

A Sudoku approach to fit the Central Framework and Ecosystem Accounts in the SEEA...and SNA

Alessandra La Notte

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Similarities between Sudoku and national accounting systems

- From a metaphorical standpoint, the process of organizing and arranging numbers in accounting systems could be defined as a logic-based number-placement puzzle
- The internal consistency of this number-placement puzzle lies in its mathematical structure and in the constraints it imposes
- Each accounting item creates a **system of interconnected relationships** between accounting tables and modules

A balanced and interconnected system of relationships

...that needs:

- Accuracy
- Consistency
- Comparability

...to enable policymakers, researchers, and businesses to make informed decisions based on reliable information

Which are the concepts of the SEEA to start from in this approach

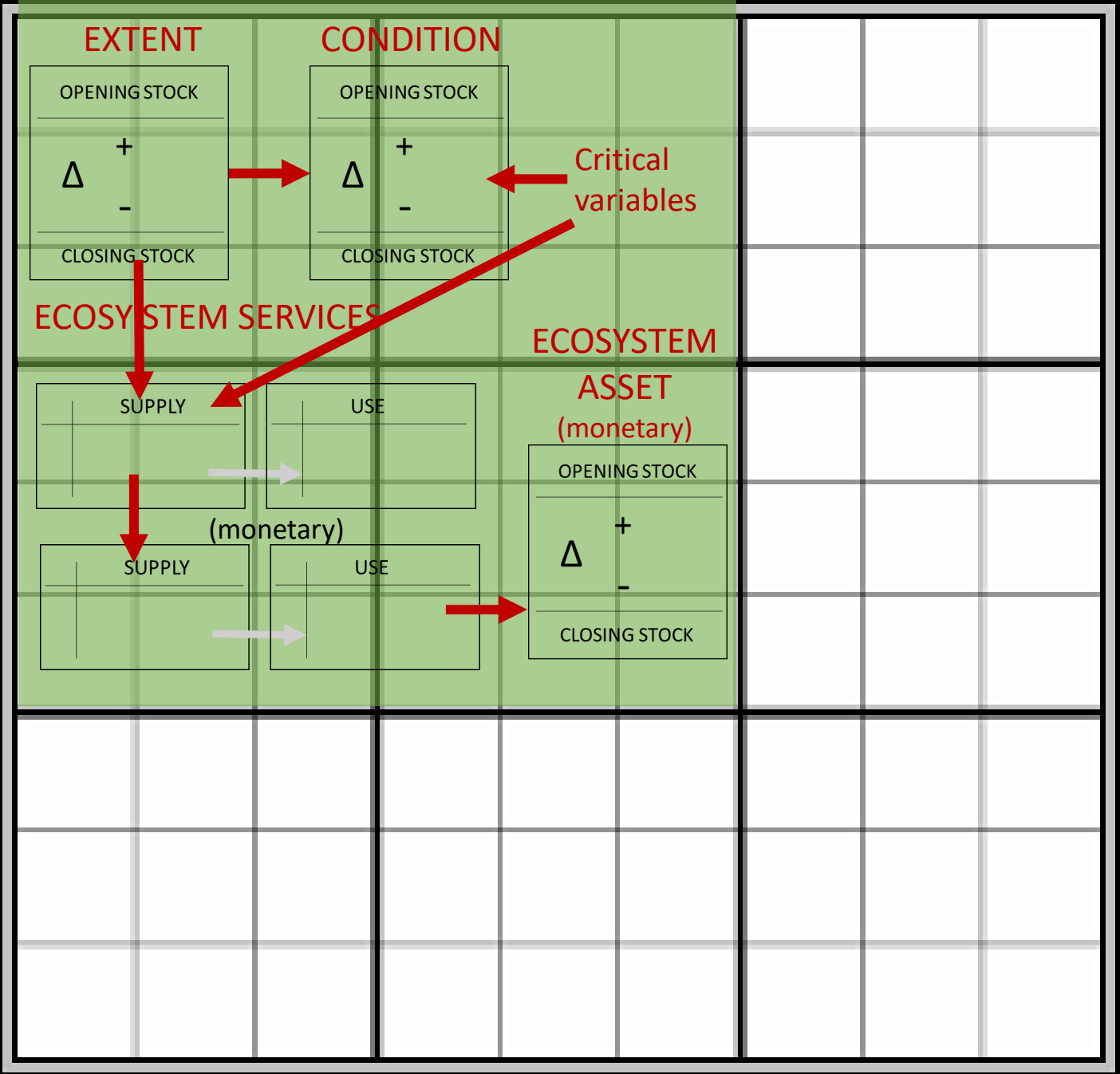
- SNA as CORE account
- SEEA as SATELLITE account

- There should be consistency b/w SEEA and SNA

- In the SEEA there are two components:
 - Central Framework
 - Ecosystem Accounts

