

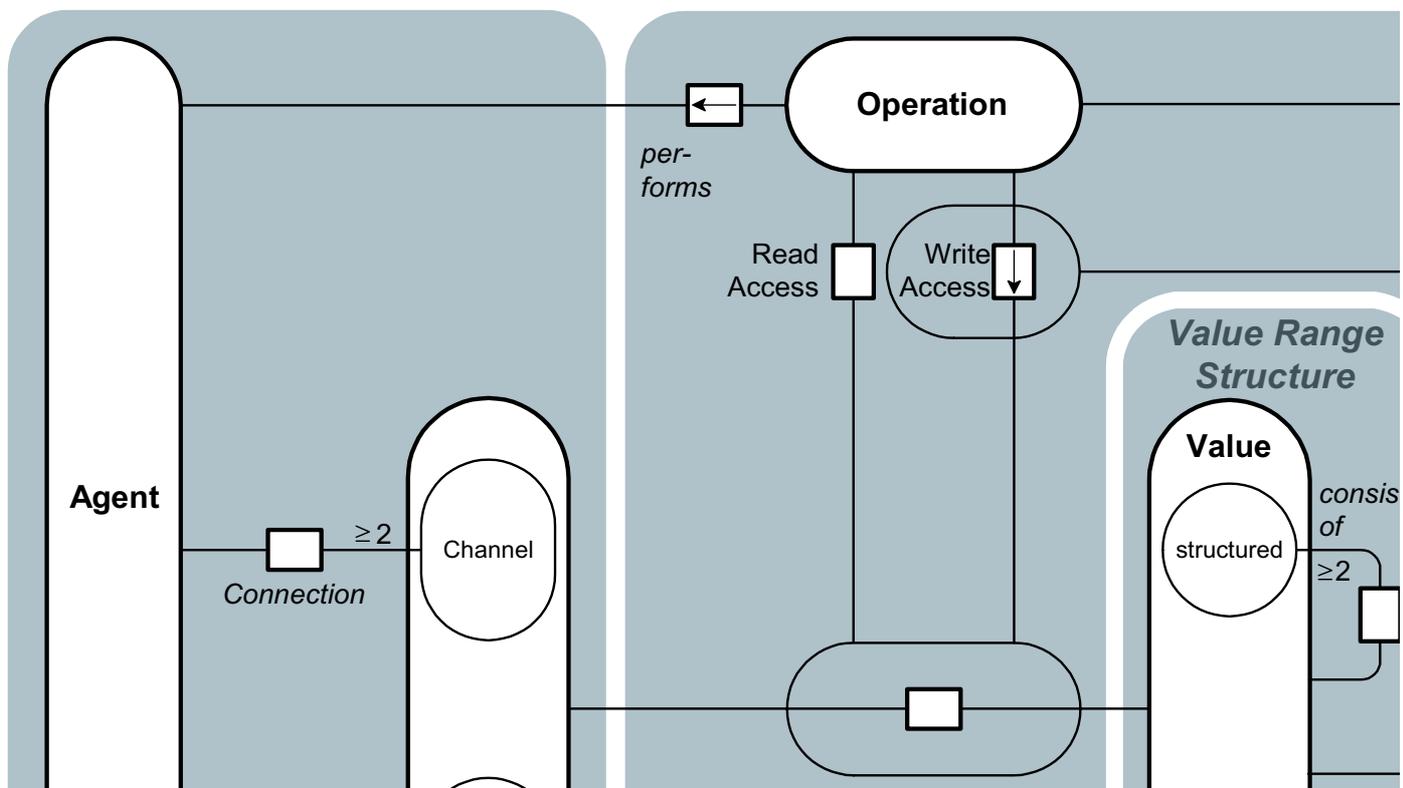


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FMC Glossary

With German-English Index of FMC Terms

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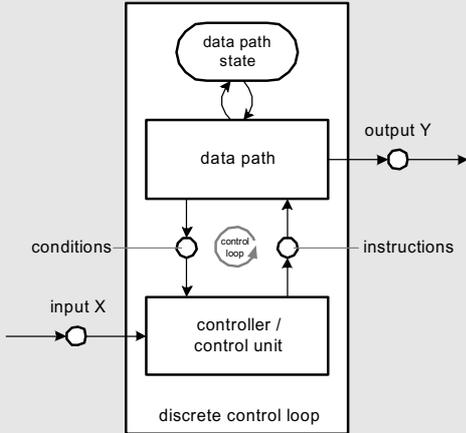
FMC Glossary

