

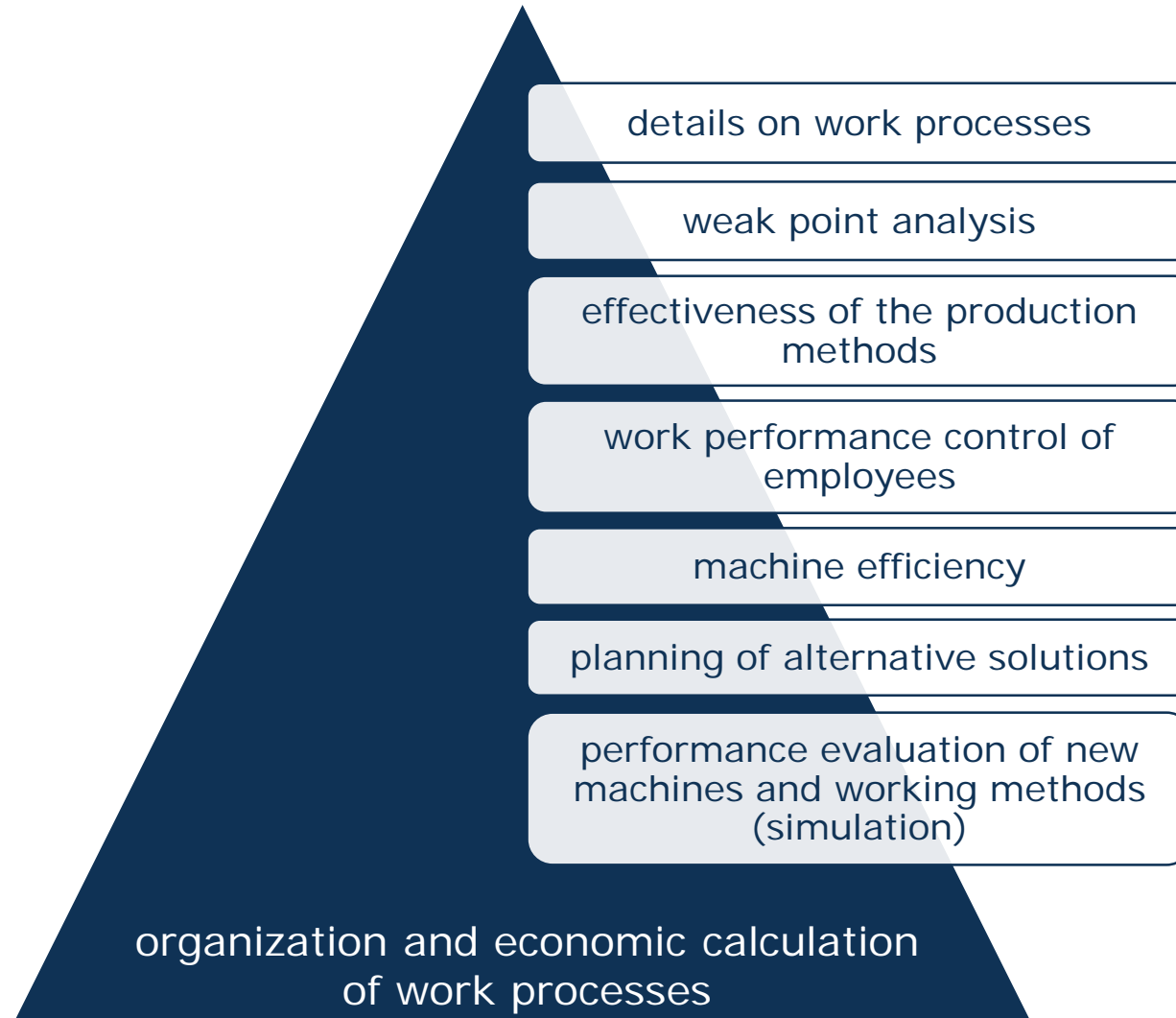
Revision of the Working Time Classification to Optimize Work Processes in Modern Agriculture