SEEA EA

Stylized Sudoku representation



SUPPLY

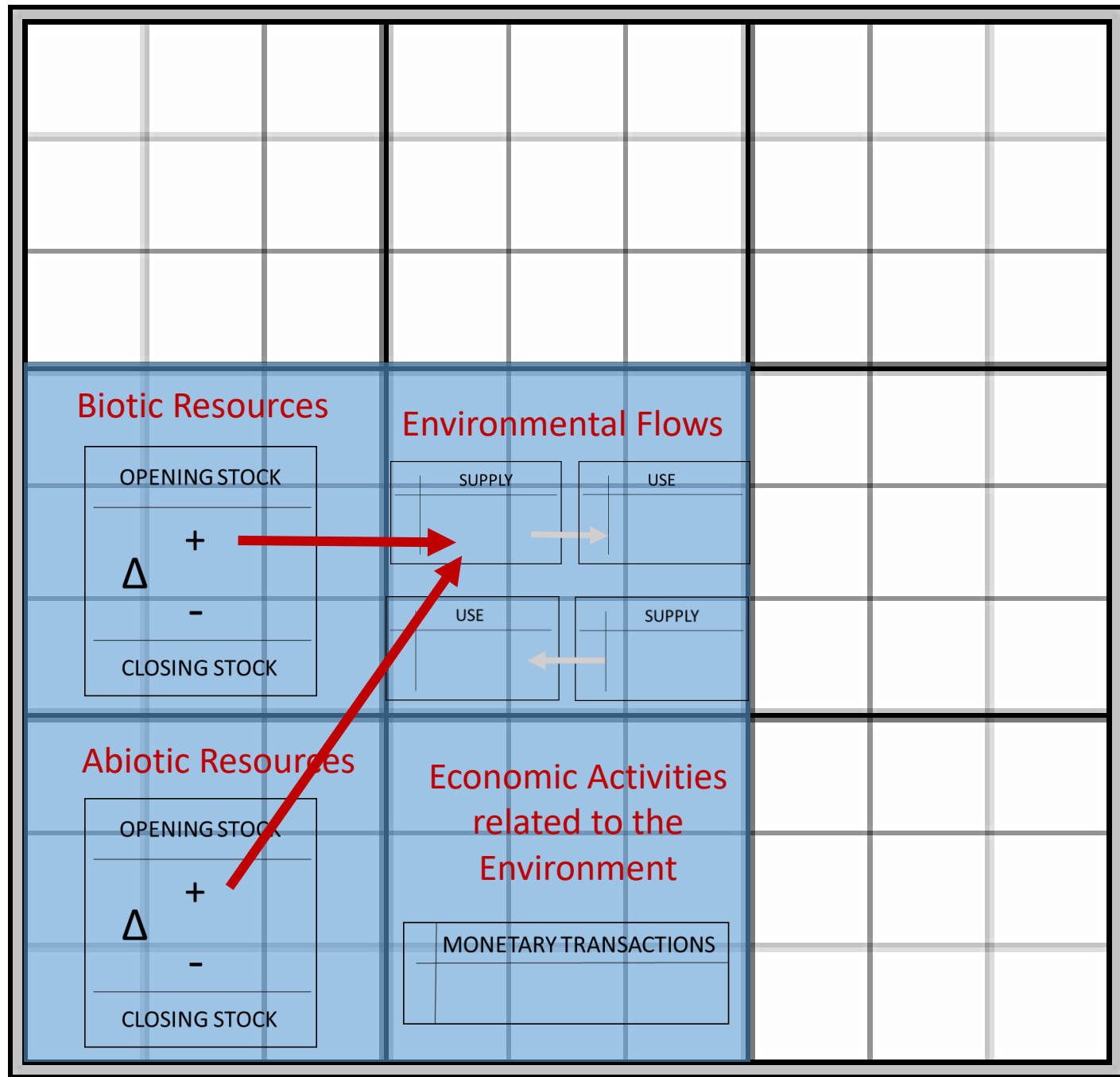
USE

Ecosystem Services	Economic Units		Ecosystem Types		
	Industries	Households	Terrestrial	Freshwater	Marine
Provisioning services					
<i>crop provision</i>					
<i>timber provision</i>					
...					
Regulating & maintenance services					
<i>pollination</i>					
<i>soil retention</i>					
<i>water purification</i>					
<i>flood control</i>					
<i>carbon sequestration</i>					
...					
Cultural services					
<i>nature-based recreation</i>					
<i>nature-based education</i>					
...					

Economic Units		Ecosystem Types		
Industries	Households	Terrestrial	Freshwater	Marine

