Data quality assessment method for LCI data of the Dutch building industry

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Do you need a data quality assessment system?
Do you prefer a simple or an elaborated approach?

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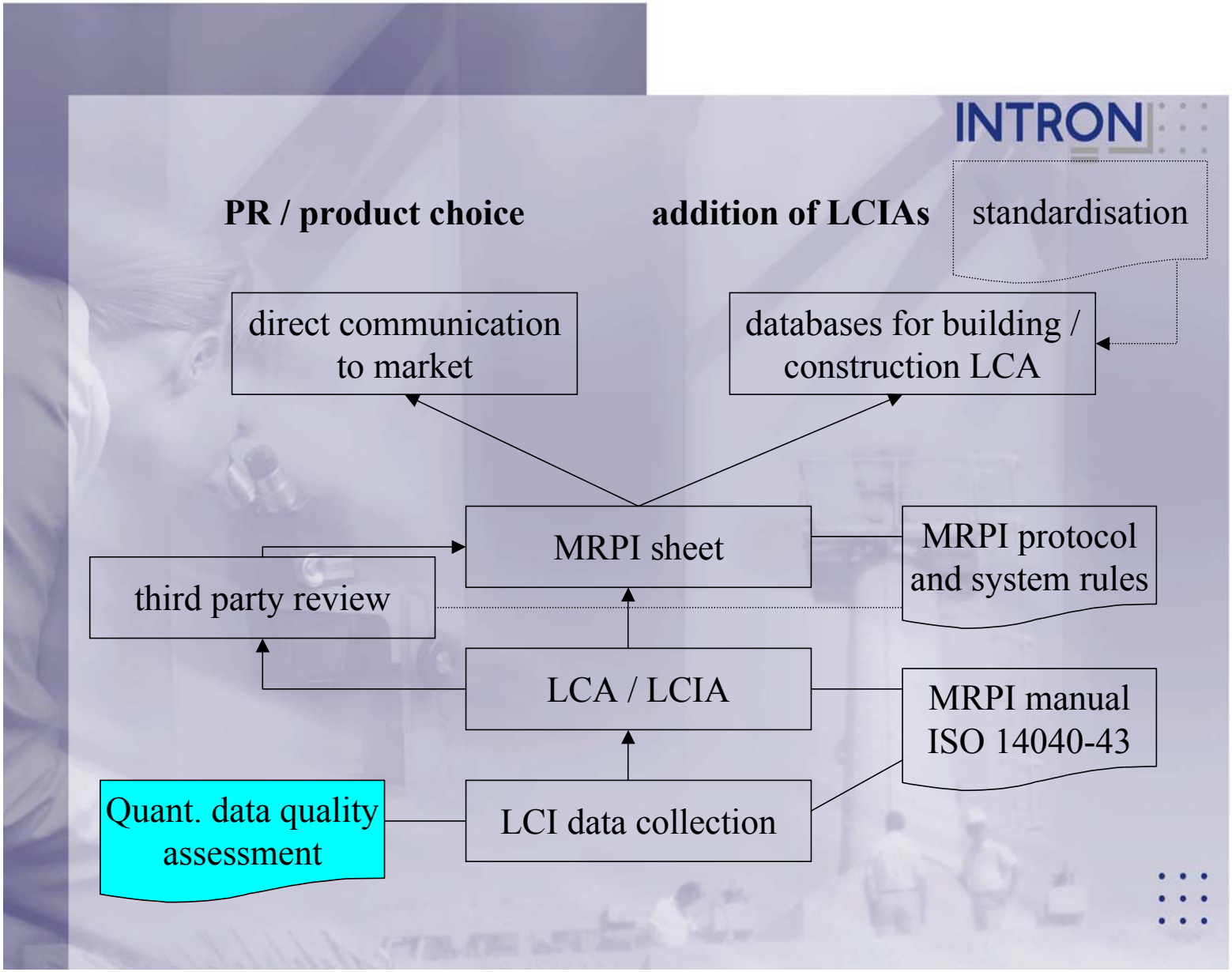
LCA in the Dutch building industry