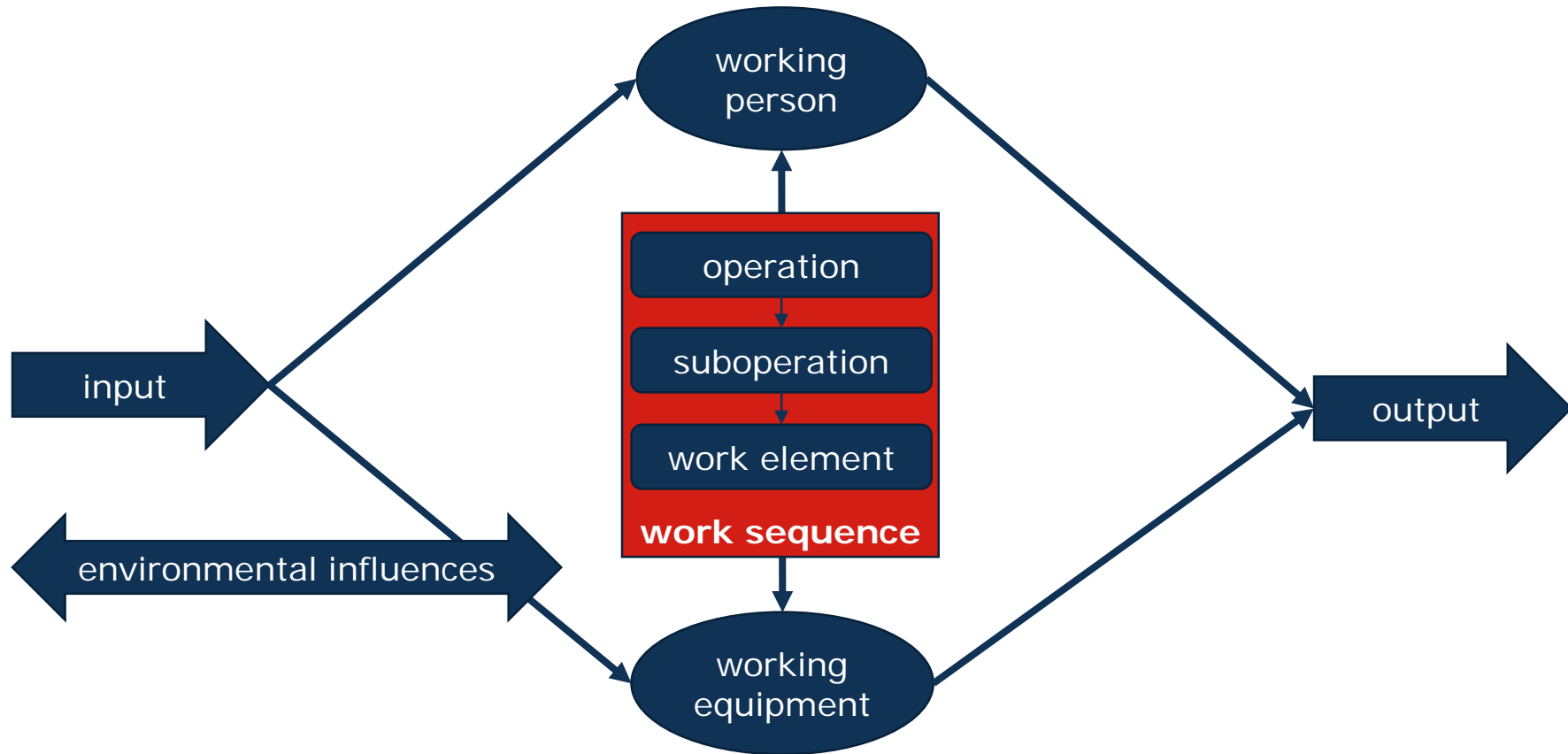
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Types of work processes indicate the interaction between the working person and the working equipment within the work system.

Types of work processes combined with time are identical to types of time:

- driving – transit time
- turning (working equipment) – turning time
- waiting – inherent delay time
- unplanned fault – fault time

History of the development of the working time classification in Germany

5 element times

- preparation time
- operation time
- non-productive time
- delay time
- transit time