SEEA CF

Stylized Sudoku representation

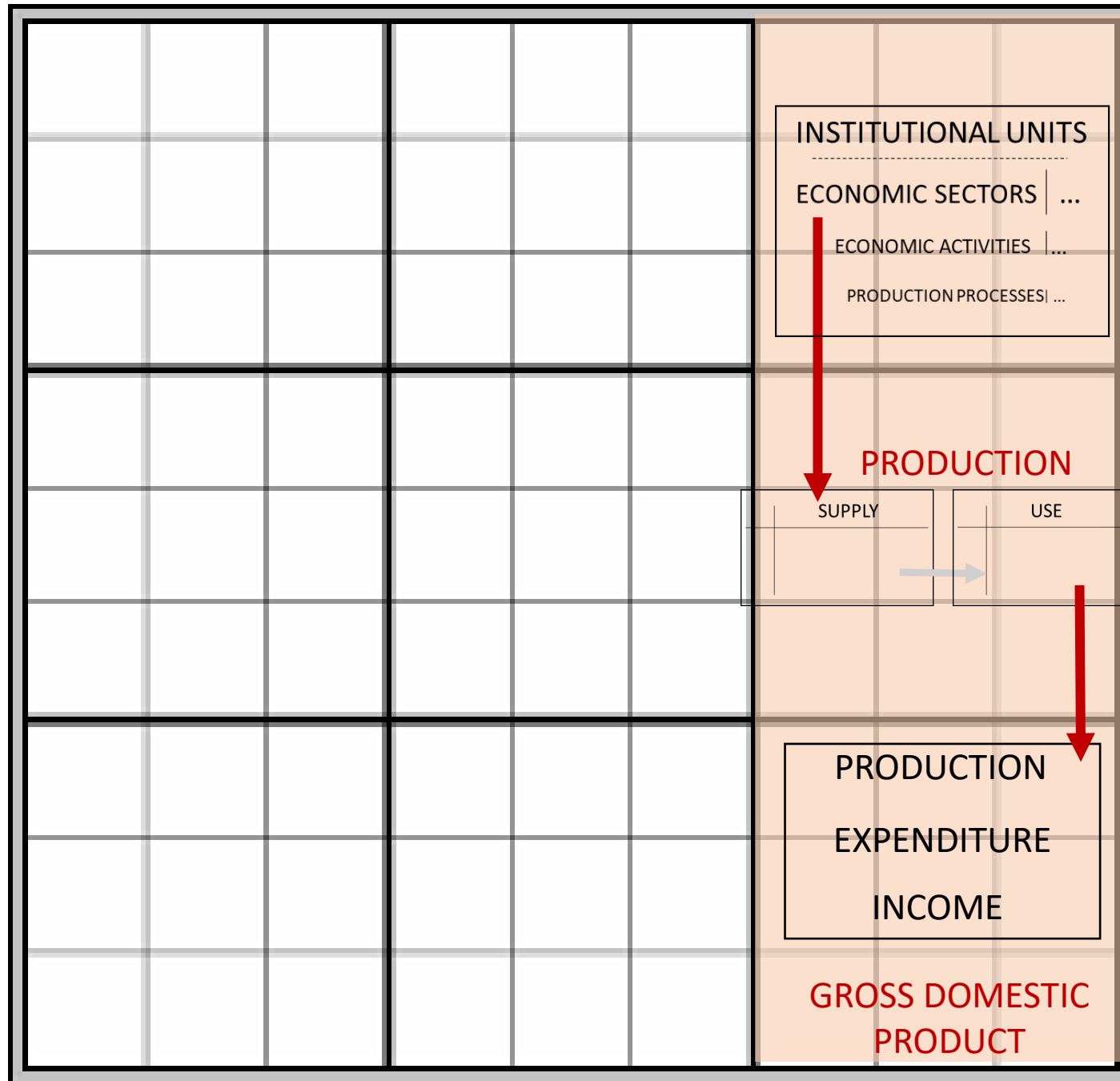


		Mineral and energy	Timber resources		Aquatic resources		Water resources	TOTAL
			Cultivated	Natural	Cultivated	Natural		
Opening stock of resources								Tot opening stock
Addition to stock of resources								
Growth in stock								Tot growth in stock
Discoveries of new stock								Tot discoveries
Upward appraisals								Tot upward appraisal
Reclassifications								Tot reclassification
<i>Total additional to stock</i>								<i>Tot addition in stock</i>
Reductions in stock of resources								
Extractions								Tot extractions
Normal reductions in stock								Tot reduction in stock
Catastrophic losses								Tot catastrophic losses
Downward reappraisals								Tot downward appraisal
Reclassifications								Tot reclassification
<i>Total reductions in stock</i>								<i>Total reduction in stock</i>
Closing stock of resources								Tot closing stock

