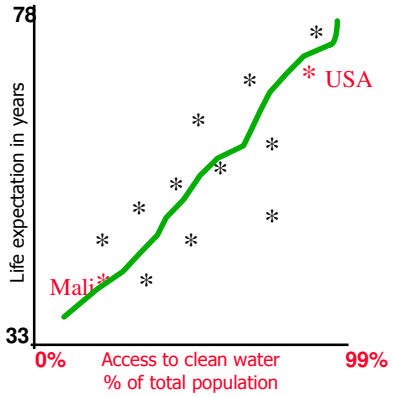
1970 data

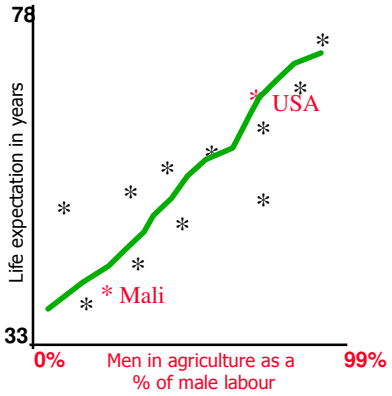
Life Expectation & 6 Social Indicators

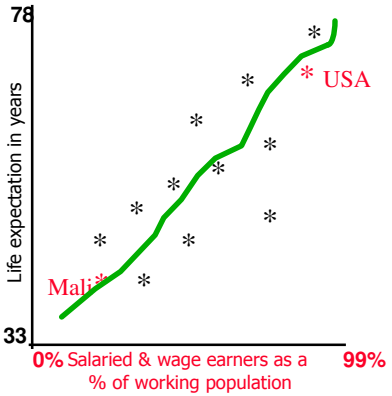








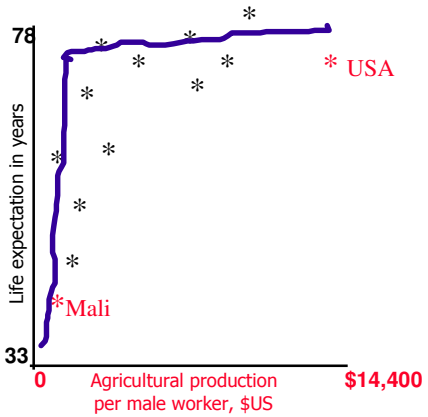


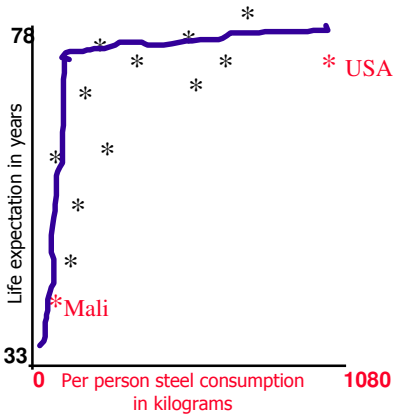


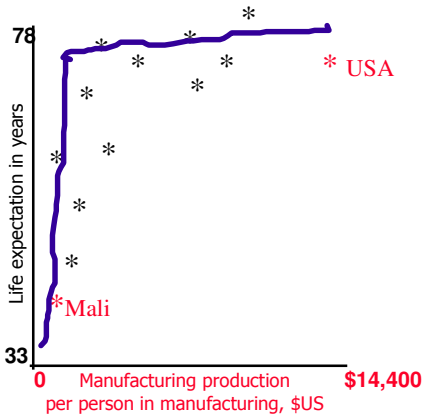
(freehand, notional lines; real 'best-fitting line' graphs to be scanned in)

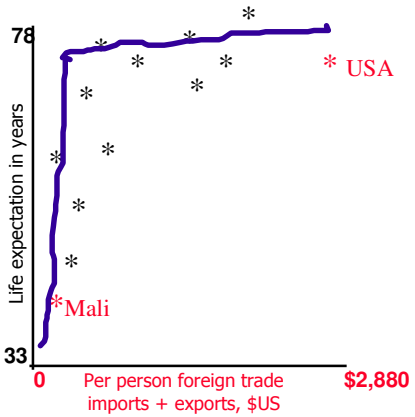
1970 data

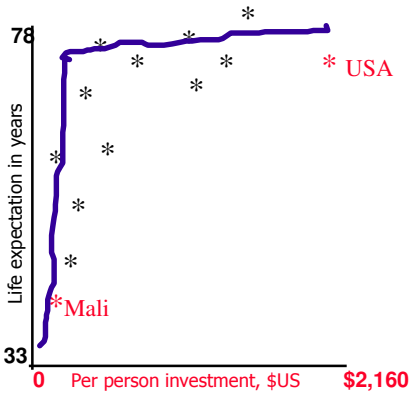
Life Expectation & 6 Economic Indicators