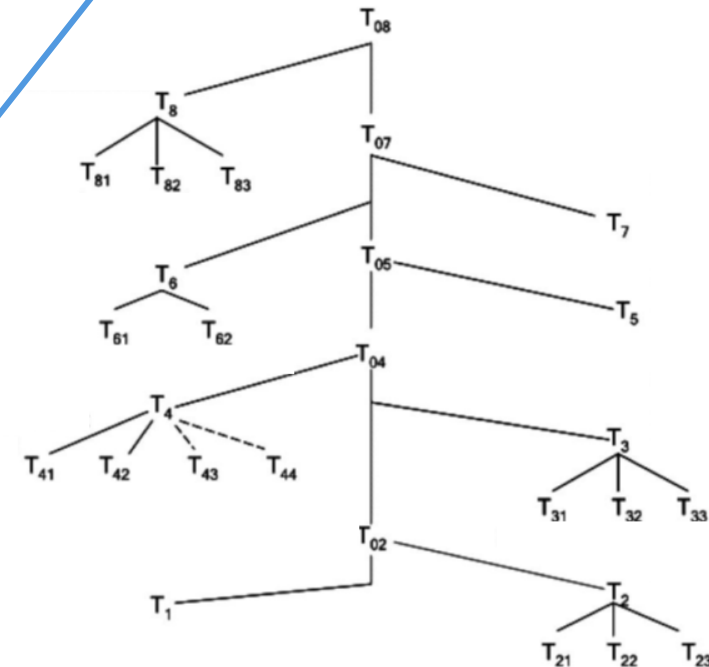
7 element times

total time			
accomplishing and delay time		preparation and transit time	
accomplishing time		delay time	
base time		fault time	
auxiliary time		operation time	
turning time	loaded/unloaded drive		

4 element times

- preparation time
- operation time
- non-productive time
- fault time

8 element times



Seedorf, 1919

v. Bismarck and Buchholz, 1931

CIOSTA-method, 1955

Röhner, 1956

Schweizer, 1963

Krause, 1964

Kreher, 1969

KTBL-calculation method, 2000

Schmid, 1977

Hahn, 1984

Hermann, 1997

Sonnen, 2007

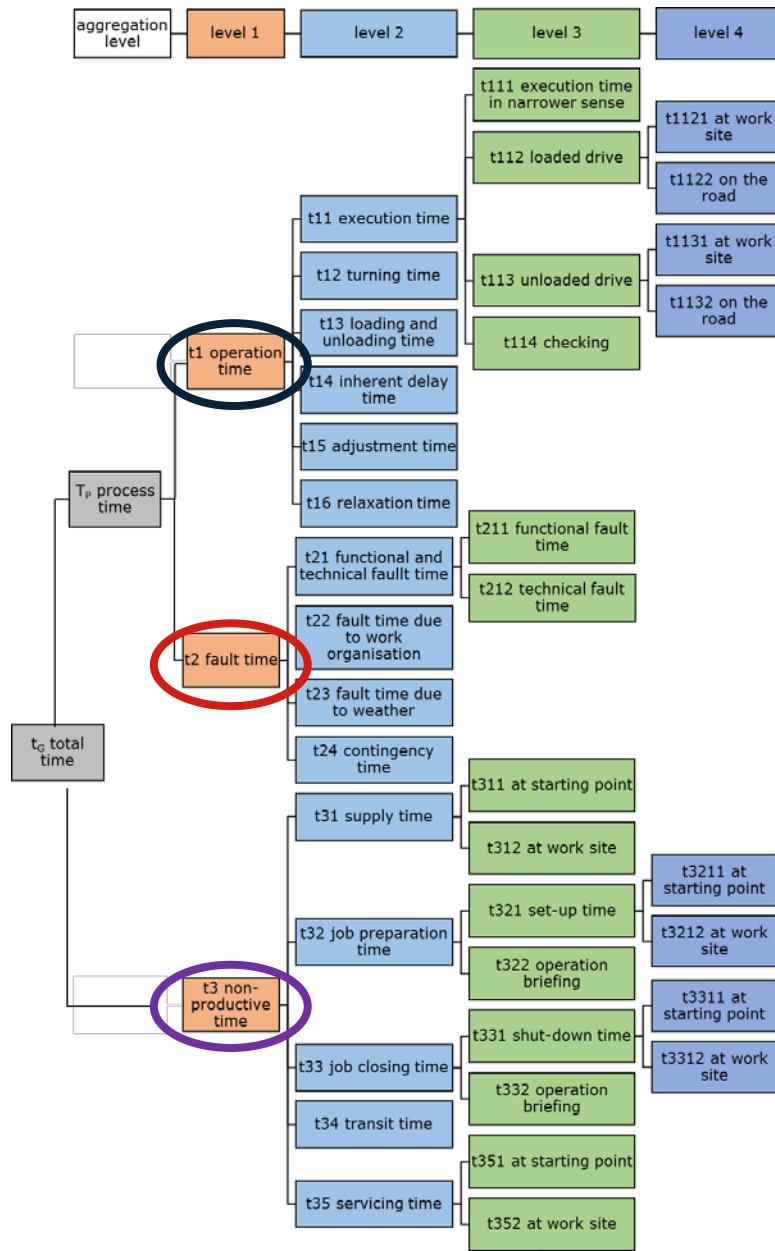
TGL 80-22289, 1970

TGL 22289, 1974

The following requirements have to be taken into account:

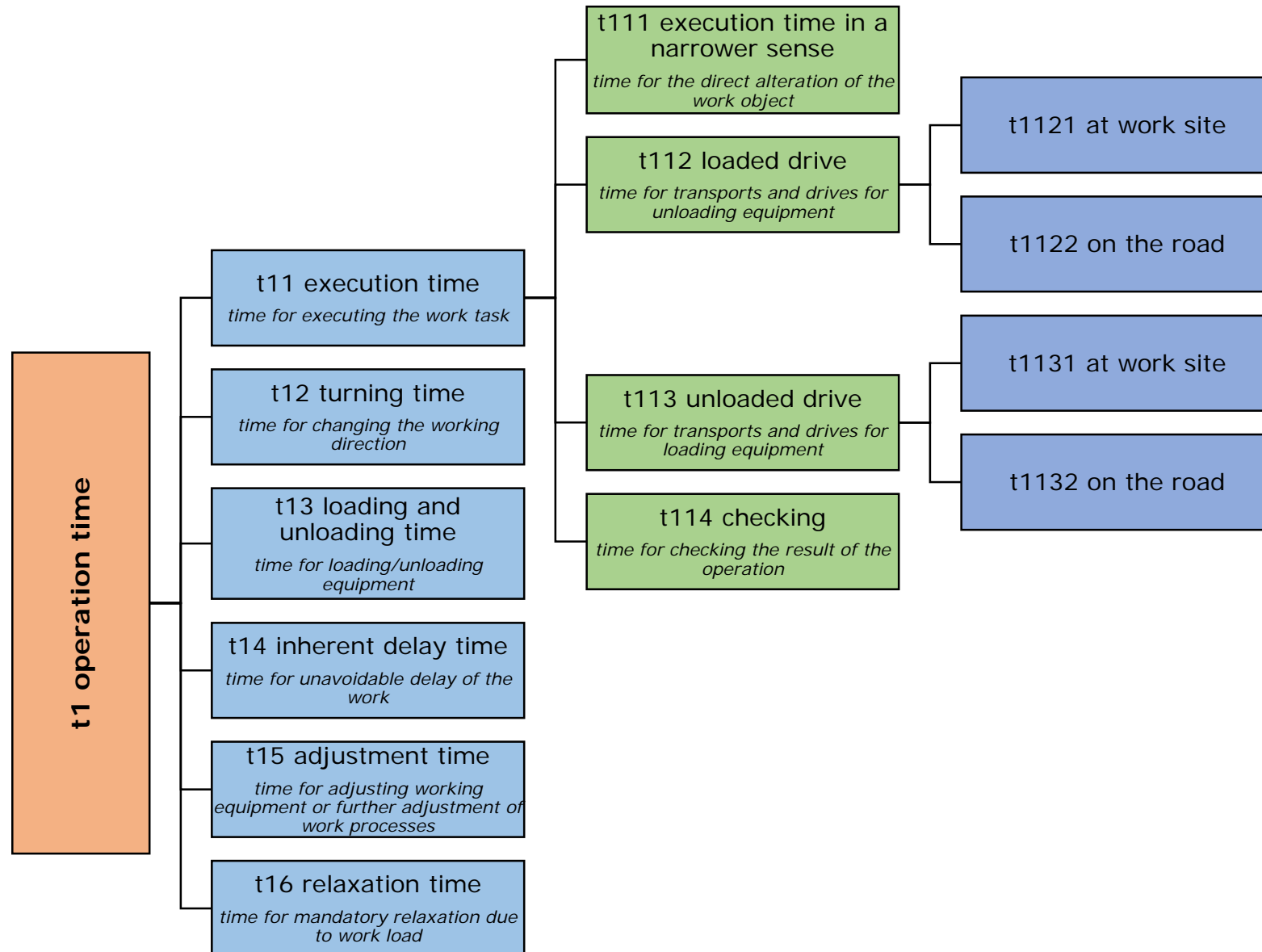
- standardized
- logical and transparent structure
- clear definition of the element times
- sufficiently detailed
- expandable
- suitable for all kinds of work
- simultaneous consideration of man power and working equipment
- applicable for automated time recording