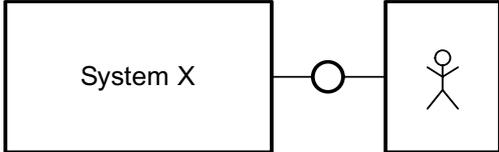
Term	Begriff	Definition
access (read/write/ modify)	Zugriff (lesend/ schreibend/ modifizierend)	Access of agents to locations. Can be categorized into read, write, or modifying access. With read access the information flows from location to agent, with write access the information flows from agent to location, and with modifying access it flows in both directions. see: location see: agent
activity	Aktivität	complex sequence of operations see: operation
agent	Akteur	Active system component serving a specific purpose. The behaviour of an agent can be observed in the locations connected with it as it processes the data stored there. see: system component, active see: location
arc weight	Kantengewicht	The weight of a directed arc that connects a place and a transition in a Petri net defines the number of tokens that, in case of firing of the transition, are taken from the place if it is an input place, or are put into the place if it is an output place. An arc weight is assigned to each arc, if it is not specified the default arc weight is one. see: place see: transition see: Petri net see: token see: firing see: input place see: output place

Term	Begriff	Definition
block diagram	Aufbau- diagramm/ Aufbaubild	Bipartite diagram type showing the compositional structure of a system. The node types are angular and rounded shapes. Angular shapes represent agents (active system components), rounded shapes represent locations (passive system components). see: compositional structure see: node see: agent see: location see: system component, active see: system component, passive
capacity	Kapazität	Maximum number of tokens a place can hold. see: token see: place
cardinality range	Kardinalitäts- angabe	The minimum and maximum number of elements of a set of entities that participate in a relation.
channel	Kanal	Passive system component connected to at least two agents that can communicate through it. Information transported over a channel is volatile. see: agent see: system component, passive
class	Klasse	Abstraction of distinct concrete objects with similar qualities.
compositional structure	Aufbaustruktur/ Aufbau	Static structure of a system that describes the active and passive system components and the connections between them. Block diagrams are used to depict compositional structure. see: system component, active see: system component, passive
concurrency, degree of	Nebenläufigkeits- grad	Number of transitions in a Petri net which are independently enabled. see: transition see: Petri net see: enabled

Term	Begriff	Definition
concurrent	nebenläufig	<p>Two activities, or operations, are concurrent when they are causally independent from each other. They can therefore occur simultaneously or in arbitrary order.</p> <p>see: activity see: operation</p>
condition-event net (C/E net)	Bedingungs-Ereignis-Netz	<p>Petri net whose places all have a capacity of one. The places of a condition-event net can be seen as statements that are either true or false according to their marking state. The firing of a transition is called an <i>event</i> because it makes some statements false (places lose their marking) and others true (places get marked). For a transition to be enabled certain statements have to be true (corresponding places are marked), hence these are called <i>conditions</i>.</p> <p>see: Petri net see: place see: firing see: transition see: enabled</p>
conflict	Konflikt	<p>Marking of a Petri net in which the firing of one transition disables another transition.</p> <p>see: firing rule see: marking see: Petri net see: firing see: enabled</p>
controller or control unit	Steuerwerk	<p>An automaton that is the part of the discrete control loop which coordinates the order of operations. It cannot execute them but instructs the data path to do so. It reflects the control state of an automaton.</p> <p>see: control state see: discrete control loop see: data path</p>

Term	Begriff	Definition
control state	Steuerzustand	<p>In a discrete control loop, the state of the automaton is split into control state and data path state. The value range of a control state can only be defined by explicitly listing all values and all value transitions. The control state is incorporated by the controller and it is crucial for the behaviour of the automaton.</p> <p>see: controller or control unit see: discrete control loop see: data path</p>
data path	Operationswerk	<p>An automaton that is the part of the discrete control loop which is able to perform certain operations and output their results. Instructions about which operation to be performed next is given by the controller. The data path does not know anything about the order of operations. It reflects the data path state of an automaton.</p> <p>see: data path state see: discrete control loop see: controller or control unit</p>
data path state	Operationszustand	<p>In a discrete control loop, the state of the automaton is split into control state and data path state. The value range of the data path state can be defined without explicitly listing all values, for example by giving upper and lower bounds. The data path state is the current state of all values handled by the data path.</p> <p>see: data path see: discrete control loop see: control state see: controller or control unit</p>
directed arc	gerichtete Kante	<p>One way connection between two nodes in a graph</p> <p>see: node</p>