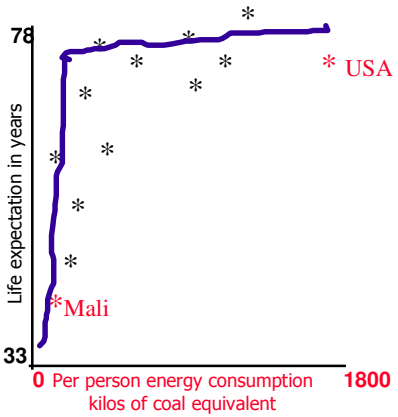








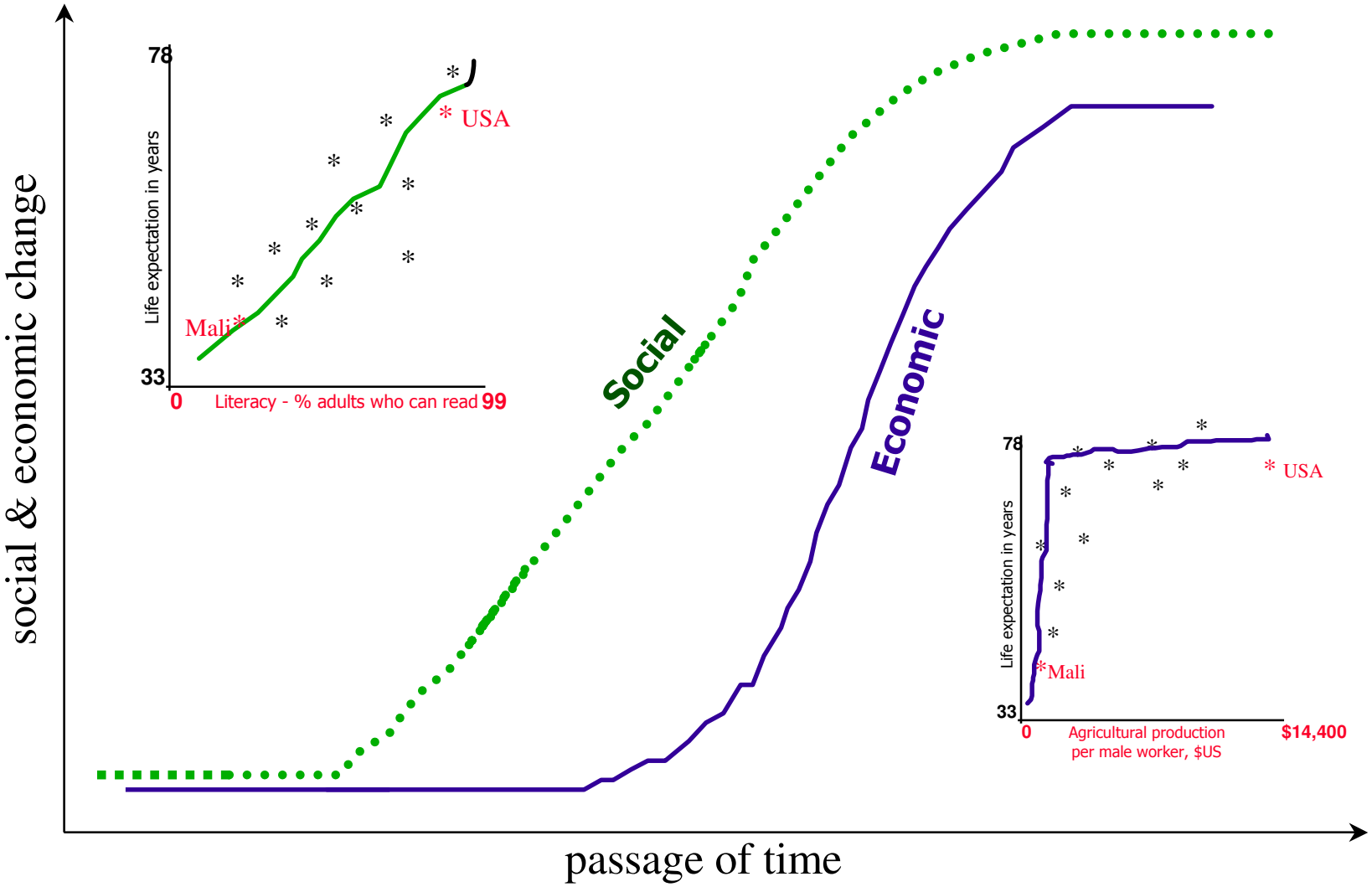




(freehand, notional lines; real 'best-fitting line' graphs to be scanned in)

