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Statistics on paper collection -

Chaos in terminology related to recycling in the paper industry

EcoPaperLoop

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Terminological chaos like in the Middle-Ages?

Fanpop.com

Different terms

Different grades

pragueguide.com

Different calculation methods

Different currencies

femalefirst.co.uk

Different weights, measures

Different or missing definitions

Sub-optimization

Unreliable statistics

cheating

finland.fi

What is the framework

Reliable

Communication – Analysis – Comparison – Understanding - not possible

Definitions and use of terms and variables may vary

1. **Vast number of different terms (jungle)**
2. **Terms are not uniformly defined**
   - **Regional differences**
   - **Time**
   - **Researcher, institution, organization, seller, buyer…**
3. **Misuse of terms**
4. **No uniform MFA (Material Flow Account) framework exists**
   - **Terms, definitions vary**
   - **Regional or study specific**

terminological & statistical & framework problem

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Terminology

Confusion

Different terms are used for the same matter

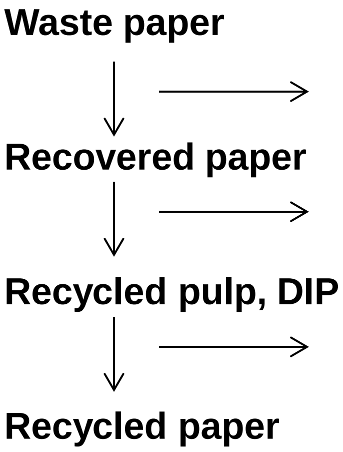
Waste paper
Recovered paper
Recycled fiber
Recycled paper
Etc.

Recovered paper

The same term is used to refer to different products

Recovered paper

Waste paper
Recovered paper
Paper for recycling
Recycled pulp, DIP
Recycled paper



Waste paper

Recovered paper

Recycled pulp, DIP

Recycled paper

Literature Review -TERMS

Available recovered paper potential, box board cuttings, C … GS, collected paper, collection,
collection of paper and board, collection rate, … ds, corrugated, corrugated and
kraft, corrugated containers , CPB, C … rade, demand for high grades,
DIP, discarded paper, DL … gs, high grade deinking, high
grades, HMP, H … cling, MCL, mixed collection
of RCP, RCP col … MOW, MWL, MWP,
newspapers and m … agazines, old news, old
newspaper, OIN, C … ing, paper collection, paper
collection rate, pape … paper recycling, paper
recycling rate, paper … nsumer recovered paper,
printed woody paper … covered fiber, recovered
fibre, recovered paper … ollection, recovered
paper pulp, recovered p … , recovery (cost),
recovery level, recovery … cled fiber, recycled
fiber, recycled paper, rec … of paper, recycling
of waste paper, recycling … recycling, scrap
paper, secondary fiber, sec … recovered paper, UOP,
utilization, utilization rate, … ection, waste paper net recovery
rate, waste paper recovery r … cycling, waste paper utilization rate,
wastepaper recovery, WBN, … lor ledger, white GP containing shavings, and white
wood free grades.

Jungle of terms: Literature review revealed 794 different terms from 64 sources related to recovered paper. There are even more. Many of the terms are overlapping; many not precisely defined

Do we really need this many terms?

Classification Systems for Grades - TERMS

Regions and companies have different recovered paper classification systems

- Europe , EN 643 - 57 grades of RP , New EN 643 – 95 grades of PfR
- USA, PS-2009 - 48 + 35 specialty grades
- Japan, PRPC   - 20 grades and 7 statistical groups
- Russia (Gost)
- Australia (AuRPS)
- South Africa (PRASA)
- Individual companies

365 trade grades were identified, globally
Partly over-lapping, not well defined
Do we need this many trade grades?