Working time classification for agricultural works

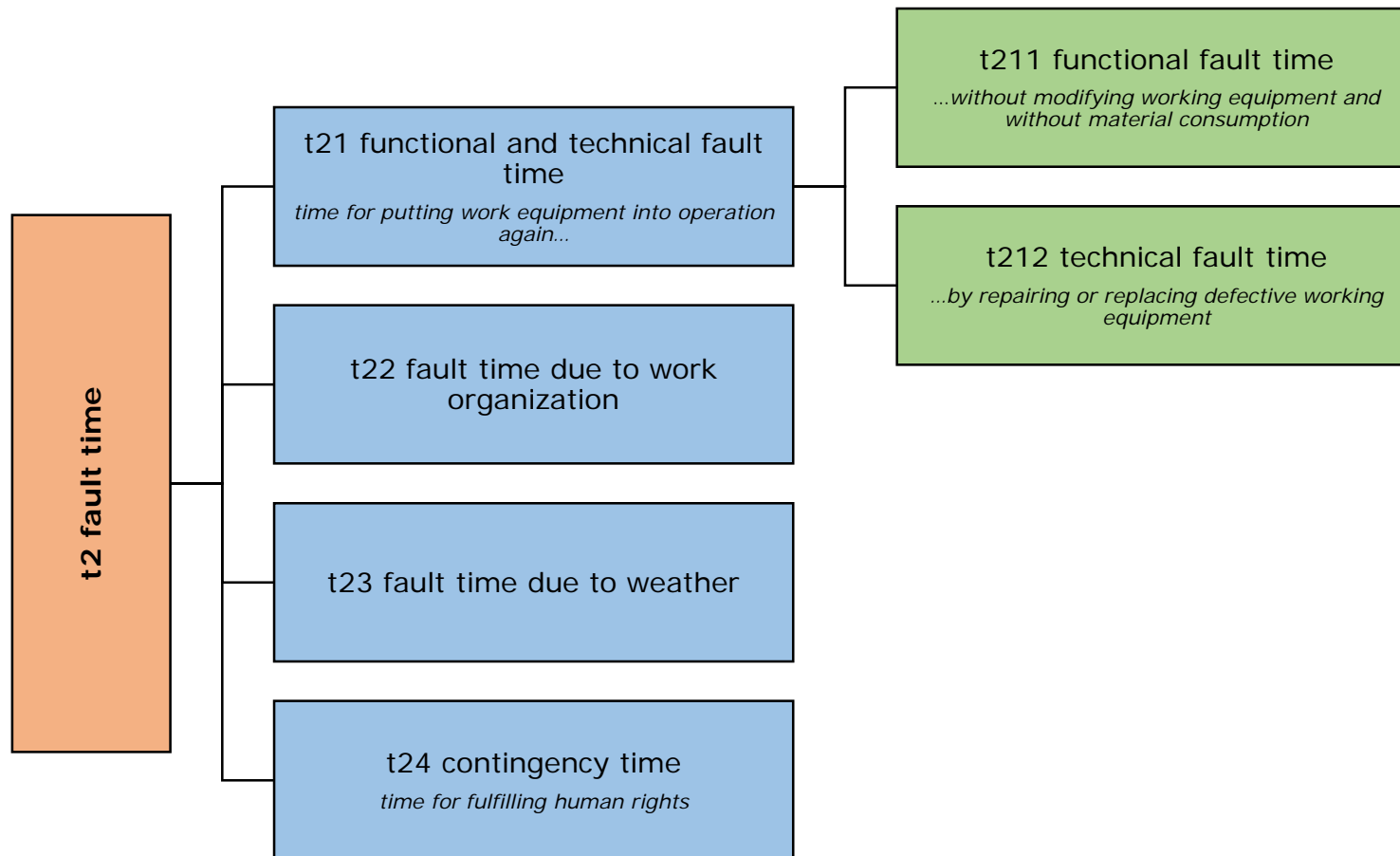


- t_1 = operation time
- $t_1 + t_2$ = process time
- $t_1 + t_2 + t_3$ = total time