SUPPLY

USE

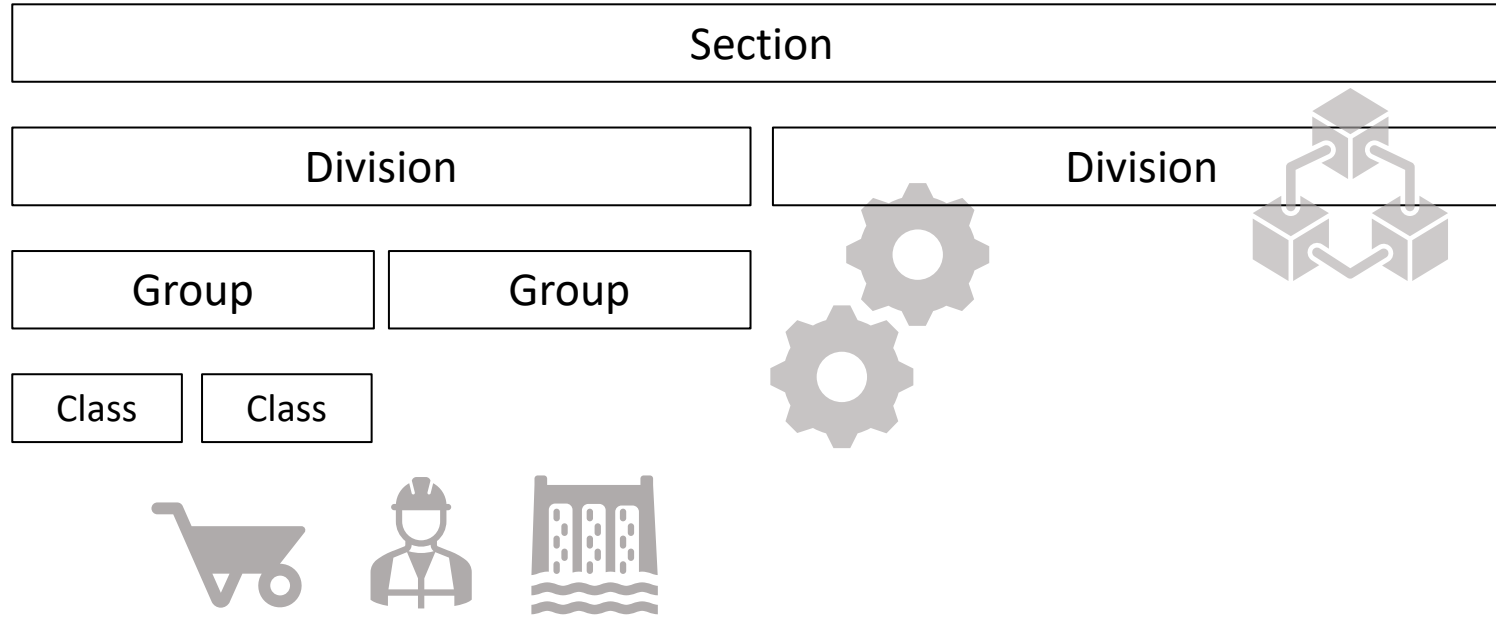
		Production		Flows from the rest of the world	Flows from the environment	Total supply by natural inputs and residuals	Production		Flows from the rest of the world	Flows from the environment	Total use by natural inputs and residuals
		Industries	Households				Industries	Households			
Natural inputs											
Residuals											
Total supply		from industries	from households	from import	from the environment		Total use	by industries	by households	from export	from the environment