Change

Photo: Ilkka Kuusisto

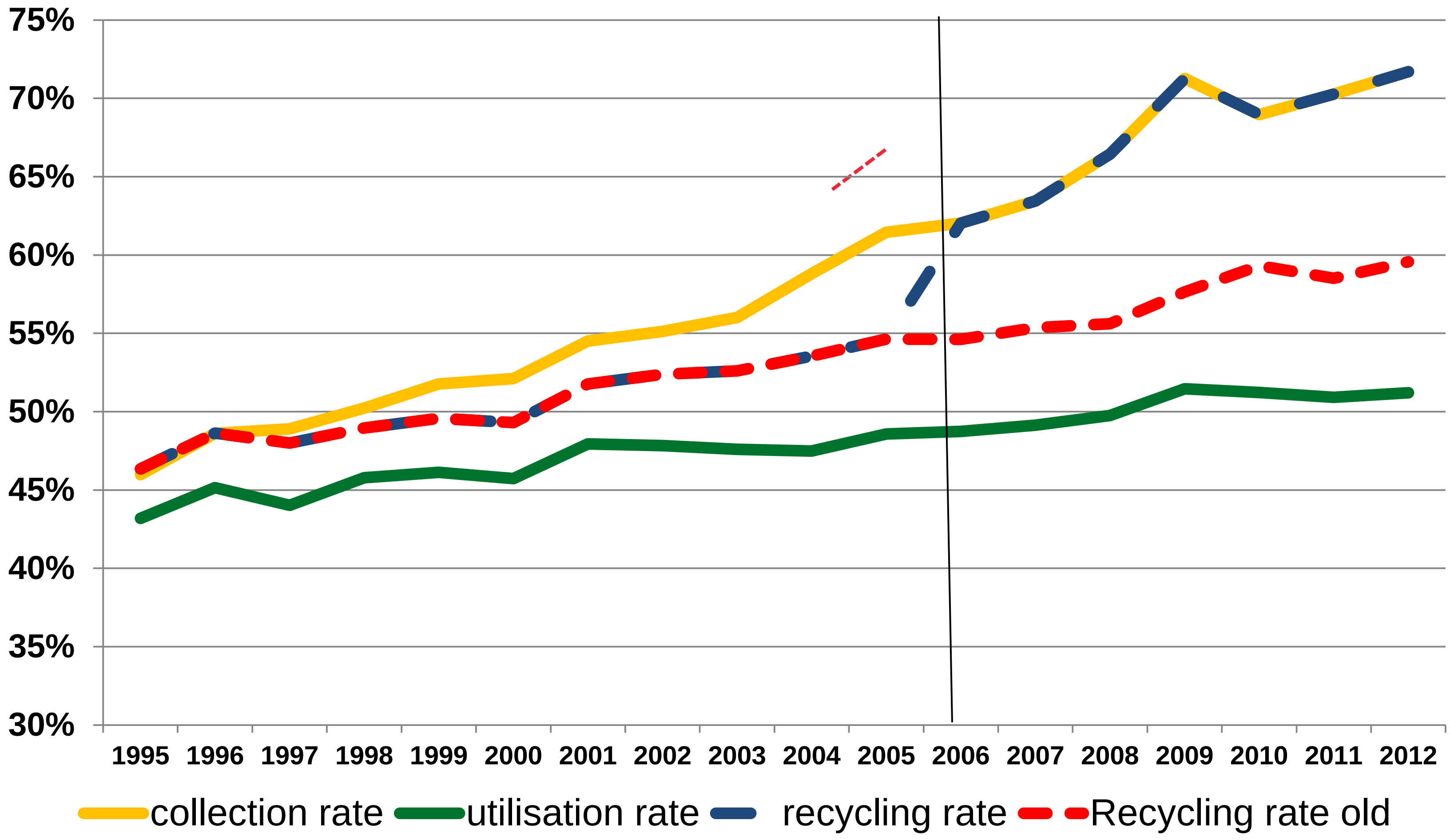
Waste → **Raw material and trade commodity**

Understanding changes in time
Example: Collection vs. Recycling

$$\text{Collection rate} = \frac{\text{RP utilization} + (\text{net trade})}{\text{Paper consumption}} = \underset{\text{(after 2006)}}{\text{Recycling rate}}$$

Before 2006 European recycling included local utilization only. After that also utilization outside the region (net trade) was included turning recycling to collection

Time series in Europe 1995 – 2012



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Question: What is the difference between following terms in Europe?