- building industry is environmental policy topic since 1991
- as a response to ‘black lists’, industry developed MRPI
  - environmental relevant product declaration (ERPI / MRPI)
- MRPI = Type III Environmental Product Declaration (EPD) system, including third party review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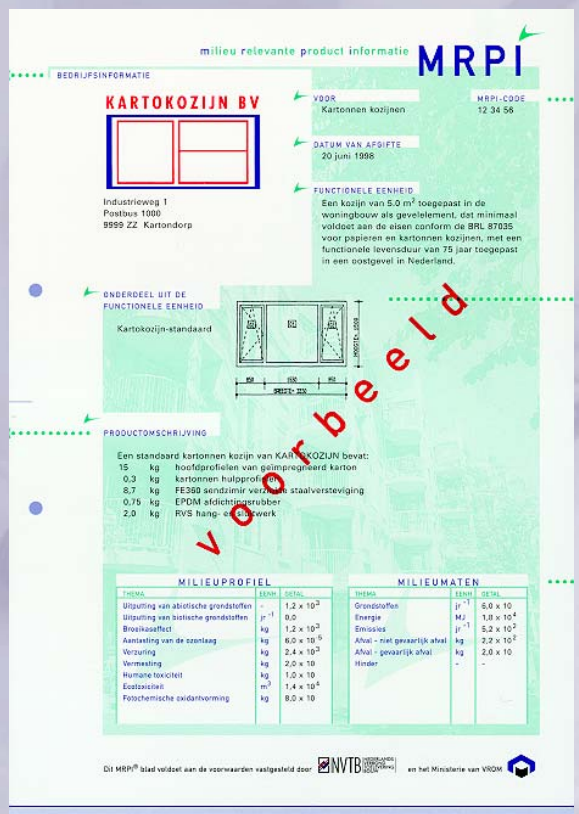
PR / product choice
addition of LCIAs
standardisation
direct communication to market
databases for building / construction LCA
MRPI sheet
MRPI protocol and system rules
third party review
LCA / LCIA
MRPI manual ISO 14040-43
Quant. data quality assessment
LCI data collection

MRPI datasheet (example)



milieu relevante product informatie **MRPI**

BEDRIJFSINFORMATIE

KARTOKOZIJN BV

Industrieweg 1
Postbus 1000
9999 ZZ Kartondorp

VOOR
Kartonnen kozijnen

MRPI-CODE
12 34 56

DATUM VAN AFGIFTE
20 juni 1998

FUNCTIONELE EENHEID
Een kozijn van 5.0 m² toegepast in de woningbouw als gevelelement, dat minimaal voldoet aan de eisen conform de BRL 8703S voor papieren en kartonnen kozijnen, met een functionele levensduur van 75 jaar toegepast in een oostgevel in Nederland.

ONDERDEEL UIT DE FUNCTIONELE EENHEID
Kartokozijn-standaard

PRODUCTOMSCHRIJVING
Een standaard kartonnen kozijn van KARTOKOZIJN bevat:

15	kg	hoofdprofielen van geïmpregneerd karton
0,3	kg	kartonnen hulpprofielen
8,7	kg	FE360 sendzimir verzinkt staalversteviging
0,75	kg	EPDM afdichtingsrubber
2,0	kg	RVS hang- en sluitwerk

voorbeeld

MILIEUPROFIEL

THEMA	EENH	GETAL
Uitputting van abiotische grondstoffen	-	$1,2 \times 10^{2}$
Uitputting van biotische grondstoffen	jr^{-1}	0,0
Broeikaseffect	kg	$1,2 \times 10^{2}$
Aantasting van de ozonlaag	kg	$6,0 \times 10^{-5}$
Verzuring	kg	$2,4 \times 10^{-2}$
Vermesting	kg	$2,0 \times 10$
Humane toxiciteit	kg	$1,0 \times 10$
Ecotoxiciteit	m^{3}	$1,4 \times 10^{4}$
Fotochemische oxidantvorming	kg	$8,0 \times 10$

