The Role of Money

Information to Control the Flow of Energy Through Work Processes

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Or

The Once and Future Token of Wealth

With apologies to T.H. White

Money – Messages about Energy

- Trading goods and services is a natural consequence of human eusocial evolution

- Communications regarding relative value of goods and services

- Money (or price) provides the means of encoding and decoding messages between traders

- ***Information that directs the flow of exergy through the economic system***

The Trade Calculus
Into the Mesolithic

- Labor – energy expended to obtain energy
- Hunting/Gathering – Tool making & Territory
- Human economy, a cooperative process – eusociality (E.O. Wilson et al)
- Specialization – talents applied for efficiency
- **EROI always mattered**
  - Energy content of foodstuffs
  - Energy potential of tools (e.g. spears for hunting)
  - Energy required to produce (food & tools)

Into the Neolithic

- Agriculture
  - Increasing the proportion of solar energy going into food yield in a given area (aperture for sunlight)
  - Labor expended to plant, harvest, etc.
  - Specialization – "mono"-culture and tool making
  - Trade for variety – nutrients, taste, etc.
  - Barter – 1 pig for 15 jars of grain
  - Labor costs relative to caloric potential of foodstuffs
  - High EROI foods generally have higher net value
 - High EROI tools, the same

Assets

- Land – the aperture for collecting solar energy
- Foodstuffs – the products of photosynthesis stored for later use
- Tools – the technologies that increase effective efficiencies (plow) or reduce energy loss (shelters and clothing)
- Knowledge – how to work with maximum EROI
- Trinkets & Arts – with high enough EROI to produce surplus

All Assets Come from Work

- Work gets done with the flow of energy from a high potential source through the ***work process*** to a low potential sink

- Assets*are produced by work processes

- Assets are moved by a flow of energy and go from production to a consumer/user

- Assets carry with them the value of embedded energy – the exergy expended in making them

* Includes services, which do alter structures or move matter

Work Process Model
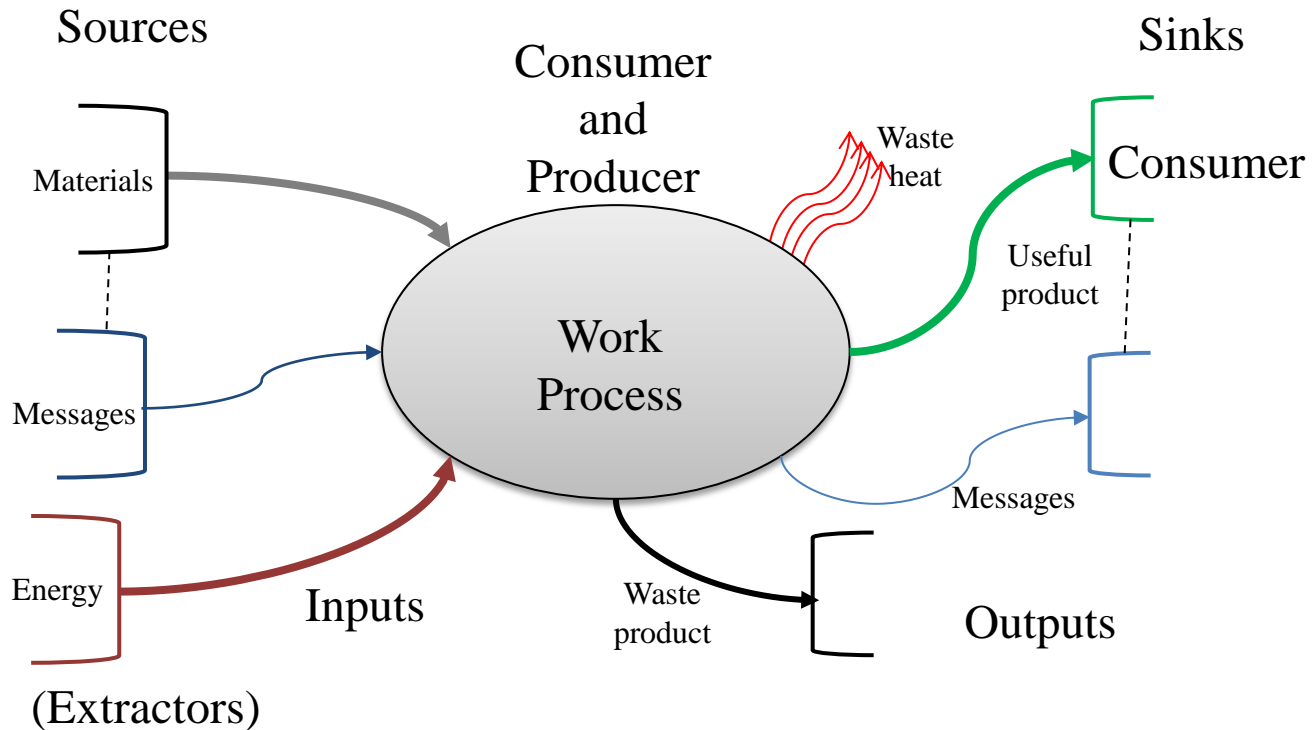
The work process requires a decision processing "agent" to monitor and control the results.