Waste paper recovery

Recovered paper collection

Recovered paper recycling

Recycling of paper for recycling

Grandfather's axe
blade
helve

Answer: Time

Does recycling rate explain what is should?

$$\text{Recycling rate} = \frac{\text{RP recycling}}{\text{Paper consumption *)}}$$

(-2006)

Recycling = paper industry use (local + exports) + ~~other uses~~ + ~~composting~~,

Paper consumption (collection potential) =

Paper consumption + ~~converted products net~~ trade + ~~traded packages net trade~~

No because both recycling and paper consumption do not indicate what they should

---

***) Several different terms and definitions to describe paper consumption were identified,**
For example: Paper consumption, product usage, theoretical recovered paper potential, available recovered paper potential, market supply paper & board, market supply of converted products, Product use, new paper based products, used paper, paper products, paper use, paper for recycling at end users, paper, paper use and discard, apparent consumption of P&B, adjusted consumption..

Recovery, what is it?

In the USA and Japan recovery = collection

Recovery rate is the ratio of total recovered paper collected to new supply of paper and paperboard (AF&PA)

In Europe recovery = Principle of waste management policy including:

- re-use
- material recycling
- composting
- energy recovery
- exports to similar purposes

(European Declaration on Paper Recovery, 2000)

American recovery ≠ European recovery

European recovery cannot be calculated

Terminology and time horizon

FIELD	PAST	PRESENT	FUTURE
PRODUCT	Waste	Raw material, Fuel, trade commodity	Raw material Fuel, trade commodity
TERMINOLOGICAL SYSTEM	Overall description	Overall descript Not enough	Exact description Necessary
TERMS USED	Waste related	Recovered paper Paper for recycling (great variation)	**DEFINED products:** Waste, recovered, recycled paper, recycled fiber
AVAILABILITY	Abundant, waste	Balance, globally	Shortage, globally
INDICATORS	General description total RP enough	General description total RP , regional variation	Precise uniform description by grade needed
GRADE DEFINITIONS	Country specific	Regional , e.g. EN 643	Globally uniform
FRAMEWORKS	General, regional or study specific. Terms and definitions vary greatly	Regional or study specific, great terminology variation between frameworks	Global, terminologically sound, uniform definitions