SNA

*Stylized Sudoku
representation*

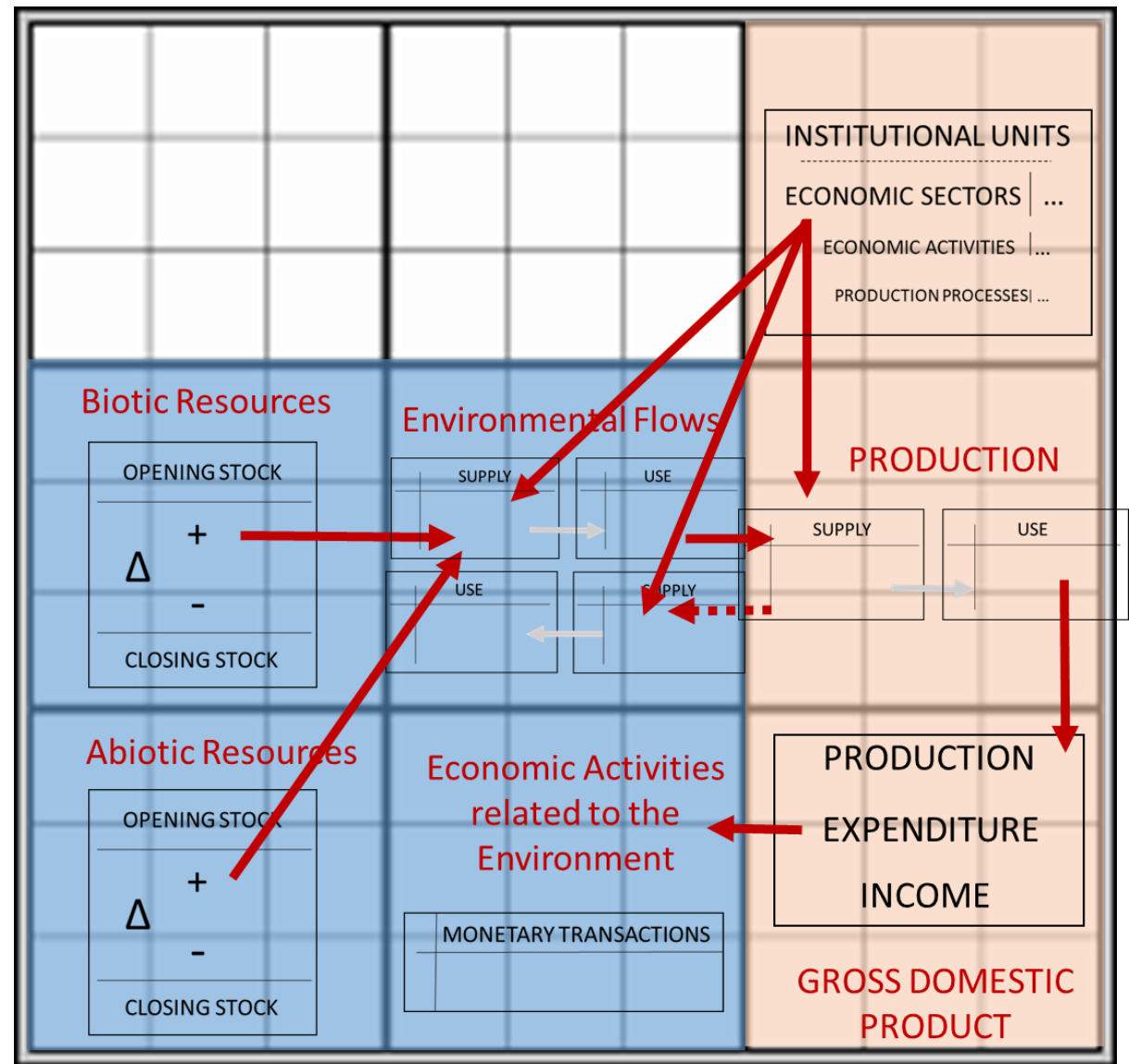
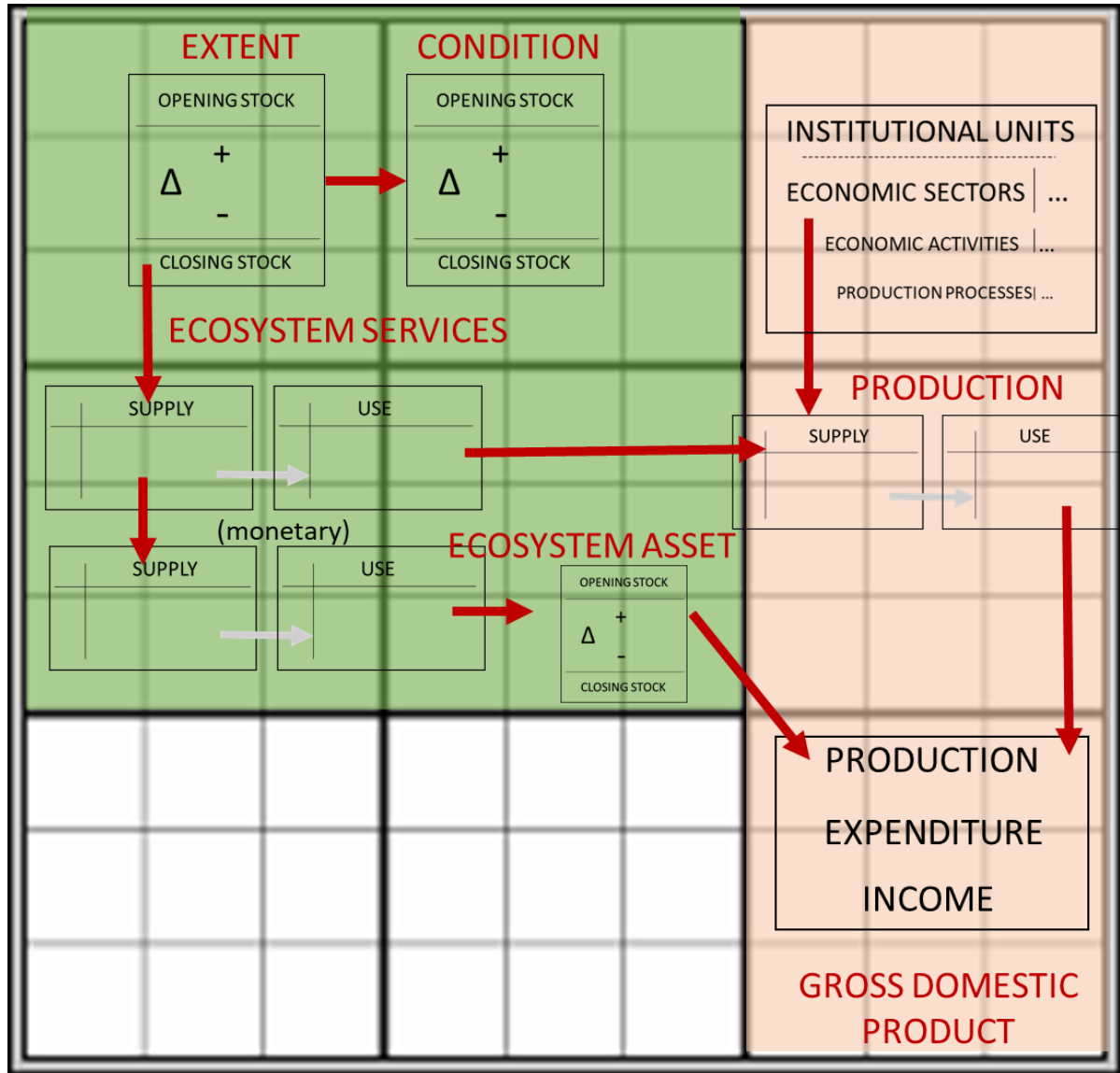
ISIC