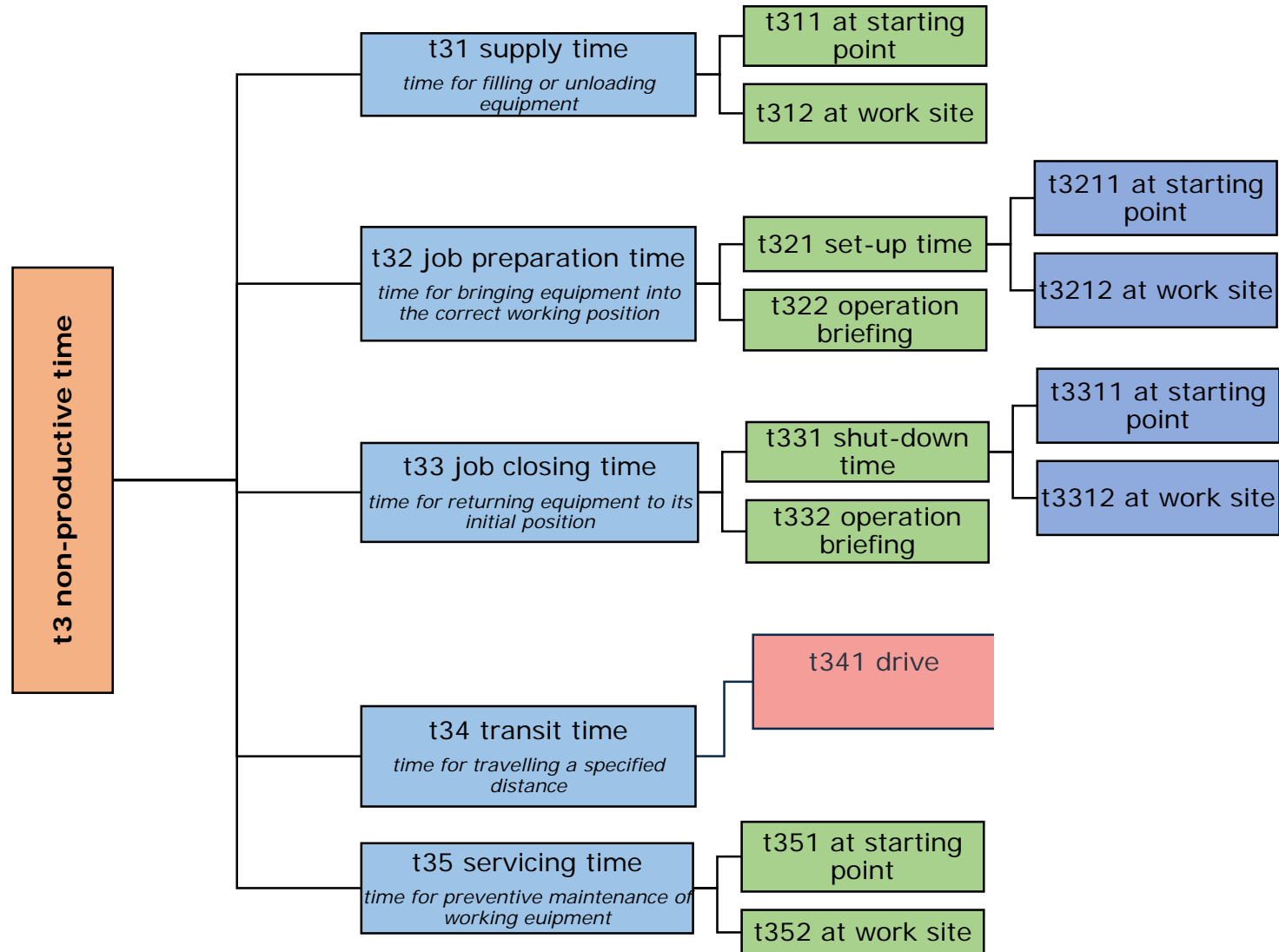
Working time classification for agricultural works – operation time