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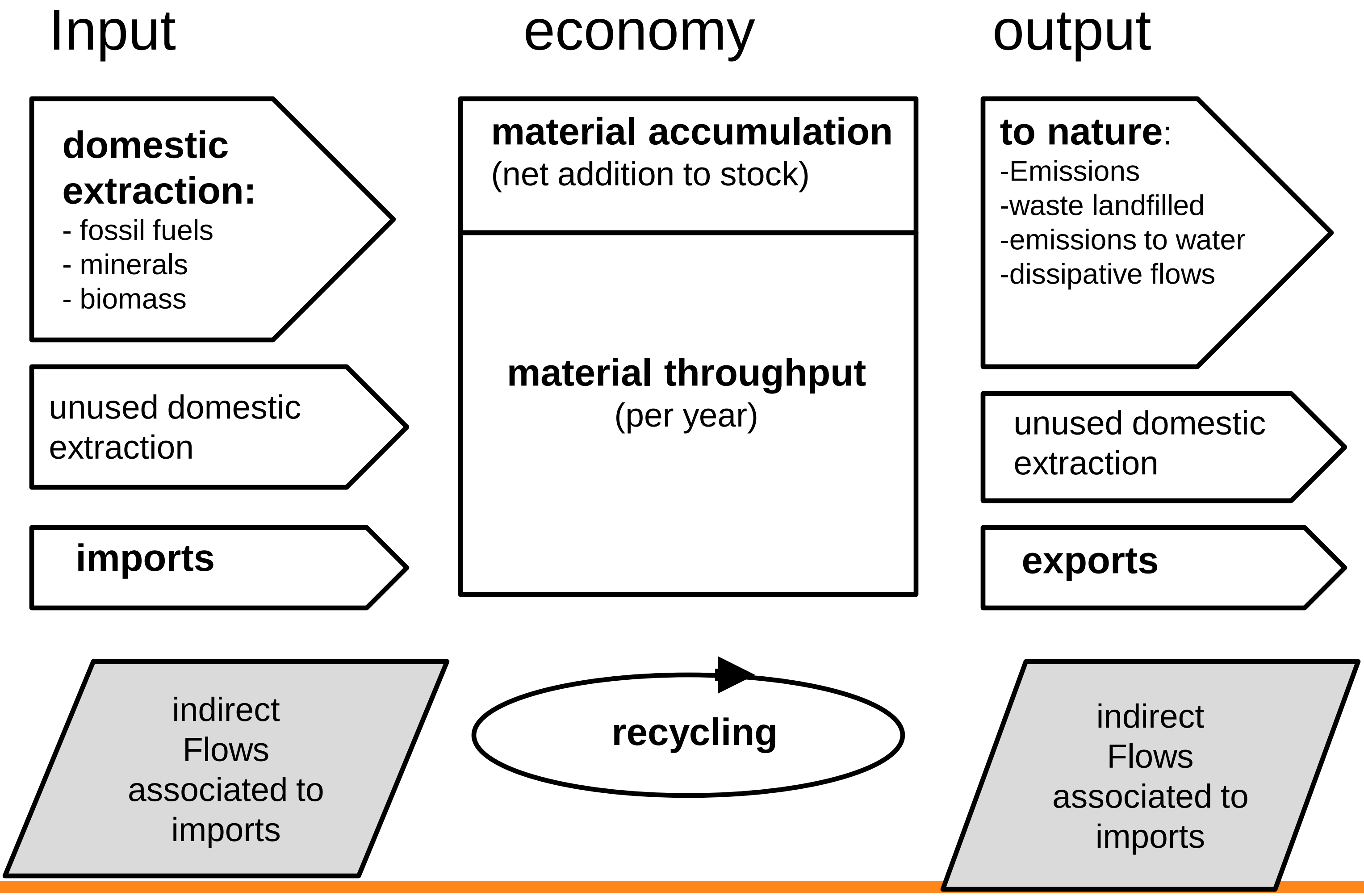
Framework

Material Flow Account -MFA

Economy-wide material balance scheme *) Normally used in MFA' s



Input

economy

output

domestic extraction:
- fossil fuels
- minerals
- biomass

unused domestic extraction

imports

material accumulation
(net addition to stock)

material throughput
(per year)

to nature:
-Emissions
-waste landfilled
-emissions to water
-dissipative flows

unused domestic extraction

exports

indirect Flows associated to imports

recycling

indirect Flows associated to imports

*) excluding air and water flows

Source: Eurostat, 2001

MFA - frameworks related to paper recycling

Ten different frameworks related to paper industry material flows from different sources were identified and analyzed

ERPC (2013),
Villanueva et al (2007),
Indufor (2013),
EcoPaperLoop (2012)
CEPI (2013) and CEPI (2008)
Schmidt et al (2007),
PRPC (2010), **Davidsdottir et al (2005)**
Pento (1994