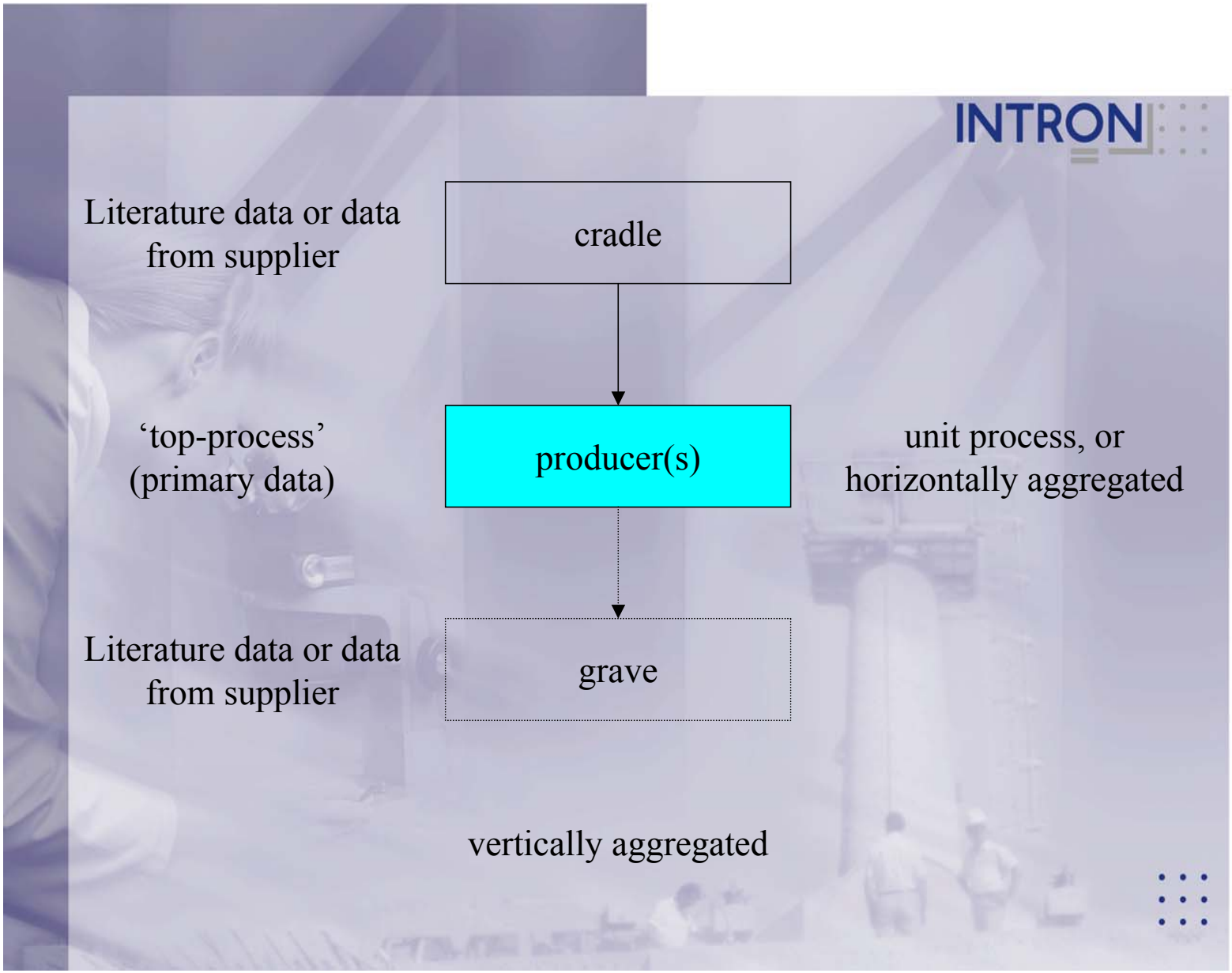
MILIEUMATEN

THEMA	EENH	GETAL
Grondstoffen	jr^{-1}	$5,0 \times 10$
Energie	MJ	$1,8 \times 10^{4}$
Emissies	jr^{-1}	$5,2 \times 10^{2}$
Afval - niet gevaarlijk afval	kg	$2,2 \times 10^{2}$
Afval - gevaarlijk afval	kg	$2,0 \times 10$
Hinder	-	-