Origin of Money

- Money is a "claim on energy*" and flows in a direction opposite the flow of energy and assets**
- Cuneiform markings in clay to represent assets (mostly food) – approx. 6 kya Mesopotemia
- Abstraction through symbols and tokens
- Representing a real asset and often assigning ownership (the "claim" part)
- Trust in small communities of traders
- Early markets – replacing barter of assets

*   Nate Hagens   ** Howard Odum (includes services)

Evolution of Money

- Tokens representing specific assets directly
- Numeric representation of claims on assets in general
- Price setting – valuing work
- Price taking – valuing having an asset
- Money becomes abstract asset

The Once Role of Money

- Tokens to facilitate trade of real assets coming from real work – magnitude matters

- Legitimated by governing (ruling) bodies

- Banks evolved from granaries (savings) – developed abstract symbol accounting

- Prices could be negotiated:
  - Specialization increases efficiency of production
  - Sufficient transparency of work processes
  - Easier to compare relative use value of assets

A Systems Model of the Economy

- Production work processes
  - Producer processes
  - Consumer processes
- **Adaptive agents controlling work processes**
- Communications between agents
  - Coordinate work activities
- Whole system embedded in a biophysical environment
  - Resources
 - Waste sinks

Adaptive Decision Agents

- Agents are information processors that make decisions

- Decisions are amplified into action (behaviors)

- Adaptive agents learn from prior experience and can alter decision processing as a function of shifts in the environment

- Biological decision agents have "interesting" inherited decision-influencing processes – not necessarily rational in the current environment

Examples of Decision Agents

- Mechanical – rule based
  - Thermostat
  - Computers
- Biological – metabolic based
  - Cells
  - Worms
  - Humans
- Supra-biological – collective benefit based
  - Ant colonies
  - Governments*

* Warning: not yet completely evolved.

