Becoming an Interplanetary and Interstellar Culture

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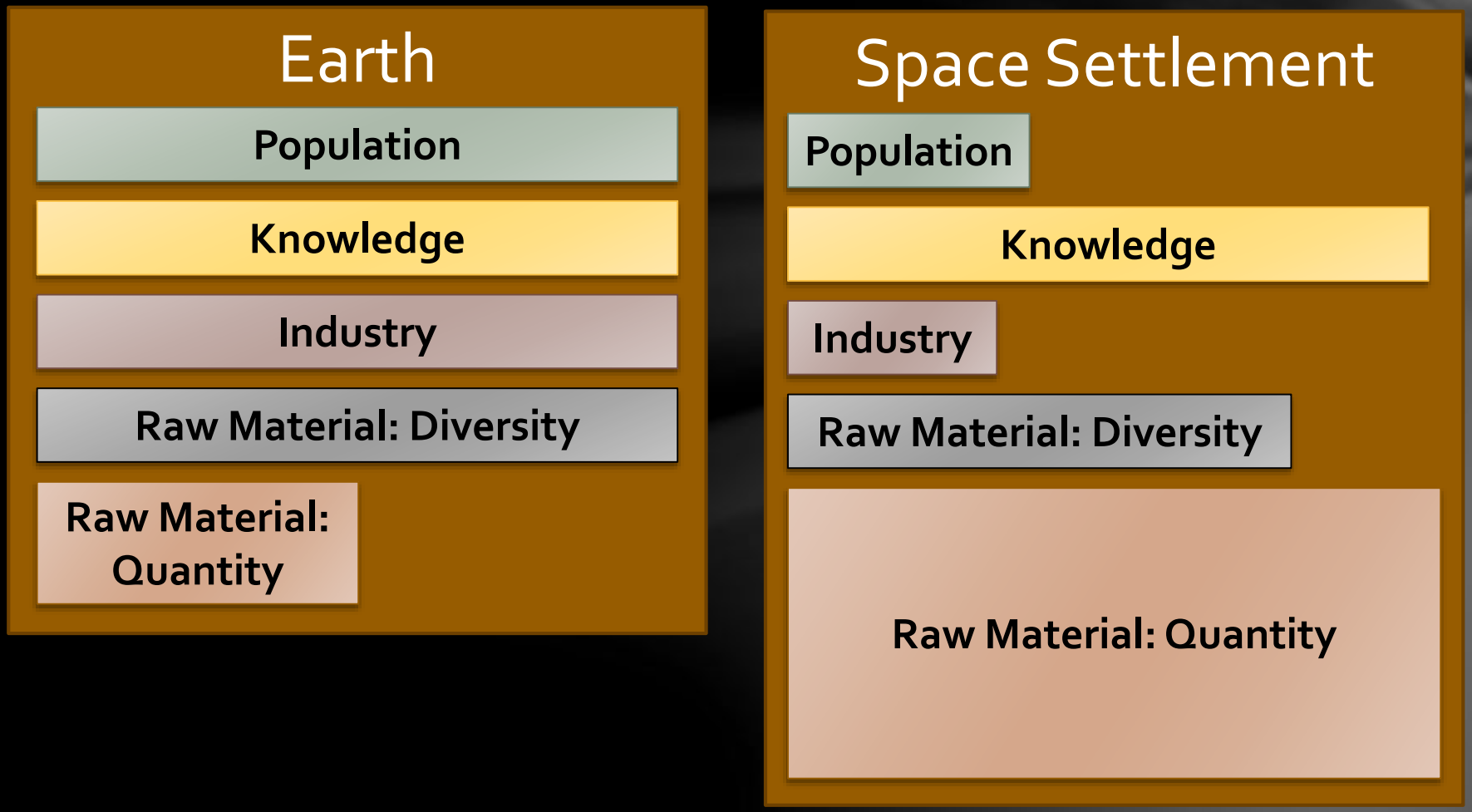
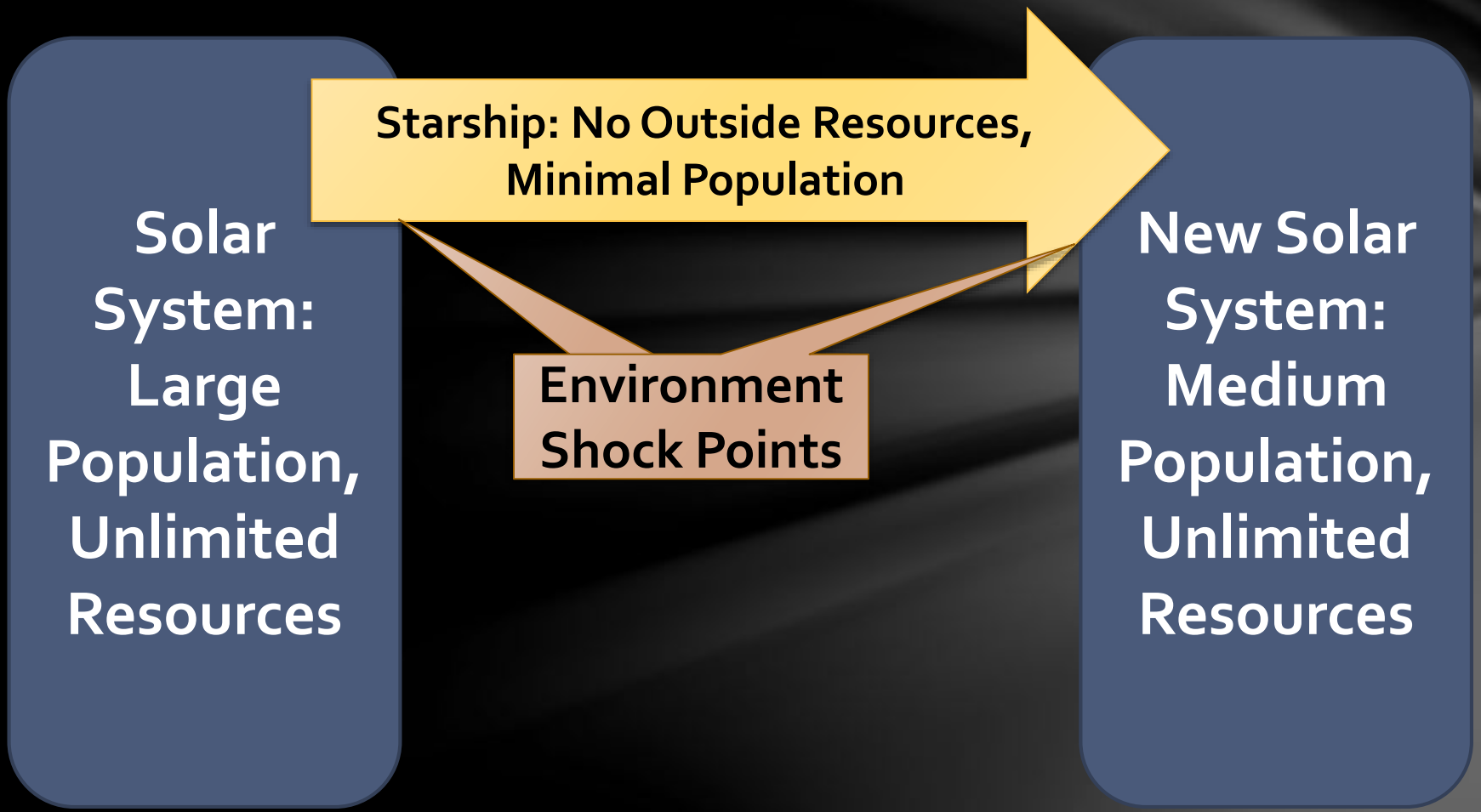
Earth Versus Space Settlement