Term	Begriff	Definition
discrete control loop	Steuerkreis	<p>A system model for handling the complexity of a large amount of states in an automaton. These are split into control and data path state. Therefore the d.c.l. system structure consists of a controller and a data path. Both are connected via two directed channels: one for passing instructions from the controller to the data path and a channel for returning the results of an operation to allow the controller to make conditional decisions.</p>  <p>see: controller or control unit see: data path</p>
dynamic structure	Ablaufstruktur, Ablauf	<p>Description of system behaviour summarizing the causal dependencies of operations, activities and events of that system. Dynamic structure is expressed using Petri nets.</p> <p>see: operation see: activity see: event see: Petri net</p>
E/R diagram/ entity relationship diagram	ERD/ Entity-Relationship-Diagramm	<p>Bipartite graph used to describe value range structures and topic diagrams. The node types are angular and rounded shapes. Rounded shapes represent entity sets and angular shapes represent the relations between them. E/R diagrams whose entities are values describe value range structures. The entities in E/R diagrams that are topic plans can be of any type.</p> <p>see: value range structure see: topic diagram see: entity</p>

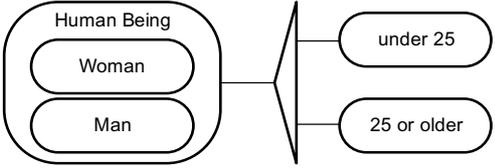
Term	Begriff	Definition
enabled	schaltbereit	<p>A transition in a petri net is enabled (ready to fire), if it meets two requirements:</p> <p>(1) Each input place of the transition contains as many tokens as the arc weight specifies. (2) Each output place of the transition can still accept as many tokens as the arc weight specifies.</p> <p>see: transition see: Petri net see: marking see: firing rule see: input place see: output place</p>
entity	Entität	<p>An object that can be identified. Entities and sets of entities are represented using entity relationship diagrams.</p> <p>see: E/R diagram/entity relationship diagram</p>
environment	Umgebung	<p>FMC system descriptions consider the system itself as well as its environment. All agents and locations that are not part of the system in question but are nevertheless relevant for system description belong to the environment.</p> <p>Example: The user agent, which belongs to the environment, is regarded in the description of System X.</p>  <p>The diagram consists of two rectangular boxes. The left box is labeled 'System X'. A horizontal line connects the right side of this box to a small circle. From the right side of this circle, another horizontal line extends to the left side of a second rectangular box. Inside this second box is a stick figure representing a user agent.</p>
event	Ereignis	<p>Change of a value stored in a location. Each event occurs exactly at one point in time.</p> <p>see: location see: Petri net</p>

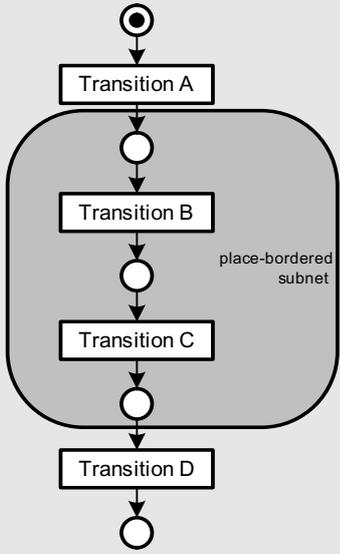
Term	Begriff	Definition
event communication	Ereignis-kommunikation	<p>Communication where the relevant information is not its content but the time of occurrence. Event communication between agents in a Petri net is represented by a flow of tokens between the agents' swim lanes.</p> <p>see: agent see: Petri net see: swim lane</p>
firing	schalten	<p>The firing of a transition implies that this transition is enabled. Then, as many tokens as the arc weight specifies are taken from each input place; to each output place the number of tokens specified by its arc weight is added.</p> <p>see: transition see: enabled see: token see: arc weight see: input place see: output place</p>
firing rule	Schaltregel	<p>Defines the valid changes of the marking of a petri net. It is used to transform the initial marking into other markings. The firing rule consists of two parts, the definition of firing and the definition of enabledness.</p> <p>see: Petri net see: place see: transition see: firing see: enabled</p>
function	Funktion	<p>Injective mapping between two sets and thus a mathematical term. It should not be confound with procedures or so called function procedures of programming languages which are a set of instructions describing an algorithm.</p> <p>see: procedure</p>