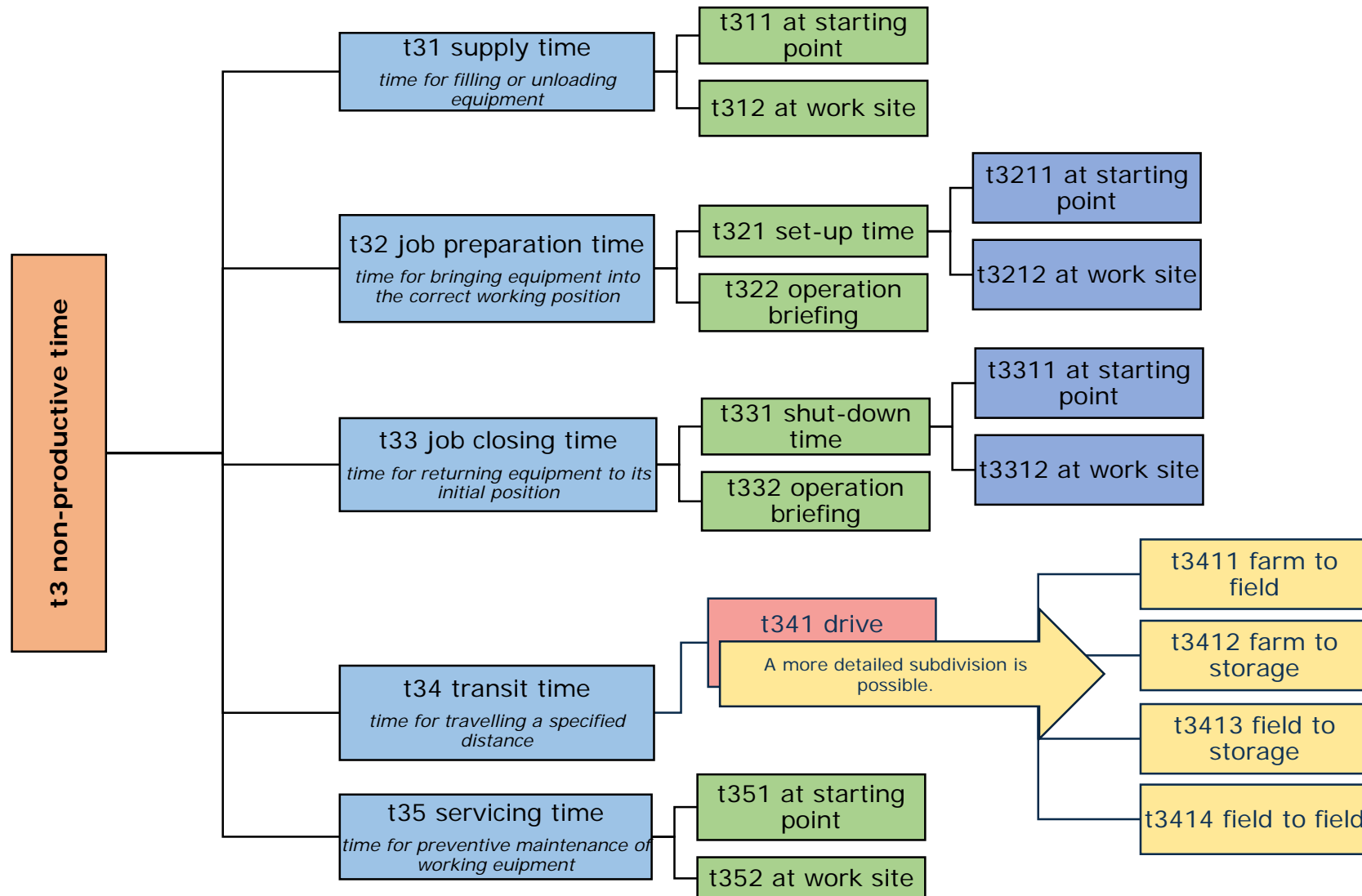
Working time classification for agricultural works – fault time



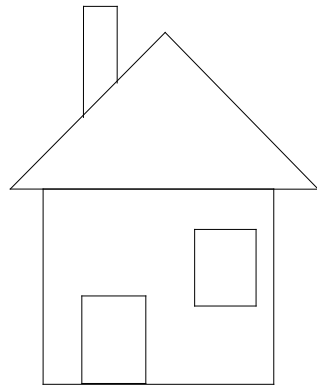
Working time classification for agricultural works – non-productive time



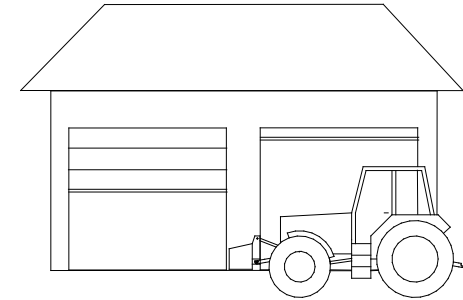
Working time classification for agricultural works – non-productive time