The Economy and the Environment
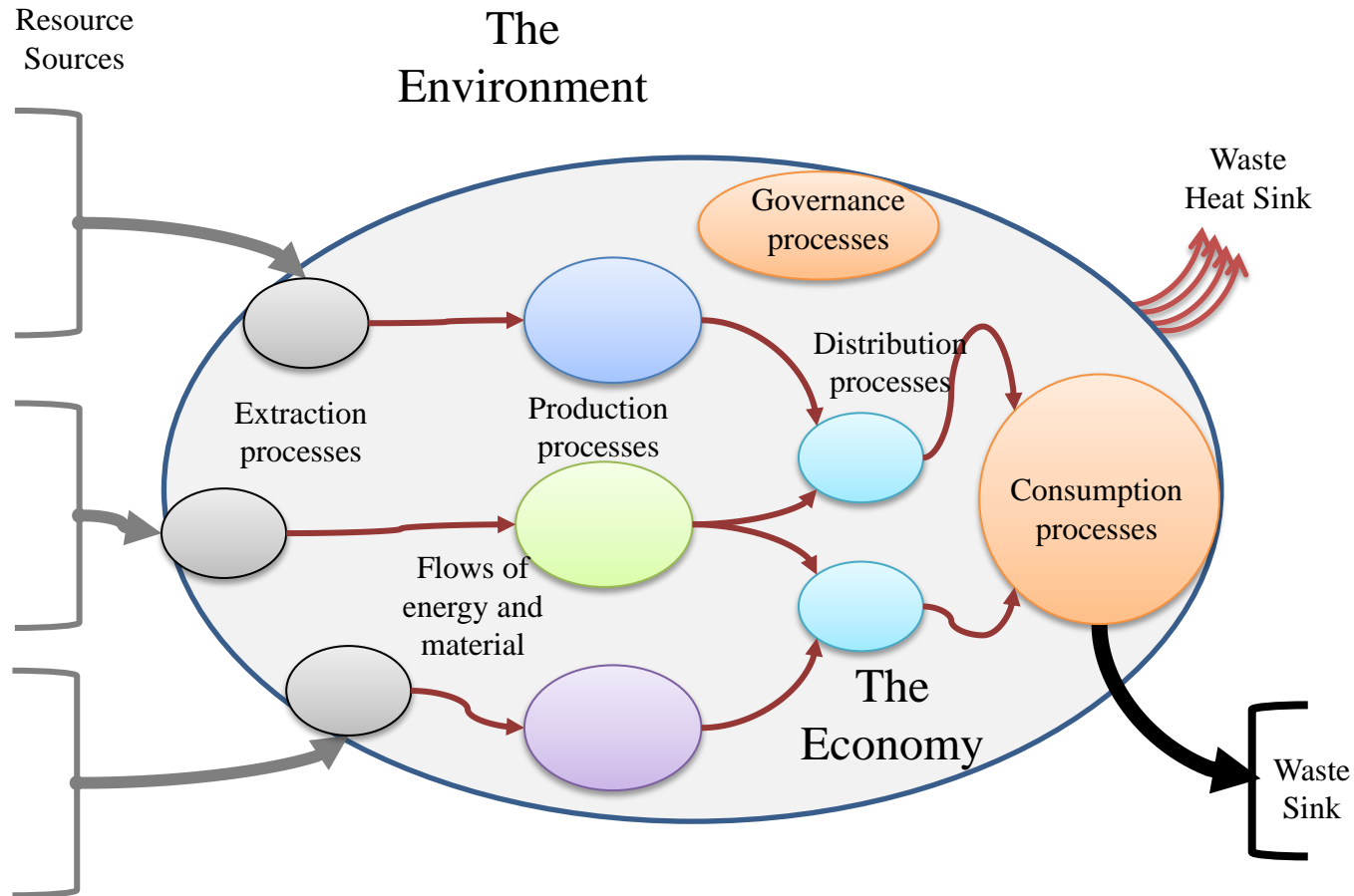
Energy flows from sources (extraction) through work and distribution processes to