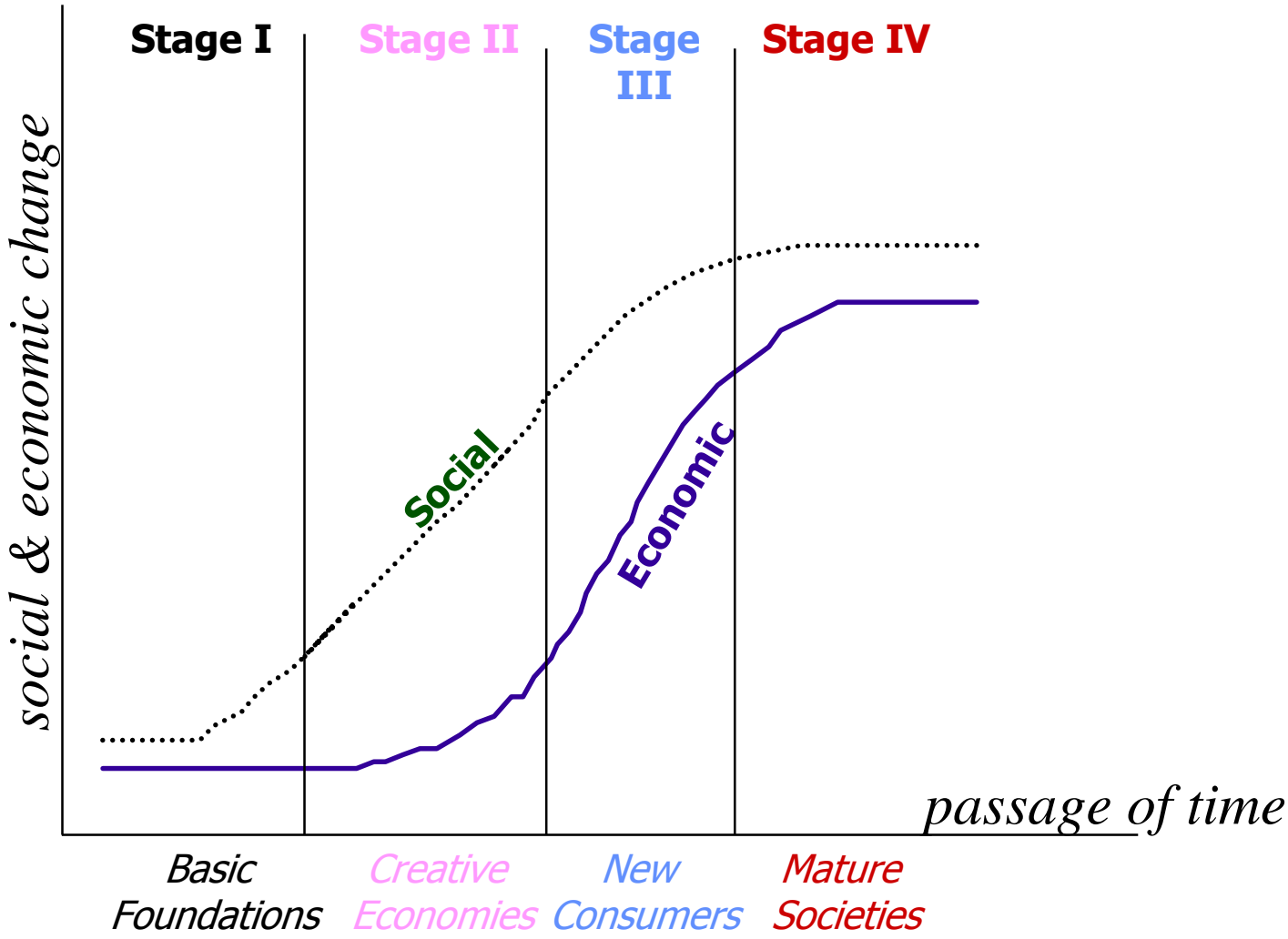
unpublished paper, "Social Foundations of Economic Development", November 1984 by B.J. Heinzen