SUPPLY

USE

		Production		Flows from the rest of the world	TOTAL			Production		Flows from the rest of the world	TOTAL
		Industries	Households					Industries	Households		
Products						Products					
Total Supply		Supply from industries	Supply from households	Supply from Import		Total Supply	Use by industries	Use by households	Use from Export		



Example # 1: timber provision

SEEA EA

SUPPLY	
Ecosystem Services	Ecosystem Types
	Woodland and forests available for wood supply
Provisioning services	
<i>timber provision</i>	woody biomass growth

USE	
Ecosystem Services	Economic Units
	Forestry sector (intermediate) Households (final)
Provisioning services	
<i>timber provision</i>	woody biomass growth

	Timber resources	
	Cultivated	Natural
Opening stock of resources	Standing timber	Standing timber
Addition to stock of resources		
Growth in stock	Net Annual Increment	Net Annual Increment
Reductions in stock of resources		
Extractions	Removals	Removals
Closing stock of resources	Standing timber	Standing timber

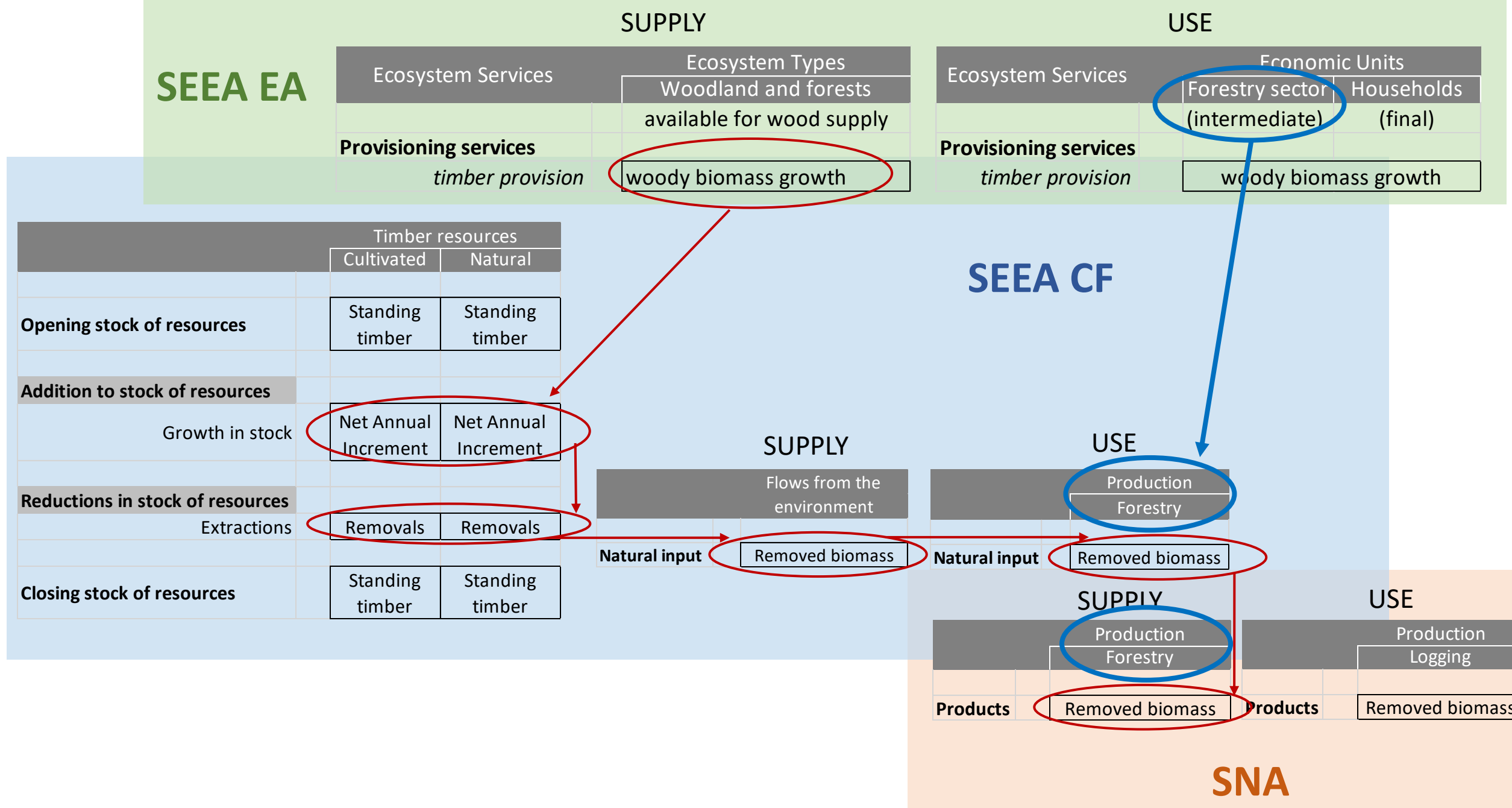
SUPPLY	
Flows from the environment	
Natural input	Removed biomass