Dit MRPI® blad voldoet aan de voorwaarden vastgesteld door NVTB en het Ministerie van VROM

Goal of data quality assessment in MRPI®

- to make the quality of the data collected by the producer (=top-process) transparent
  - shows the effort of the EPD owner
- to make the quality of the LCA (cradle-to-gate/grave) for MRPI® transparent
  - for discussions with the users of the MRPI®-LCIA data (esp. LCA building calculations)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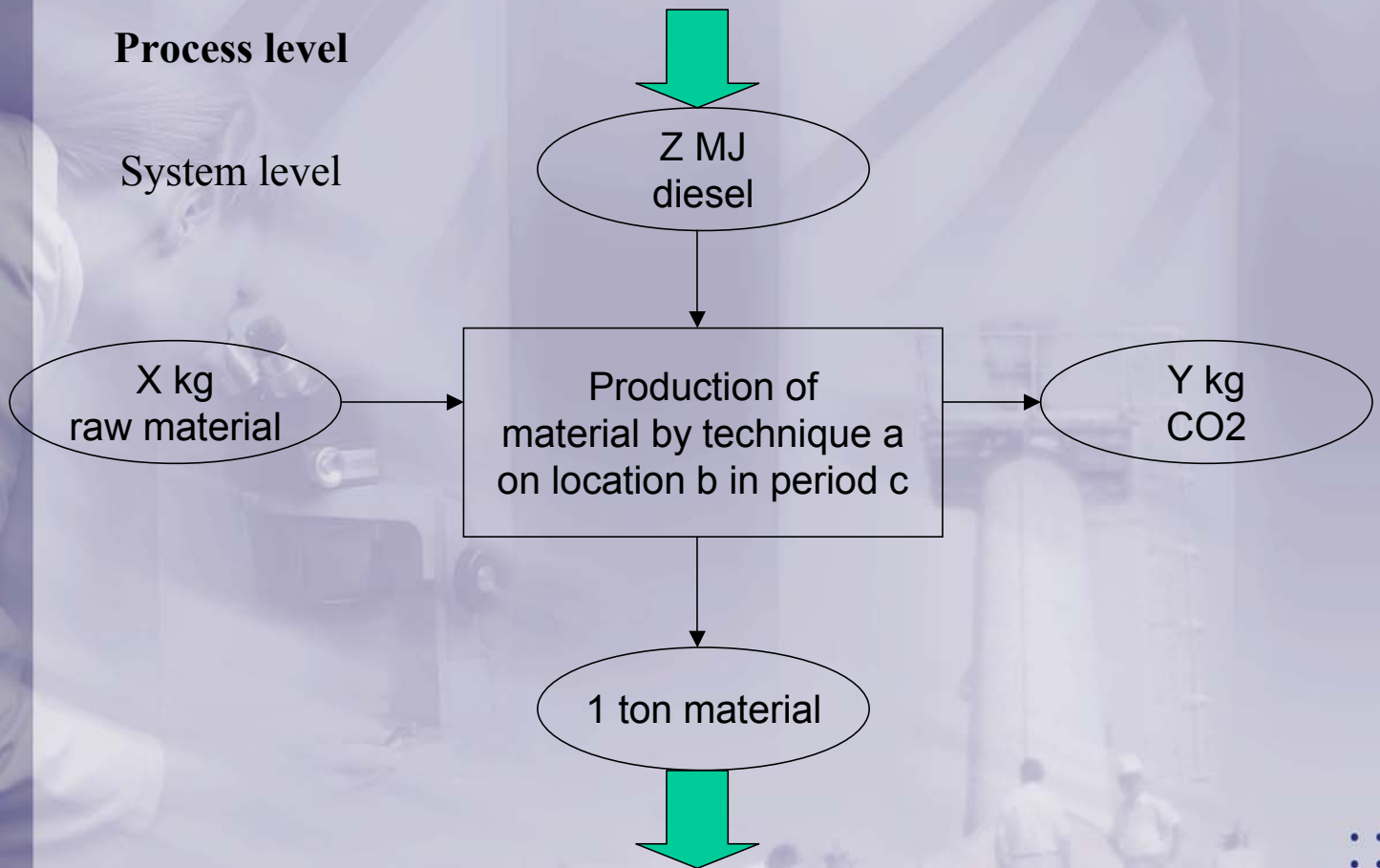
Literature data or data from supplier
cradle
'top-process' (primary data)
producer(s)
unit process, or horizontally aggregated
Literature data or data from supplier
grave
vertically aggregated