Several different stages
Could e identified and
grouped into
5 main stages

See following slide

Analysed frameworks and identified stages

Main stage	**Sub-stage or flow used in different frameworks**	**ERPC (2013)**	**Ville-nueva (2007)**	**Indufor (2013)**	**Ecopaper Loop (2012)**	**CEPI (2013)**	**CEPI (2008)**	**Schmidt et al (2007)**	**PRPC (2010)**	**Davids-dottir (2005)**	**Pento (1994)**
raw material utilization	virgin fiber pulp used for paper		U, V, R	U, V, R		V,R	**R**	**U, V, R**	U, V, R	U, V,R	V, R
	recovered paper used for paper	N	N	N	N	N	**N**	**N**	N	N	N
	- Utilization = collection + recovered paper net trade		N=(K-L+M)	N=(K-L+M)		N=(K-L+M)		N=(K-L+M)	N=(K-L+M)	N=(K-L+M)	N=(K-L+M)
	Recovered paper used for recycled / deinked pulp	N	N				N	N	N	N	N
	recycled / deinked pulp used for paper		N						Q	Q	Q
	non-fibrous materials used for paper					S		S			S
paper production	paper production	A	A	A	A	A	A	A	A	A	A
	- production of different paper grades		A			A					A
paper consumption	paper consumption		E	E	E	E	E	E	E		E
	-paper consumption by grade										E
	converting paper into paper products	E				E	E	E			E
	consumer / end user who discards paper	E				E				E	E
	consumption = product usage + additives				E+T			E+T			
	consumption = production + net trade		A+C-D	A+C-D		A+C-D			A+C-D		A+C-D
	product use				E	E	E			E	E
	theoretical recovered paper potential				E-E'						
	non-collectable paper taken into account				E'	E'					
	ink and additive use in converting				T		T	T			
	available recovered paper potential				E-E' -M+L						
	trade of packaging material included					E+F					
	trade of converted products included					E+G					E+G
RP Collection	recovered paper collection	K	K	K	K	K	K	K	K	K	K
	recovered paper sorting	K	K			K	K		K		
	fulfill recovered paper grade quality definition	K					K				
	collection from different sources or collection of different recovered paper grades					K	K		K		K
Other options	other recycling options			H		H				H	
	other recovery options		H+I	H+I		H+I					
	-energy recovery		I	I						I	
	-composting		H			H					
	-other treatments					H					
	long living products included				H		H				H
	land filling		J		J	J		J		J	J
	disposal			J		J	J				
	sewerage				J						
	incineration		J or H	J or H	J or H	J or H		J or H		J or H	J or H
	process losses in pulping					P					P
	not collected, non-collectable				E'	E'			E'		E'

Note: Any letter in a box indicate that the source has recognized the corresponding stage. Different letters refer to the "framework under construction"