USE	
Production Forestry	
Natural input	Removed biomass

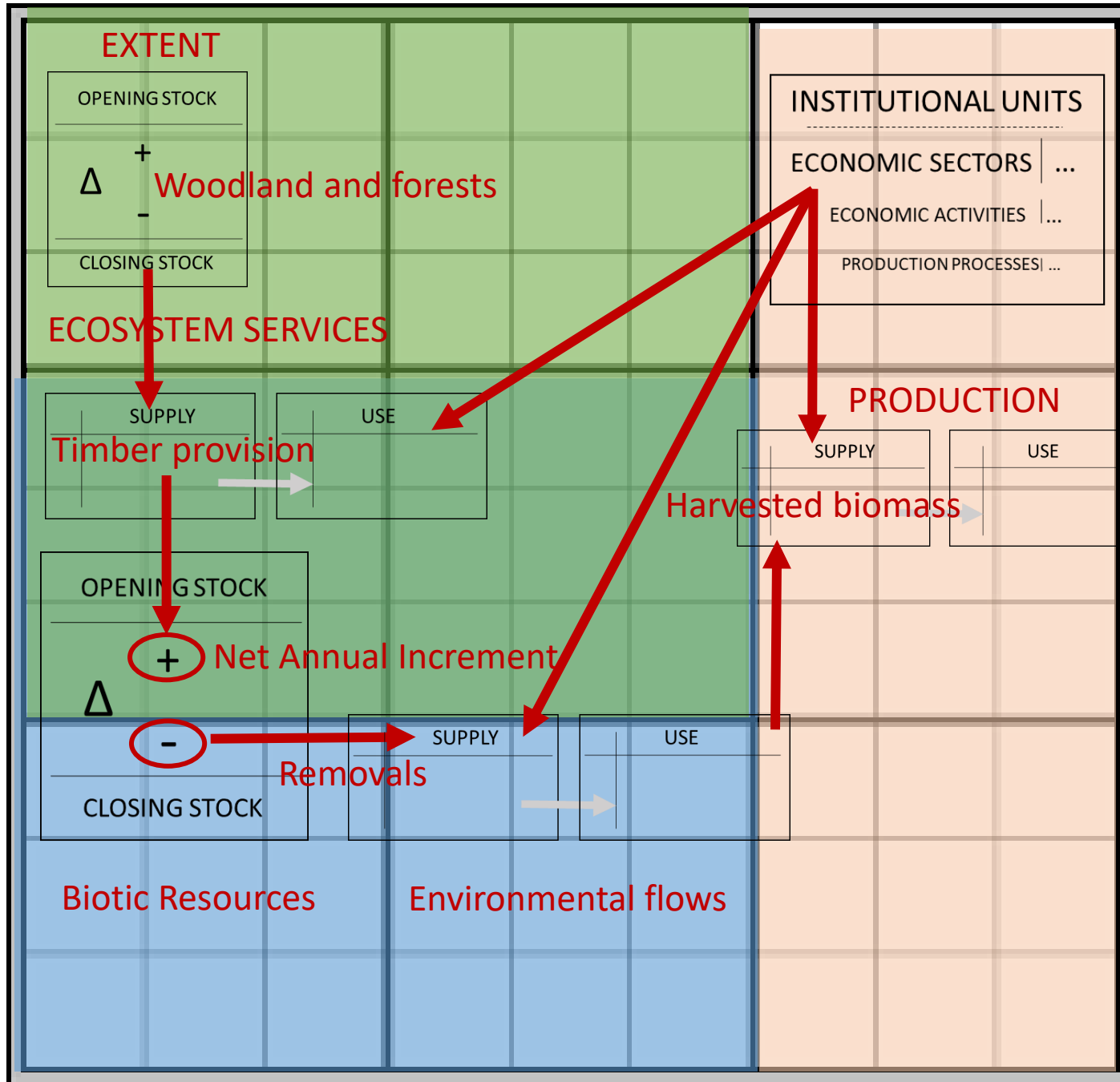
SUPPLY		USE	
Production Forestry		Production Logging	
Products	Removed biomass	Products	Removed biomass

SNA

SEEA CF



SEEA EA
SEEA CF



SNA

Example # 2: water purification

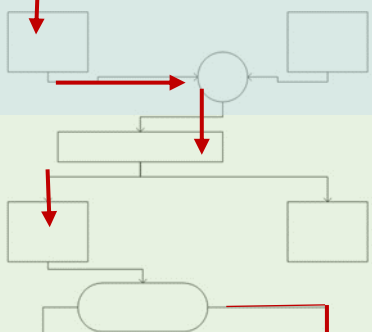
SNA

		Production	
		Industries	Households
Products		Output	

SEEA CF

		Production		Flows from the rest of the world	Flows from the environment
		Primary	Secondary, tertiary and households		
Residuals		excess N	excess N	unremoved N	