Application of the working time classification – filling a biogas plant



starting point



machine site

bucket volume of the wheel loader:
1.2 m³
required amount of substrat in
total: **6.0 m³**
⇒ 5 filling processes



www.stadtwerke.springe.de

work site



www.boeck.de

storage

Application of the working time classification – filling a biogas plant

Element of work sequence	Element time (levels 3 and 4)	Working time requirement, cmin	Factor (distance), m	Working time requirement, cmin
going (unloaded) to the wheel loader	t3211 set-up time at starting point	1.7	20	34.0
climbing in of the wheel loader and starting	t3211 set-up time at starting point	27.7	-	27.7
driving to the storage (bunker silo)	t3412 transit time (starting point (farm) to storage)	0.6	80	66.6
climbing out of the wheel loader	t321 set-up time at work site	8.9	-	8.9
going to the storage	t321 set-up time at work site	1.7	5	8.5
opening the cover	t321 set-up time at work site	261.0	-	261.0
going to the wheel loader	t321 set-up time at work site	1.7	5	8.5
climbing in of the wheel loader	t321 set-up time at work site	8.8	-	8.8
driving closer to the storage	t1131 unloaded drive at work site	0.9	5	4.5
extracting substrate from the storage	t111 execution time	33.6	-	33.6
driving to the biogas plant (incl. weighing)	t1121 loaded drive at work site	1.0	100	100.0
filling the biogas plant	t111 execution time	38.4	-	38.4
driving to the storage	t1131 unloaded drive at work site	0.6	100	66.6
climbing out of the wheel loader	t3312 shut-down time at work site	8.9	-	8.9
going to the storage	t3312 shut-down time at work site	1.7	5	8.5
closing the cover	t3312 shut-down time at work site	264.0	-	264.0
going to the wheel loader	t3312 shut-down time at work site	1.7	5	8.5
climbing in of the wheel loader	t3312 shut-down time at work site	8.8	-	8.8
driving to the machine site	t3412 transit time (storage to starting point)	0.6	80	66.6
parking and climbing out of the wheel loader	t3311 shut-down time at starting point	16.9	-	16.9
going (unloaded) to the starting point	t3311 shut-down time at starting point	1.7	20	34.0



5 repetitions

Application of the working time classification – filling a biogas plant

Element time (levels 3 and 4)	Working time requirement, cmin	Element time (level 2)	Working time requirement, cmin
t3211 set-up time at starting point	34.0	t32 job preparation time	61.7
t3211 set-up time at starting point	27.7		
t3412 transit time (starting point (farm) to storage)	66.6	t34 transit time	66.6
t321 set-up time at work site	8.9	t32 job preparation time	295.7
t321 set-up time at work site	8.5		
t321 set-up time at work site	261.0		
t321 set-up time at work site	8.5		
t321 set-up time at work site	8.8		
t1131 unloaded drive at work site	4.5	t11 execution time for five loadings	1215.5
t111 execution time in a narrower sense	33.6*		
t1121 loaded drive at work site	100.0		
t111 execution time in a narrower sense	38.4*		
t1131 unloaded drive at work site	66.6		
t3312 shut-down time at work site	8.9	t33 job closing time	298.7
t3312 shut-down time at work site	8.5		
t3312 shut-down time at work site	264.0		
t3312 shut-down time at work site	8.5		
t3312 shut-down time at work site	8.8		
t3412 transit time (storage to starting point)	66.6	t34 transit time	66.6
t3311 shut-down time at starting point	16.9	t33 job closing time	50.9
t3311 shut-down time at starting point	34.0		
		Total time	2055.7



5 repetitions

- The analysis of agricultural work processes is based on systematic work classification and time classification, respectively.
- The requirements on a time classification include a wide applicability to work processes, understandable structuring and simultaneous consideration of man power and working equipment.
- The recording of working time data is the fundamental prerequisite for the calculation of standard times needed for the modelling of work processes.
- Optimized work processes reduce required time and have positive effects on the economics of work systems in agriculture.

Thank you very much for
your attention.

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Work system

using the example „milking cows“

element of the work system	
work task	milking cows
input	cows energy/electricity information
working person	Peter, 10 years of experience
working equipment	milking parlor milk tank cleaning wipes water dipping/disinfection agents
work sequence	job preparation collecting cows (waiting area) allowing cows to enter the milking parlor pre-milking cows cleaning teats massaging the udder attaching and positioning the cluster milking dipping teats allowing cows to leave the milking parlor job closing
environmental influences	physical and chemical influences: noise, light, gases organisational and social influences e.g. working atmosphere
output	milked cows milk