Two Kinds of Best-Fitting Lines



unpublished paper, "Social Foundations of Economic Development", November 1984 by B.J. Heinzen

Development Stages



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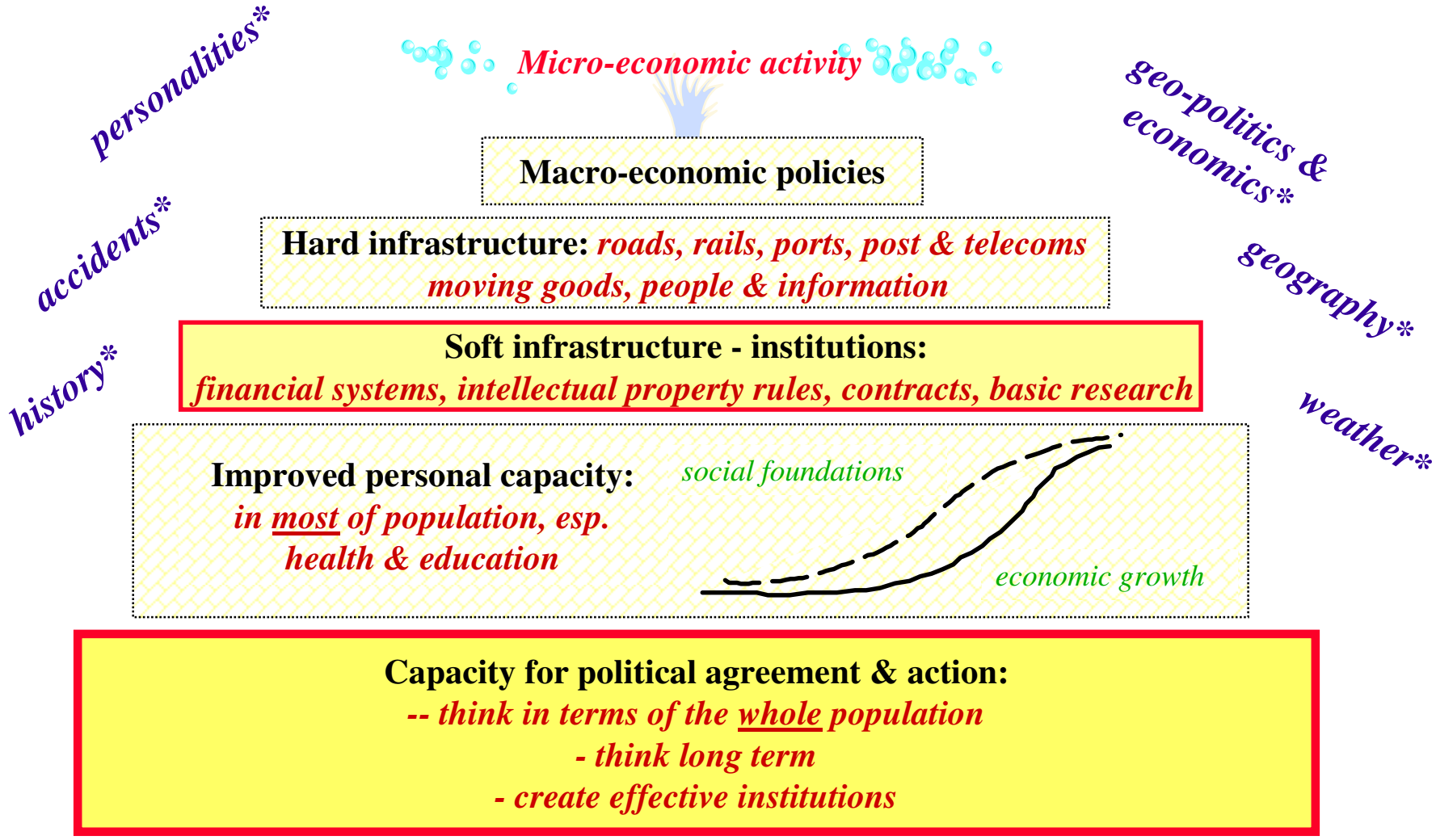
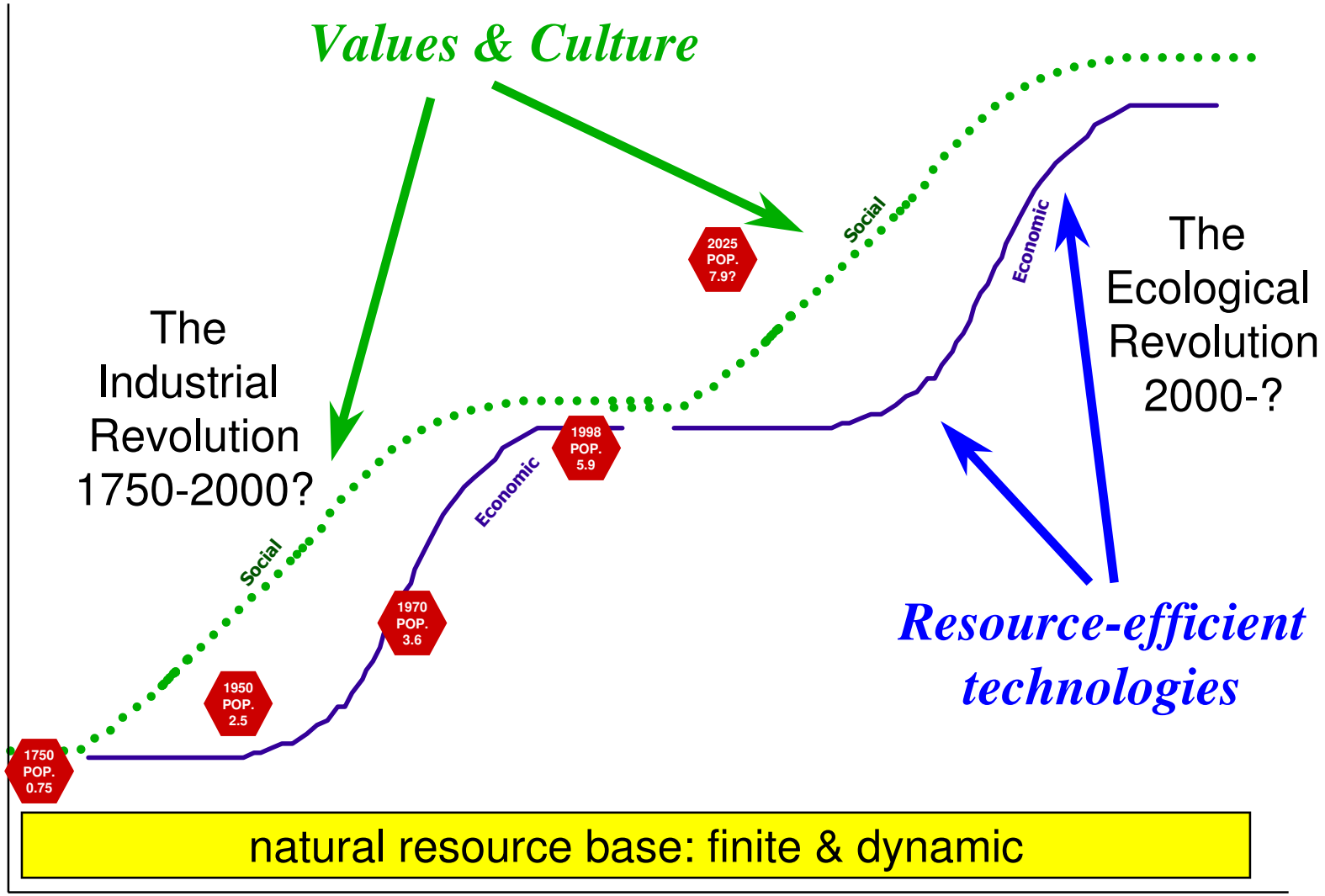
Development's Building Blocks