Term	Begriff	Definition
initial marking	Anfangs- markierung	<p>The initial marking of a Petri net defines how many tokens each place contains at the beginning of the processing. The number of tokens per place may not exceed the place's capacity.</p> <p>see: marking see: Petri net see: place see: token see: processing see: capacity</p>
input place	Eingangsstelle	<p>The input place of a transition in a Petri net is a place which is connected to the transition by a directed arc that points towards the transition. Transitions can have any number of input places.</p> <p>see: Petri net see: place see: transition see: directed arc see: enabled see: firing see: firing rule see: output place</p>

Term	Begriff	Definition
layer diagram	Schichtungsbild/ Schichtungs- diagramm	Used to illustrate layerings, i.e., quadratic relations. Members of the basic set thus appear in two different, usually hierarchically distinct, roles in the relation: If the basic set consists of procedures in a computer program and the relation is "A calls B" procedures can assume the role of the caller or the callee. Example: Procedure A calls B and C, procedure C calls D, procedure D calls itself (recursion).
location	(informationeller) Ort	Storage or channel on which values can be observed. see: channel see: storage see: system component, passive
marking	Markierung	Occupancy of a place in a Petri net with tokens. The marking of a Petri net follows from the markings of its places. see: place see: Petri net see: token
node	Knoten	Graphs consist of nodes and arcs. Nodes are generally represented as circles or squares, arcs as lines connecting the nodes.

Term	Begriff	Definition
occurrence sequence	Folgengeflecht	<p>Directed acyclic graph containing occurrences of firing of transitions. Every concrete processing of a Petri net can be described with one and only one occurrence sequence. Each node in this sequence represents the firing of one transition (occurrence). Two nodes are connected by an arc if and only if the firing of one transition (arc source) can be followed immediately by the firing of the second transition (arc target) and they cannot be fired concurrently. If there is a conflict it must be solved resulting in different processings of the Petri net and thus different occurrence sequences.</p> <p>see: transition see: firing see: processing see: Petri net see: node see: conflict</p>
operation	Operation	<p>Elementary activity an agent can perform. It includes at least one write access to a location and arbitrary read access.</p> <p>see: activity see: agent</p>
output place	Ausgangsstelle	<p>The output place of a transition in a Petri net is a place which is connected to the transition by a directed arc that points towards the place. Transitions can have multiple output places.</p> <p>see: transition see: Petri net see: place see: directed arc see: input place see: enabled see: firing see: firing rule</p>
partition	Partition	<p>A partition of the set A is a set B whose elements are disjoint, non-null subsets of A. Each element of A has to be contained in exactly one element of B.</p>

Term	Begriff	Definition
partition, orthogonal	Partition, orthogonale	<p>Different partitions of an entity are orthogonal to each other if the criteria by which they have been classified are independent.</p> <p>Example: orthogonal partition of the entity „Human Being“ by criteria gender and age:</p> 
		see: partition
Petri net	Petrinetz	<p>A directed bipartite graph describing causal dependencies between events, operations, and activities, and thus defining a process type. By firing the graph's transitions in any possible order discrete sequences of those elements can be generated, the so-called "occurrence sequences". Hence, Petri nets are also referred to as generators.</p> <p>see: firing see: event see: operation see: activity</p>
place	Stelle	<p>Node in a Petri net representing a control state or another condition, e.g. event communication.</p> <p>see: Petri net see: marking see: place-transition net see: transition see: capacity</p>

Term	Begriff	Definition
place-bordered	stellenberandet	<p>A subnet of a Petri net is place-bordered, if when entering the subnet, the first element is a place and when leaving the subnet, the immediately next is a transition. Place-bordered subnets can often be combined to a single place.</p> <p>Example: The following subnet between the transitions A and D is place-bordered because its first element is a place and the immediately next, after the subnet, is a transition.</p>  <p>see: simplification</p>
place-transition net	Stellen-Transitionsnetz	<p>Place-transition nets are condition-event nets extended by</p> <ol style="list-style-type: none"> (1) assigning an individual capacity to each place, (2) assigning a weight to each arc, and (3) defining a firing rule. <p>Note: In the Context of FMC the term "place-transition net" is rarely used. The term "Petri net" however always refers to graphs being place-transition nets.</p> <p>see: transition see: marking see: firing rule see: arc weight see: capacity</p>
platform	Trägersystem	<p>System consisting of hard- and software components that becomes a role system by introducing a processible role description.</p> <p>see: program processor</p>