The Soda Straw Problem



What Stresses an Interstellar Culture?

- An Interstellar Culture must survive…
  - Multi-decade flight time with no additional resources
  - Arrival with unlimited resources and few tools
  - The drastic jump in scale from a minimal population to one that can claim a new solar system and built their own starships

Starship: "USS Strawman"

Parameter	Value
Mission Flight Time	50 Years
Crew, Departure	~100
Settlers, Arrival	~250
Departure Sponsor	Asteroid Mining Company
Mission	• Explore, Settle, Communicate • Mine Asteroids to repair/refuel • Settle asteroids, then planets • Build a own starship in 100 years
Prep Time	Function as the construction/design crew for 10 years prior to departure

Crew Demographics at Departure

Parameter	Value
Ethnic	Maximize diversity to give broad genetic pool Not all races that will exist in 100 years exist now
Age	Minimum 15, with parents Maximum 40, with children
Why Spread?	Generational diversity will help keep original crew from forming an over-focused generational identity.
Why Bound?	Assumes that a 15 year old has some productivity already, and a 40 year old has many years of productivity left, and a reasonable chance of seeing the destination system.

Education and Skills

Required Knowledge/Skill Base

Parameter	Value
Core Starship	Know all technologies for living in and light maintenance (status quo) of starship
Foundational	Know how to create these technologies from nothing, step by step.
Adaptive	Adapt those and other technologies from Starship to Settlement, Exploration, and related technologies.
Developmental	Know how to build beyond those technologies
Human	Soft skills, primary instruction and communication Medical and physical
Core Life	Basic housework, gardening, and other skills a society must have at any technology level to survive

Risk and Opportunity

Parameter	Value
Technology	• Avoid blind faith in technology • Know it well enough to restore if lost • Know enough to advance, modify, replace
Soft Skills	• Avoid irrational decisions and leadership • Know how to communicate, but also to detect propaganda, fallacy, and mathematical error.
Core Skills	• Avoid dependency on any group for core life needs • If everyone knows how to survive, then survival more likely • Unlikely to have dependent class (at any social level)

Education: Liberal Arts

School	Grade	Study	Description
Trivium	K-5	Grammar	Mechanics of Language/Symbol
	6-8	Logic/Dialectic	Mechanics of Thought/Knowledge
	9-12	Rhetoric	Use of Language to Instruct/Persuade
Quadrivium	13, 14	Arithmetic	Numbers
		Geometry	Numbers in space
		Music	Numbers in time
		Astronomy	Numbers in time and space
Bachelor	Specializations for primary career Ability to adapt to other disciplines as needed		
Advanced	Unless critical to mission, avoid overspecialization until destination reached and/or population large enough.		
Adaptive	Full library of all technology needed if any new roles needed.		

Practicum at All Grades

Parameter	Value
Productivity	• Paid work-study geared to age range • Practicum tied to classroom studies, so question "when will I ever use what you are teaching me?" is not an issue – they use it immediately. • Work ethic - doing important simple work, not make-work. • Key self-sufficiency skills (repair, tailoring, farming) so that the colony won't starve if the five farmers are disabled.
Reinforcement	• Each task set repeated to allow elder children to help teach younger ones. • Avoid "skill rot"
Enrichment	• Creativity and productivity rewarded

Education: Unified

Parameter	Value
Technology	• Core knowledge on operations of equipment, repair, and how it works. • Extended on how to build simplified versions of it. • Any technology element in library should be understandable to any crew member, ideally.
Liberal Arts	• Expanded math and science offerings • Music theory - would include resonance physics and other practical matters to engineering
Practicum	• Would integrate other lessons into unified model, so cooking would be linked to thermal physics, gardening to biology, cleaning to chemistry, etc.
Creative	• Avoid the Pavlovian model of multiple choice and return to essay tests, creative projects based on lessons learned. Recyclable 3D printing good here.

Political Structure

Why Earth Structures Don't Apply

Parameter	Earth, 2012	Solar System	Starship
Radio Delay	1 second or less	Minutes to hours	Years
Control	Layered by distance and location	Layered by ship commander, then sponsor nation, regardless of location (Like maritime law)	Independent
Trade/ Resupply	Hours to days	Months to years	Information only
Structure	National	Explorer Bases/ Settlement	Settlement
Regulation	Large Population	Small Population	Minimal Population

Scalable Government: Size

Parameter	Value
Minimum	Independent ships, colonies, and automata.
Interlink	All under central rules concerning law, regulation, etc.
Independent	Pilot in command regulations regarding local decisions outside the scope of law and regulation.

Scalable Government: Distance

Parameter	Value
Local Government	• Settlements, ships, habitable territory or spaces. • Continent and island chain scales
Regional Government	Limit of region may not vary depending on orbital dynamics. • Planetary system with moons seen as unit • Section of solar system that is star-centered, so inner solar system, asteroid belts, etc. would be separate territories. • Highly elliptical orbits would have to be entirely in one region or their own region

Limits on Regulation and Law

Parameter	Value
Law and Regulation	• More tech writers, fewer lawyers • All should be brief, clear, structured in tables with examples, non examples, and drill downs where appropriate, and clear terms with cross-links to centralized definitions. GAAP must apply.