consumers, eventually flowing out as wastes.
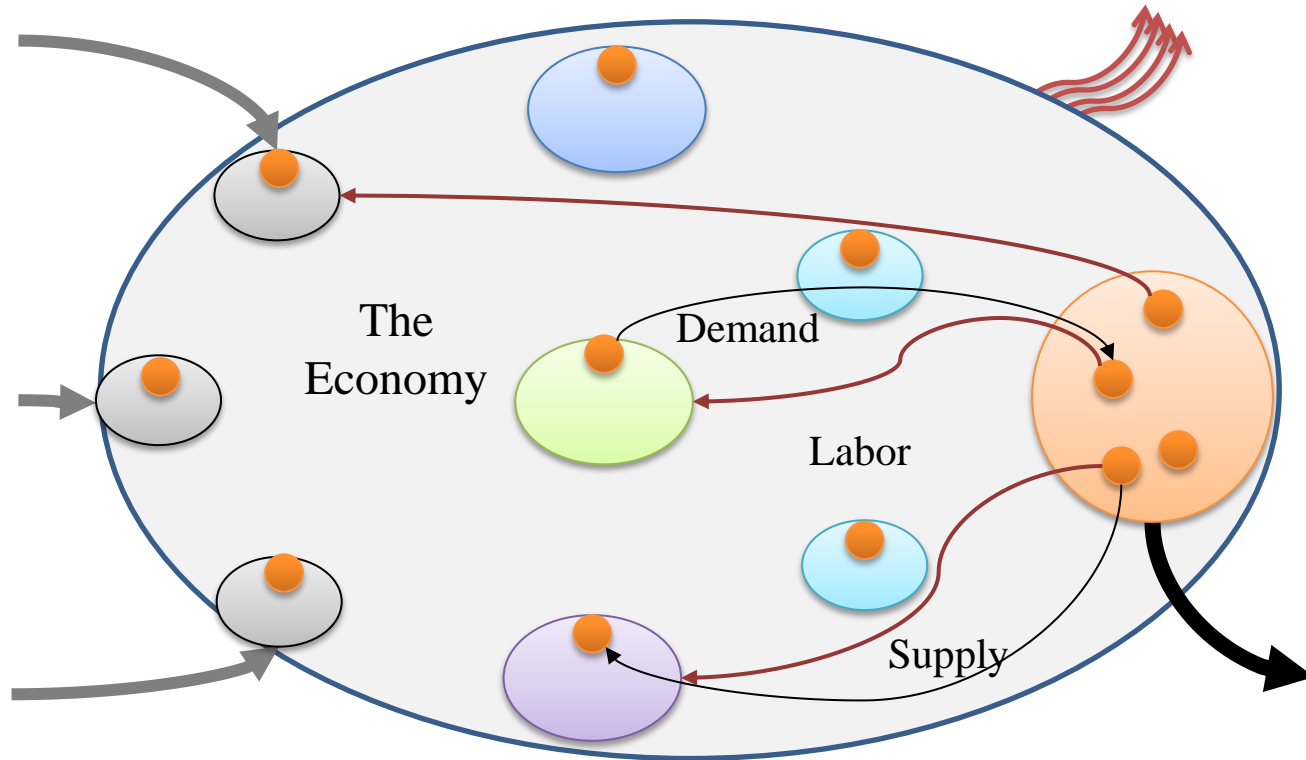
Adaptive (deciding) Agents and Information Flow Controlling Trade