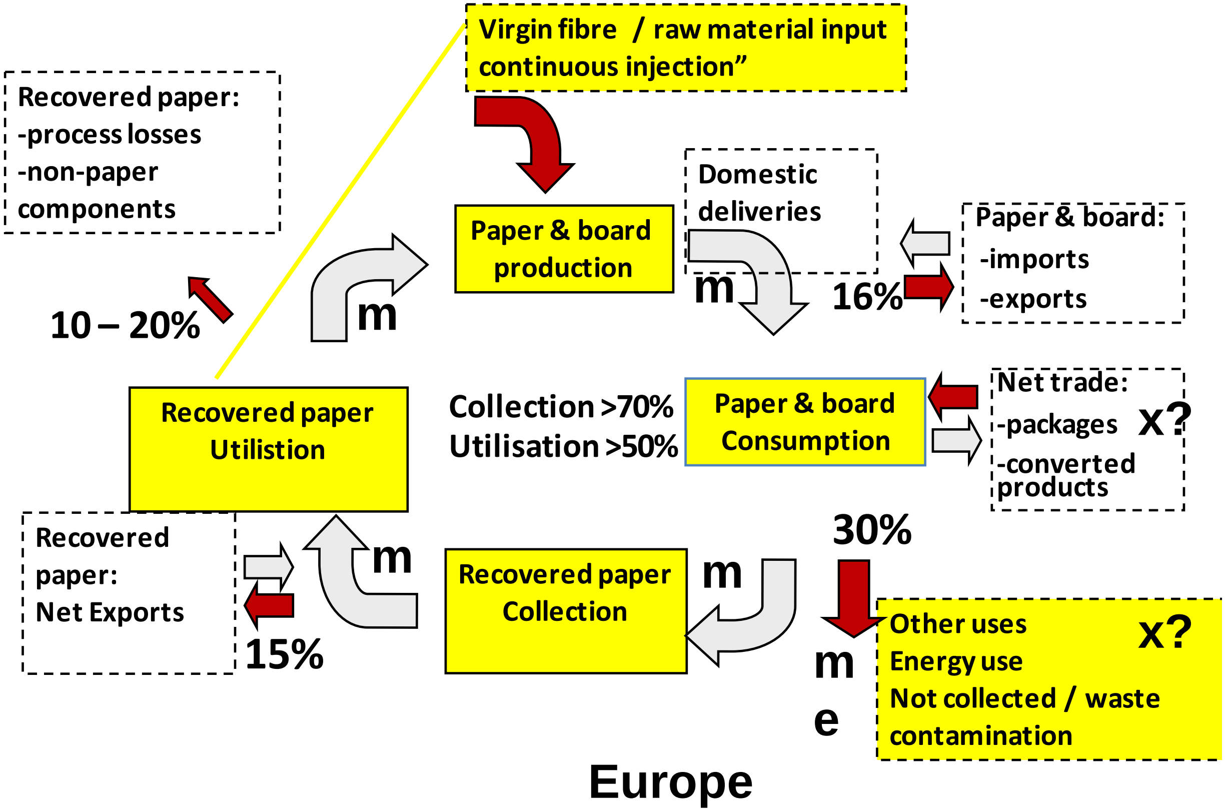
Selected comments about the analyzed MFA frameworks

- **Each of them described a regional or study specific question**
- **Frameworks are not necessarily comparable**
- **Usually total recovered paper (no grades or definitions)**
- **Great variation in use of terms:**
  - Product itself
  - Terms like paper consumption, several definitions
  - Recycling and recovery options and terms which are relations
  - Incineration / energy use
- **Terms do not necessarily describe reality**
  - E.g. trade of packaging material and RP use outside the paper industry normally not in use
- **Volume differences: Moisture change, process losses, non-paper components, additives & inks in converting not included**

Framework under construction

Identified main 5 stages

UNDER CONSTRUCTION



Virgin fibre / raw material input continuous injection”

Recovered paper:
-process losses
-non-paper components

10 – 20%

m

Paper & board production

Domestic deliveries

m

16%

Paper & board:
-imports
-exports

Recovered paper Utilistion

Collection >70%
Utilisation >50%

Paper & board Consumption

Net trade:
-packages
-converted products

x?

30%

Recovered paper:
Net Exports

15%

m

Recovered paper Collection

m

m

e

Other uses
Energy use
Not collected / waste
contamination

x?

Europe

m = material
e = energy
x ? = volume?

Uniformity is needed

- Terms and their definition are in chaos
  - Terms which relate to product itself, recovered paper grades
  - Terms which relate to variables (like paper consumption)
  - Terms which relate to relations (like recycling rate)
  - **> Uniform global terminology needed**
  - Material Flow Account (MFA)
  - There is no single MFA which could be used globally to explain material flows and use terms uniformly
  - **> Uniform MFA is needed**
- EcoPaperLoop project has to decide whether it pays attention to paper recycling related Terms and Framework!

“However, the material still rotates”

de.wikipedia.org / artinbulk.com

$$\left\{\begin{array}{l} m \Rightarrow e \\ \text{but} \\ e \not\Rightarrow m \end{array}\right\}$$

..but we are not able to describe it reliably….yet

Thank you for your attention

Questions?

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Indufor ...forest intelligence