Term	Begriff	Definition
procedure	Prozedur	<p>Procedures describes an algorithm using instructions. Special types of procedures are so called function procedures which must have a return value. Function and function procedure should not be confound</p> <p>see: function</p>
process-oriented	prozeßorientiert	<p>The purpose of a process-oriented system is its process and not a calculated result, e g, a computer game.</p> <p>see: result-oriented</p>
processing	Abwicklung	<p>The task of the program processor.</p> <p>see: program processor</p>
program net	Programmnetz	<p>Petri net associated with a corresponding program text making it possible to identify each place in the net with a line of code in the text.</p> <p>see: Petri net see: action net (obsolete)</p>
program processor	Abwickler	<p>An agent of a platform that executes a program. The platform thereby becomes the system specified in the program.</p> <p>see: agent see: platform</p>
refinement	Verfeinerung	<p>Relation between models of the same type, which does not have to be formal. Refinements show more information and a more detailed depiction of structures, respectively, and represent a step towards implementation.</p>

Term	Begriff	Definition
reification	Objektifizierung	<p>Interpretation of a concrete relation as an entity</p> <p>Example: If „is married to“ is modeled as relation between a man and a woman one can reify the relation and introduce it as the entity couple in another relation.</p> <p>see: E/R diagram/entity relationship diagram</p>
result-oriented	ergebnisorientiert	<p>The purpose of a result-oriented program is a calculated end result and not the processing, e.g., a square root program.</p> <p>see: process-oriented</p>
return place	Rücksprungstelle	<p>Return places, besides stack places and stack tokens, are used to model recursion in Petri nets. A return place is always input place for at least two transitions that also have stack places as input places. This results in potential conflicts because the token in the return place can only be used for one transition. This conflict is solved by the token that was put on the stack places last.</p> <p>see: stack place see: stack token see: input place</p>
simplification	Vergrößerung	<p>The contrary of refinement</p> <p>see: refinement</p>
stack place	Stapelstelle/ Stack-Stelle	<p>Multi-token place used besides return places and stack tokens to model recursion in Petri nets. Stack places are marked by stack tokens and are always input places for transitions that additionally have a return place as input place.</p> <p>see: return place see: stack token see: Petri net see: input place</p>

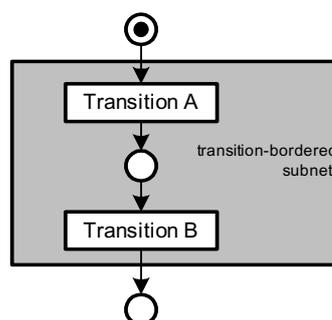
Term	Begriff	Definition
stack token	Stapelmarke/ Stack-Marke	<p>Tokens of a stack place used besides stack and return places to model recursion in Petri nets. They are called stack tokens because, although placed on several stack places, their order of placement is managed in a single stack. If there is a conflict involving a return place the stack token on top of the (placement) stack is released and the associated transition is fired.</p> <p>see: stack place see: return place see: Petri net see: token see: transition</p>
storage	Speicher	<p>Persistent information storage available to at least one agent.</p> <p>see: system component, passive</p>
structure	Struktur	A structure is a construct of sets and relations containing at least one set and one relation.
structure plan/ structure diagram	Strukturplan	see: compositional structure
structure variation	Strukturvarianz	<p>The change in system structure within a "relevant" lapse of time. Passive components (storage) are converted into active ones (agents) or vice versa.</p> <p>see: system component, active see: system component, passive see: agent</p>
swim lane	Zuständigkeitsbereich (eines Akteurs im Ablaufdiagramm)	<p>The set of all transitions in a Petri net fired by the same agent.</p> <p>see: transition see: Petri net see: agent</p>
system component, active	Systemkomponente, aktiv	<p>System components are active if they show a behaviour, i e, perform operations.</p> <p>see: operation see: system component, passive see: agent</p>
system component, passive	Systemkomponente, passiv	<p>Passive system components are storages and channels.</p> <p>see: system component, active</p>