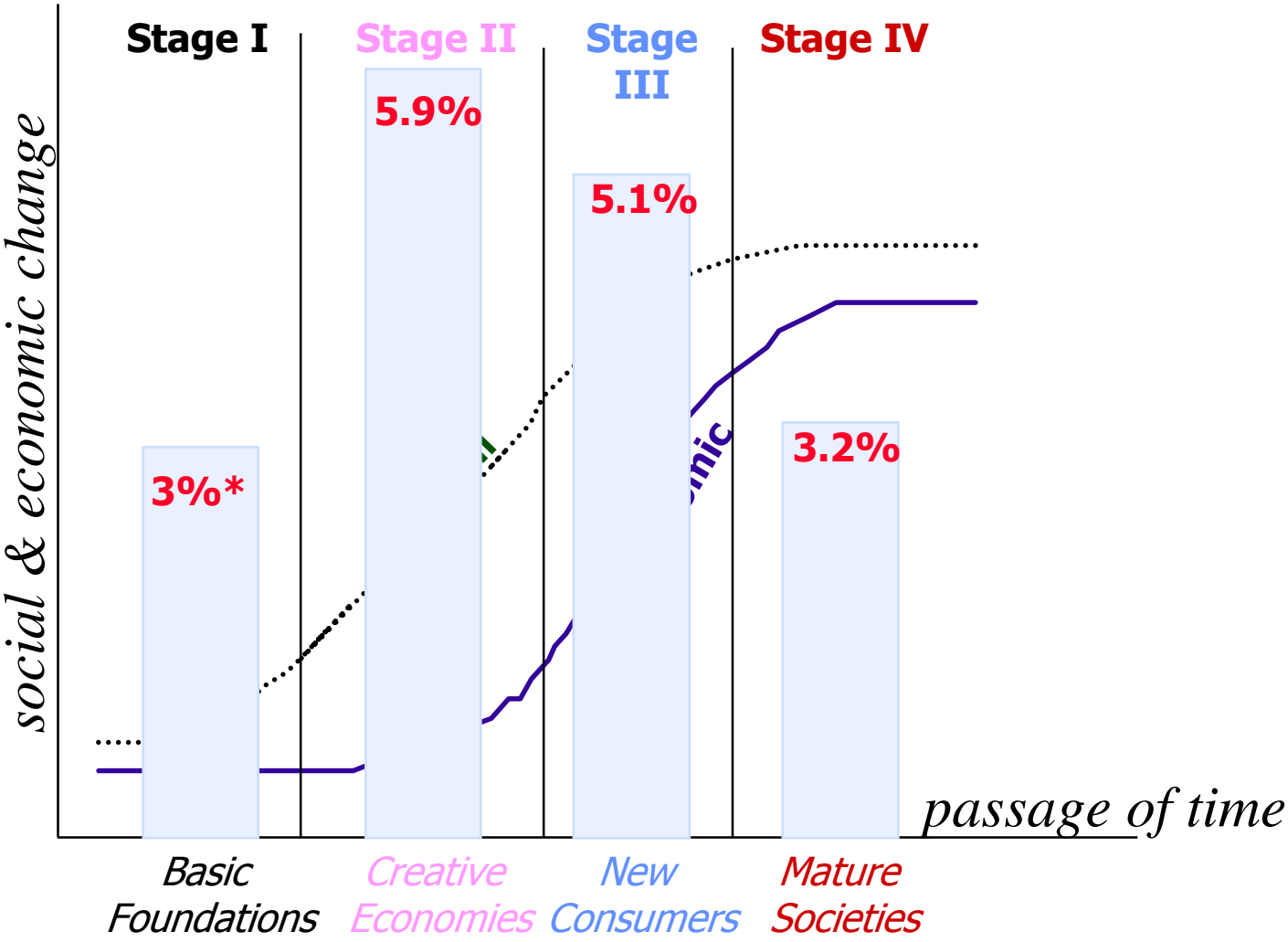


("If you can't be wise, be lucky…")*

Past, Present & Future of the World on One Page



Development Stages



* 1970-80 growth rates of countries according to 1970 dev't level