The Economy

Demand

Message

Supply

Deciding agents
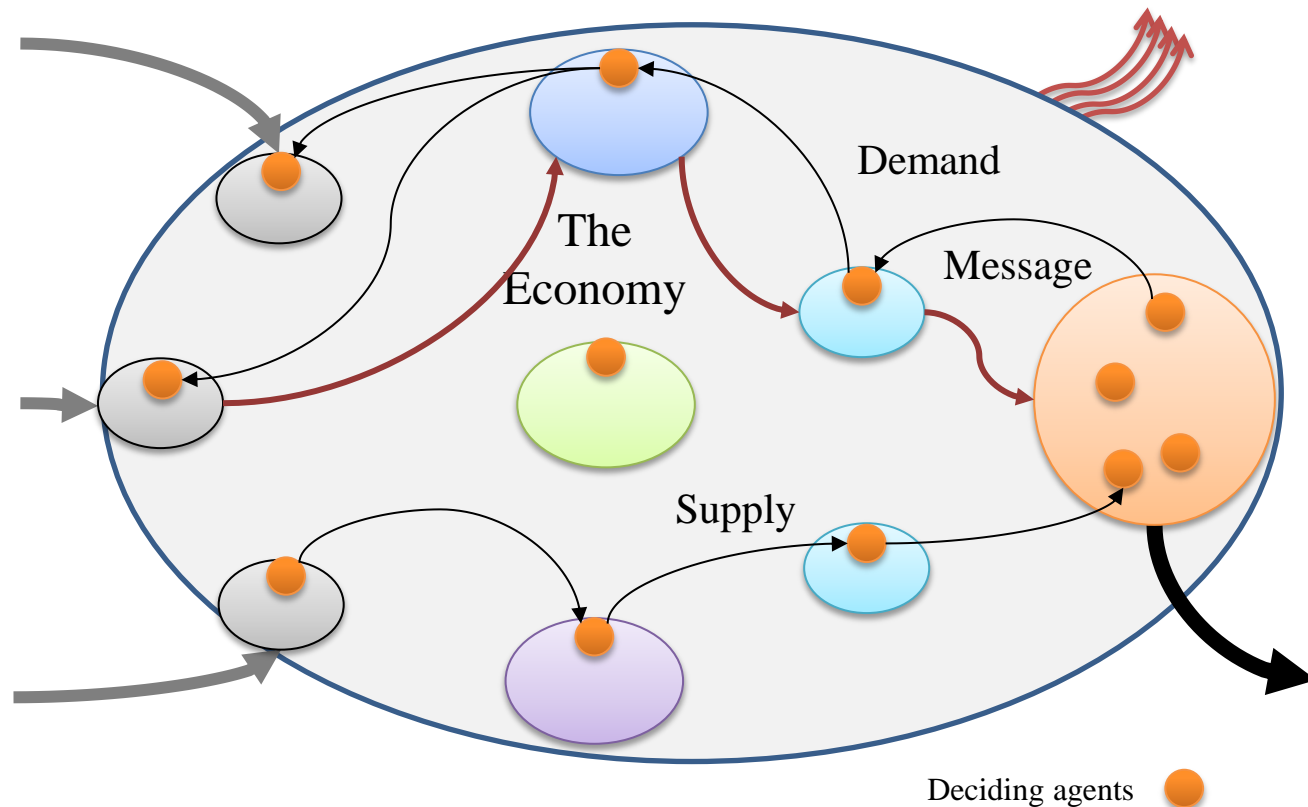
Agents use information to decide how much work to do, and when to do it.
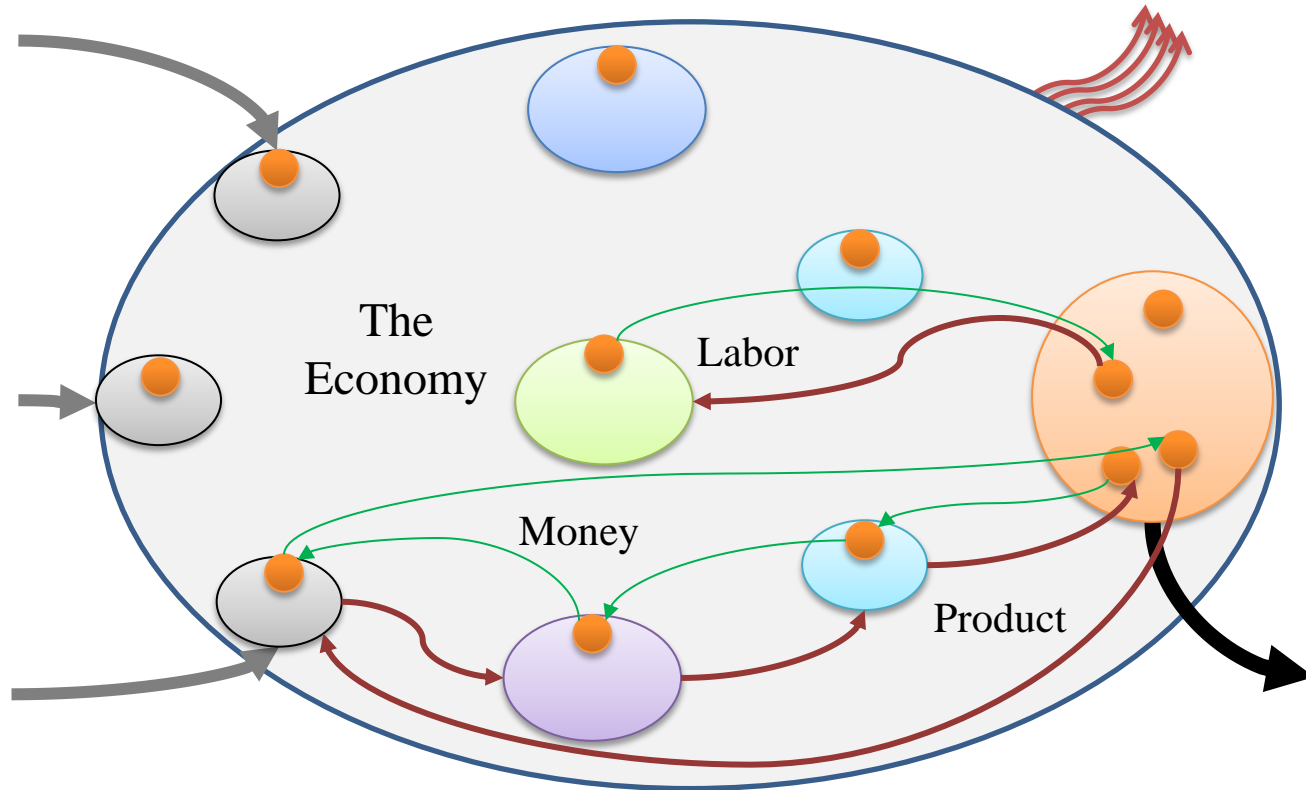
Labor Agents and Trade