Term	Begriff	Definition
system, continuous	System, kontinuierliches	<p>A continuous system is characterised by the fact that the value ranges for observation results in observed places are continuous.</p> <p>see: system, informational</p>
system, discrete	System, diskretes	<p>A discrete system is characterised by the fact that the value ranges for observation results in observed places are continuous.</p> <p>see: system, informational see: location</p>
system, dynamic	System, dynamisches	<p>A concrete, or at least conceivable, thing showing observable behaviour. This behaviour can be seen as the result of the system components' interaction.</p> <p>see: system component, active see: system component, passive</p>
system, informational	System, informationelles	<p>A system is called informational if the essential point of the issues that are observed in different places in the system is not their material or energetic appearance but their interpretation.</p>
token	Marke	<p>Basic element of a Petri net's marking. The readiness to fire of a transition requires that the transition's input places contain sufficient tokens.</p> <p>see: Petri net see: marking see: transition see: firing</p>
topic diagram	Themenplan	<p>Diagram describing relationships between entities of arbitrary type using E/R diagram notation.</p> <p>see: E/R diagram/entity relationship diagram</p>
transition	Transition	<p>A transition is a node in a Petri net and represents an event, operation, or activity.</p> <p>see: place see: place-transition net see: event see: operation see: activity</p>

Term	Begriff	Definition
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transition-bordered	transitionsberandet	A subnet of a Petri net is transition-bordered if when entering the subnet the first element is a transition and when leaving the subnet the immediately next is a place. Transition-bordered subnets can be possibly combined to a single transition.
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Example: The following subnet is transition-bordered because its first element is a transition and the immediately next is a place.



see: simplification

value communication	Wert-kommunikation	Communication where the relevant information is the content and not the time of occurrence.
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value progression	Werteverlauf	The sequence (continuous or discrete in time) of values occurring in an observed place of a system.
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see: location

value range	Wertebereich (eines informationellen Systems)	The set of all information (obtained by interpretation of forms) that can be observed in an informational system at any given time. A value range can be unstructured or structured. Well known unstructured value ranges are BOOLEAN and INTEGER.
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value range structure	Wertebereichs-struktur	Values from a structured range must contain at least one set and one relation. Every value of a structured range is a structure, hence the range is a set of structures. Because of their great cardinality these sets cannot be enumerated in practice. Therefore, structured value ranges are best described by entity relationship diagrams (ERDs).
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see: structure

see: E/R diagram/entity relationship diagram

Index of FMC Terms

German-English

Ablaufstruktur	dynamic structure
Abwickler	program processor
Abwicklung	processing
Akteur	agent
Aktivität	activity
Anfangsmarkierung	initial marking
Aufbaudiagramm	block diagram
Aufbaustruktur	compositional structure
Ausgangsstelle	output place
Bedingungs-Ereignis-Netz	condition-event net (C/E net)
Eingangsstelle	input place
Entität	entity
ERD/Entity-Relationship-Diagramm	E/R diagram/entity relationship diagram
Ereignis	event
Ereigniskommunikation	event communication
ergebnisorientiert	result-oriented
Folgengeflecht	occurrence sequence
Funktion	function
gerichtete Kante	directed arc
Kanal	channel
Kantengewicht	arc weight
Kapazität	capacity
Kardinalitätsangabe	cardinality range
Klasse	class
Knoten	node
Konflikt	conflict
Marke	token
Markierung	marking

nebenläufig	concurrent
Nebenläufigkeitsgrad	concurrency, degree of
Objektifizierung	reification
Operation	operation
Operationswerk	data path
Operationszustand	data path state
Ort	location
Partition	partition
Partition, orthogonale	partition, orthogonal
Petrinetz	Petri net
Programmnetz	program net
Prozedur	procedure
prozeßorientiert	process-oriented
Rücksprungstelle	return place
schaltbereit	enabled
schalten	firing
Schaltregel	firing rule
Schichtungsdiagramm	layer diagram
Speicher	storage
Stapelmarke/Stack-Marke	stack token
Stapelstelle/Stack-Stelle	stack place
Stelle	place
stellenberandet	place-bordered
Stellen-Transitions-Netz	place-transition net
Steuerkreis	discrete control loop
Steuerwerk	controller or control unit
Steuerzustand	control state
Struktur	structure
Strukturplan	structure plan/structure diagram
Strukturvarianz	structure variation
System, diskretes	system, discrete
System, dynamisches	system, dynamic
System, informationelles	system, informational
System, kontinuierliches	system, continuous
Systemkomponente, aktiv	system component, active

Systemkomponente, passiv	system component, passive
Themenplan	topic diagram
Trägersystem	platform
Transition	transition
transitionsberandet	transition-bordered
Umgebung	environment
Verfeinerung	refinement
Vergrößerung	simplification
Wertebereich (eines informationellen Systems)	value range
Wertebereichsstruktur	value range structure
Werteverlauf	value progression
Wertkommunikation	value communication
Zugriff	access (read/write/ modify)
Zuständigkeitsbereich (eines Akteurs im Ablaufdiagramm)	swim lane