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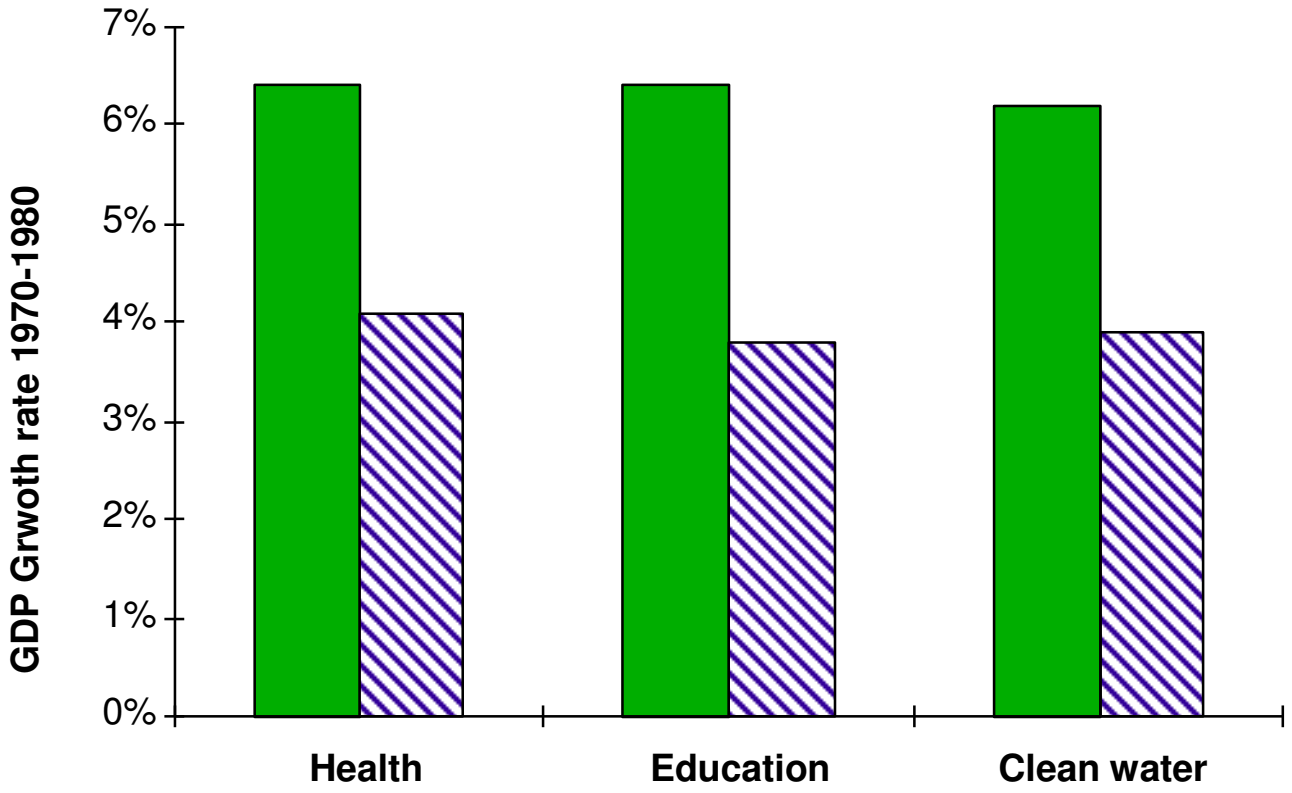
1970 Social Foundations; GDP Growth 1970-'80



15 countries where 1970 level of health, education or access to water was higher than GDP per capita in 1970.