		Production		Flows from the rest of the world	Flows from the environment
		Industries	Households		
Residuals		WWTP		unremoved N	N to be removed

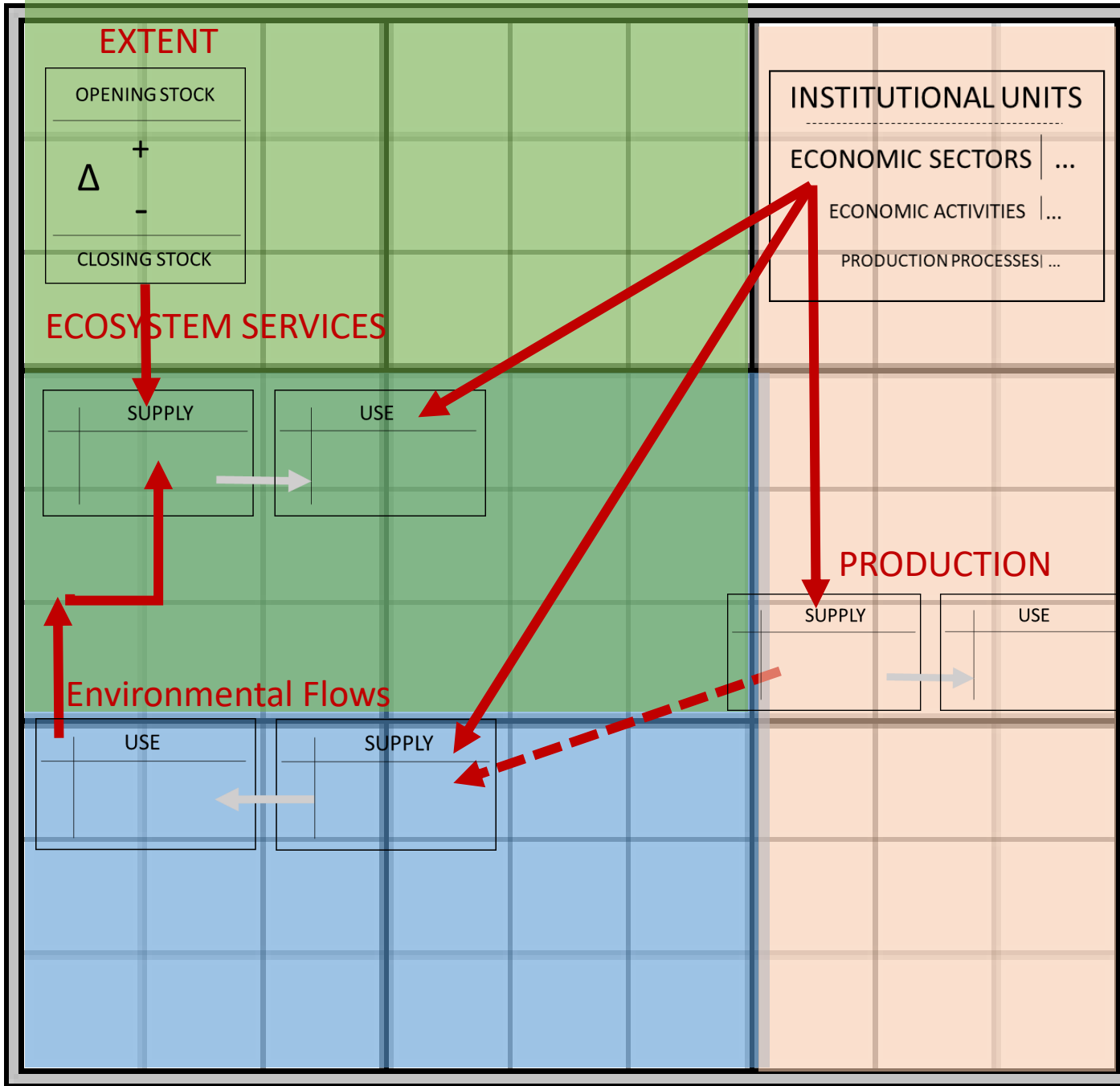


SEEA EA

Ecosystem Services		Ecosystem Types	
Regulating services		Terrestrial	Freshwater
		in soil	in river and lakes
<i>water purification</i>		N removal	N removal

Ecosystem Services		Economic Units	
Regulating services		Agriculture (diffuse sources)	all other units (point sources)
<i>water purification</i>		N removal	N removal

SEEA EA
SEEA CF
SEEA EA



SNA

Considerations

- Since they have different roles, overlapping between CF and EA should be avoided. For example:
 - There should NOT be abiotic services in EA (they are already in the CF)
 - There should NOT be land and soil in the CF (they are already in the EA)
- Some numbers are the same, some other are inputs to other numbers, some others are correlated

Question for the London Group

- Do you agree with the underpinning concept of the Sudoku, with all its implications