Example	• Core law – 1000 pages
	  • Business Law – 1000 pages
	  • Credit Union Regulation – 500 pages

If Exceeded	• No new regulation may be put in place that does not repeal one that is obsolete

House of Ages	• Regulations are reviewed every 1-10 years for:
	  • Technologically obsolete cases
	  • Unintended consequences

Strawman Constitution

Parameter	Value
Senate	• Geographical/Political Unit Representation
House of Rep.	• Population representation
Executive	• Core accountability and swift action • Split: Captain (ship) and President (population)
Supreme Court	• Case law review
House of Ages	• Consists of representatives of each generation, plus those to come, and those gone. • Review all laws to ensure no generation exploited • Similar to Congressional Budget Office + GAAP
Term Limits	• All terms limited • Newly-elected pre-term and lame duck term get one-half vote, overlapped

Economic Models

Economic Model: Distributism

Parameter	Value	
Basis	Distributism (AKA Distributionism): US/UK, 1900-1945	
Summary	"Unbridled capitalism doesn't produce too many capitalists, but too few." - *G. K. Chesterton*	
Basic unit	Family is core economic unit. Small businesses are individuals and families with means of production.	
	Embraced	Avoided
Credit	Credit Unions	Banks
Labor	Training Guilds	Labor Unions
Incorporation	Employee-Owned	Investor-Owned
Economy	Distributed Manufacture	Economy of Scale
Class structure	Middle-class stabilized	Middle-class exploited from Statists and/or Oligarchy

Ownership

Parameter	Value
Flat Start	• Crew each purchases/earns shares over decade prior to launch • Minimum of one, maximum of ten to start
Economic Units	• Money for trade and value of things • Flat tax ? (Simplification to avoid overhead)

Social Units	• Social units for value of soft elements
	  • Parenting and Teaching
	  • Care for Elderly/Disabled
	  • Open Source Development
	• Per person tax that is offset from social action ? (Dicey)

"Jubilee"	• Means of production is not sold, it is leased for 40 years or less • Prevents one generation from selling out another's birthright

Division and Partnership

What did the spirit… mean by… Division and Partnership?… How can it be that a shared good makes a greater number of possessors richer by it than if it is owned by a few?'

And he to me: 'Because you fix your eyes, again, only on earthly things, you produce darkness from true light. That infinite and ineffable good, that is up there, rushes towards love as a ray of light rushes towards a bright body. The more ardour it finds, the more it gives of itself, so that, however far love extends, eternal good causes its increase: and the more people there are up there who understand each other, the more there are to love truly, and the more love there is, and, like a mirror, the one increase reflects the other.

Dante, Purgatorio Canto 15, 37-81 c 1308-1321 C.E.

So what does that mean?

Division	Partnership
Money can be split	Knowledge can be copied
Property can be divided	Integrity can be modeled
One benefits	All benefit
Proprietary Information	Open Source Information
Represented as money	Represented as virtue and knowledge
Society and individuals need these works to survive	Society and individuals need these works to be great

Periodic Table of Economics

Things	Structures	People	AP*	Data/Knowledge
Land/Asteroids	Deeds	Explorers	90	Astronomy, Geology
Raw Materials	Mines	Mining tech	80	Industrial design
Refined Goods	Refineries	Refinery Tech	80	Chemistry, Chem-E
Finished Goods	Factories	Construction	90	Product Design
Shipped Goods	Logistics	Transport	95	Celestial Navigation
Stocked Goods	Stores	Sales/Distrib.	70	Marketing
Arts	Studios	Education	5-60	Psychology
Sciences	Labs	Medicine	10-50	Life Sciences

AP: Automation Percentage (Max)

This table is a notional discussion strawman – not an exhaustive reference

External Disruptions

Interstellar Communication

Parameter	Value
Light Speed	• Real Earth and Knowledge of Earth will slowly drift out of synch like a slow watch. • Stars behind you explored by other colonies will seem more backward than ones in the same direction explored by other ships.
Quantum Entangled	• Very slow baud rate but instant link to systems that are entangled before departure. • Ships should carry several, linked to Earth and other systems. • Earth would be a core relay point to ships launched after the last entangled link.

The Next Starship to Arrive

Parameter	Value
Why? May Bring…	• More quantum communications units for other starships launched later. • Second wave of settlers • Technologies not yet practical to build locally

Risks	• Lack of acceptance of newcomers
	  • Earned versus Assumed
	• Over-deference to newcomers
	  • Risk of exploitation by newcomers

Mitigation	• Enculturate the population prior to departure and en route as much as possible • Level-set expectations by the existing group

Thank You!

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