All other countries in each sample

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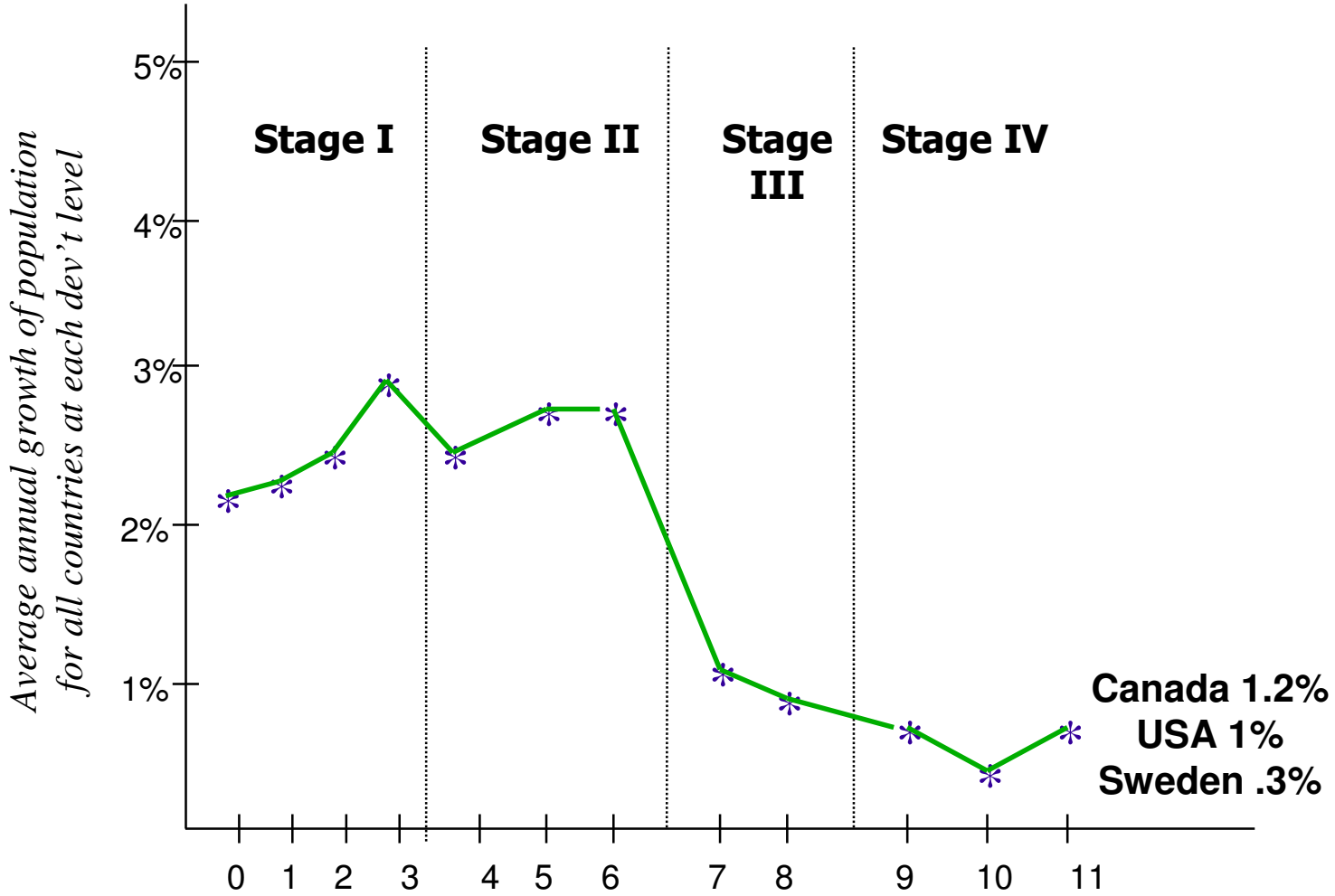
1970-1982 Population Growth by 1970 Dev't Stages



(NB: freehand lines; real data graphs to be scanned in)

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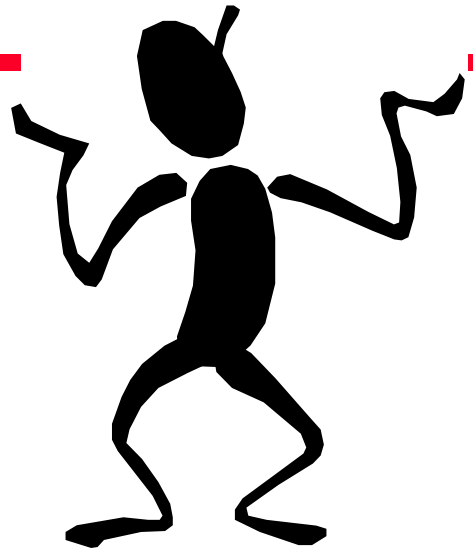
The Central Dilemma?

A Public Body Is:

- **accountable**
- **responsible for all**
- **connected**
- **competitive**

A Creative Network Is:

- **free**
- **floating**
- **open**
- **experimental**



Two Early Quiet Revolutions: 1100-1300