Substance level

Process level

System level



Existing data quality assessment systems studied

- Two approaches identified:
  - Pedigree matrices ← most practical
  - Uncertainty approaches

- Four Pedigree matrices studied
  - Weidema
  - Rousseaux et al
  - RIONED
  - AMPO

indicator	data	data
X1	Score (1-5)	Score (1-5)
X2		
X3		
X4		
X5		

Evaluation

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	Weidema (simple)	Rousseaux (for vertical processes)	RIONED (for vertical processes)	AMPO (for aggreg. processes)
transparancy	–	–	–	–
time consumption	+	–	–	–
reproducibility	–	+	+	–

The MRPI Pedigree data quality assessment matrix

- 3 Separate score matrices for unit processes, horizontally and vertically aggregated processes
- Substance level (LCI), process level and system level (LCA)
- Use of existing score definitions and recommendations of SETAC WG Data Quality
- Assessment per quality indicator (no aggregation)
- Vertical aggregated processes: consistency

Example: LCI-data (substance level)

LCI-data		Score (1-5)				
Per process unit		Reliability		Representativity	Completeness	
Name	**Amount**	**Stat repres.**	**Source**	**Time**	**Aggr. substance**	**Nomenclature**
INPUT						
Raw mat	… kg	3	5	2	1	3
(…)	(…)					
OUTPUT						
CO2	… kg	1	2	1	3	4
(…)	(…)					

Example: process and LCA-system

Score (1-5)				
Complete-ness env. flows	Complete-ness economical flows	Mass balance process	Mass balance company	Energy balance company
4	3	2	1	2

Score (1-5)		
Time related representativity	Geographical representativity	Technical representativity
1	1	2

Application in MRPI®

- Pilot in 2003 – 2004 with the MRPI® Pedigree matrix
- Minimum assessment on system level:
  - vertically aggregated process (the MRPI® data)
  - the producer's data (either unit process or horizontally aggregated process)
    - assessment of representativity in relation to the LCA
- Data quality assessment will be part of the third party review
- Not decided yet if the data quality will be expressed on the MRPI® datasheet (EPD)
- Minimum data quality scores will not be required in near future

Example for MRPI®

	Subst (Inputs / outputs)	Statistical represent.		Source	Time Represent.	Aggr. subst	Nomen clature	Compl eteness
Process producer	Percentage	70%		90%	100%	80%	75%	n.v.t.
LCA	Score (1-5)	4		3	2	3	3	4

	Process	Completeness		Mass balance process	Mass balance company	Energy balance company	Represen-tativity	
		Environ.	Econom.				Geo graph.	Tec hn.
Process producer	Score (1-5)							
LCA	Score (1-5)				n.a.	n.a.		

	System (MRPI®)	Time represent.	Geograph represent.	Techn. represent	Consiste ncy	Reproducibil ity
Process producer	Score (1-5)					
LCA	Score (1-5)					

Application in LCA of buildings (standard)

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- Data quality assessment system makes quality level of requirements more transparant
  - facilitates the discussion about requirements
- Correction factors (applied for data that do not meet the requirements) could be avoided
  - data quality requirements could be introduced

Conclusions

- Data quality assessment systems for unit processes exist
  - can be applied for top-processes in LCA from individual processes
- Data quality assessment for horizontally aggregated processes (branch MRPI®) is developed
- Data quality assessment systems for vertically aggregated processes exist, but are not practical
  - adapted system based on representativity and consistency is proposed
- A test period in 2003-2004 is used to see if the adapted propose is applicable in MRPI® practice


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