The
Economy

Demand

Labor

Supply

Agents supply labor to work processes in exchange for an ability to control the output of other work processes (for consumption).

Money Conveys Information to All Agents via Price

The Economy

Labor

Money

Product

Money flows in the opposite direction of energy (embedded in products or as labor).

Into the Anthropocene
Death of the Once Role of Money

- Social complexity
  - Stratification of classes
  - Rise of a ruling class
  - Formalization of types of ownership
- Specialization: Increased inter-reliance & decreased self-reliance (loss of knowledge)
- Technologies evolving
- New sources/power densities of energies and growth of energy availability
- Growth of assets – numbers and kinds

Price Setting Becomes a New Problem

- Loss of transparency in work processes
- Proprietary accounting for costs and ***profits***
- Markets of many producers and many consumers
  - Prices established by jostling in a competitive environment
  - Worth what a buyer is willing to pay
- Money can no longer be tied to units of work (measured in energy units) – No one knows anymore, not even the producers!

Current Concepts

- No longer strictly representing physical assets
- Treated as an asset in its own right
- Financialization
  - Borrowing with interest
  - Fractional reserve banking
  - Equities and commodities markets (legalize gambling!)
  - Derivatives and their markets
- Money supply – what should it be?
- Indeed, what is it????

The Not-Too-Distant Future?

- The biophysical reality – Energy is still the basis of all wealth production

- Net energy has already reached its zenith and may actually be declining now

- Peak oil amplifies the effects

- If net energy flow declines, so too our capacity to do useful work

What Will Happen to Money?

- The number of tokens floating around will probably not decline because there is no standard for value

- The amount of assets being produced **will** decline, current assets will decay – more tokens in the economy than there are assets to represent

- The financial system will crash (King Arthur is dead – long live the king) taking the whole monetary system with it

Into the Post-Capitalist Age

- What is a likely scenario for the global socio-economic system?
  - De-centralization
  - Re-localization
  - Permaculture communities
  - Appropriate technologies
  - Short-range trading
  - Local token systems

The Future Organization of Communities

- If knowledge of the morphing of money from a useful tool to an obfuscation tool is remembered …

- If knowledge of the detrimental results of capitalism and unfettered growth is remembered…

- If knowledge of the detrimental results of relying on fiat tokens and market price setting is remembered…

Local Governance Processes

- Seeking
  - Stability
  - Resilience
  - Sustainability
- Using money to achieve these goals
  - Token supply can be based on an inventory of assets and a stock of energy available to do work in the future
  - Banking reverts to savings
  - Profits revert to supporting non-producing processes (e.g. governance)

The Future Role of Money

- One token = a unit of exergy (work)
  - In potential form
  - In embedded form (assets)
- Accounting based on value of work
- Money will again represent energy claims

Thank You

Questions