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Question: 9

SOURCE: RAPPORTEUR

TITLE: MINUTES OF Q9 MEETING, BERLIN 9807

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### Agenda and Schedule

<i>Date</i>	<i>Time</i>	<i>Topic</i>	<i>Contributions</i>
July 2	AM	Decomposition and Continuations	905, 906, 907, 910
July 2	PM	Data and control structures	908, 917
July 3	AM	Time and Performance	910, 911, 912, 913, 914, 916
July 3	PM	General Maintenance including: Remote procedures, Improved grammar	904, 909, 915

### List of Documents

<i>Doc. id.</i>	<i>Submission</i>	<i>Title</i>	<i>File</i>
B901	Rapporteur	Agenda and Schedule	Agenda
B902	Rapporteur	List of Documents	ListOfDocs
B903	Rapporteur	Minutes	Minutes
B904	Ass. Rapp. Maintenance	Remote procedure	remote
B905	Rapporteur	Conditions and Continuations	CondCont2
B906	Telelogic	Decomposition	Decomposition
B907	Telelogic	Continuations	Continuations
B908	Ass. Rapp.	MSC and data	Sjoukesam98

	Semantics		
B909	Telelogic	LALR (1) Grammar aligned with Annex B	NewGrammar
B910	Ass. Rapp. Time	Order Relations and Gates	order_rel
B911	Ass. Rapp. Time	Non-Instantaneous Actions	noninst_act
B912	Ass. Rapp. Time	Textual and Graphical Syntax for Relative Timing	msc_vii98_rel_syn
B913	Ass. Rapp. Time	Timers and Relative Timing	msc_VII98_timer
B914	Ass. Rapp. Time	Risk Analysis for Performance Concepts in MSCs	foils
B915	Ass. Rapp. Time	Graphical Syntax for Absolute Timing	msc_vii98_abs_syn
B916	Ass. Rapp. Time	Timing Constraint Expressions	msc_VII98_rules
B917	Motorola	Message Sequence Charts and Data	msc_data

### List of Participants

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### Decomposition and Continuations

The Rapporteur presented B905 and this aroused a lot of discussion. There was general feeling that instance layering could be more explicitly defined. The proposed suggestions were not agreed upon because there was a feeling that the users would be hampered by the strong redundancy requirements. There were suggestions to include the instance structure information on the MSC document level.

Regarding the MSC document partitioning. This idea was also recognized, and a supplementary idea of “MSC packages” was introduced. This was uniformly agreed as desirable. There was an

idea to investigate UML to see whether the (new) MSC document diagram could be similar to some of the (numerous) diagrams of UML.

Jan Docekal (Telelogic) presented B907. The group saw no obvious reason to introduce new symbols for start and end conditions.

Jan Docekal (Telelogic) presented B906. There was reasonable agreement that conditions on decomposed instances should in some way have a counterpart in the decomposition diagram. Creation: what about parameters to the creation if the decomposition diagram will not have any creations. Does decomposition mean the same as “refinement” (restricting the set of traces) or the opposite. The gates from an MSC reference actually represent a (complicated) gate expression including **alt** and **seq**?

There are the following important questions:

1. Parallel composition (esp. referring to decomposed instances) should the alternatives of the separate composed expressions be combined through message gates.
2. What is the relation between the (glass box) definition of an instance (within a diagram) and its decomposition diagram? We have adopted the notion that a decomposed instance is similar to an MSC reference, but there is a difference from the ordinary MSC reference since the instance has some internal structure, while an MSC reference has only its gates.

### **The Rapporteur's investigation**

The Rapporteur investigated the above questions offline during the meeting and made the following presentation.

There are two slightly different issues related to decomposition. One issue is about the structural similarity between the decomposed instance and the decomposition. The second issue is what behavioral similarities should be required.

Regarding the structural similarities, it is obvious that the instance axis can be seen as a sequence of MSC constructs. The Rapporteur suggested that these constructs should have a simple correspondant within the decomposition according to the following table:

<i>Instance</i>	<i>Decomposition</i>
messaging (input, output)	compatible <sup>1</sup> messaging
action	something (not nothing)
MSC expression	corresponding global <sup>2</sup> MSC expression
timers (set, reset, timeout)	considered similar to messaging
create	create <sup>3</sup>
stop	all contained instances stop
MSC reference	corresponding global MSC reference

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<sup>1</sup> compatibility is to be determined later

<sup>2</sup> "global" will mean at least within the scope of the decomposed instance

<sup>3</sup> It was pointed out that this correspondence requires the introduction of create-gates.

condition	corresponding condition <sup>4</sup>
coregion	corresponding messaging

The question then is the interpretation of "corresponding" and this is closely related to the interpretation of the meaning of the MSC document itself. We have up to now given no "canonical" interpretation of what an MSC is. The language has been said only to define a set of traces. Whether these traces are some of the possible traces, all the possible traces or some (or all) of impossible traces is external to the language. The question is, however, related to decomposition by the fact that decomposition intuitively is associated with the general notion of refinement. Given that a refinement normally is defined as restricting the set of possible behaviors, decomposition should then restrict the number of possible traces. Empirical data shows, most probably, that decompositions are meant to describe more traces than the decomposed. How can this be interpreted as refinement? We have (at least) the following options:

1. The decomposed instance is considered only to define the gate interface and no further ordering.
2. The decomposed instance is considered to define the gate interface and the graphical order of the gates in the decomposition should be the same as that of the decomposed instance. (This would help to prevent deadlock)
3. The decomposed instance is considered to represent some of the possible traces. The decomposition should also cover these traces (as projected onto the interface). The decomposition is allowed to cover more traces. In fact the decomposition could also define traces with other gate interface than the decomposed instance?
4. The decomposed instance is considered to represent the complete behavior definition of the contained events. The decomposition should adhere to this definition with respect to its observable (external) behavior. This is the MSC-92 definition of decomposition interface.
5. The decomposed instance is interpreted as an input/output streamfunction. The decomposition projected onto the interface should give the same function values for all input histories covered by the decomposed instance.

These should be the possibilities for the definition of "corresponding messaging".

There was reasonable consensus that extensive behavioral calculation should not be necessary for the purpose of establishing the static requirements. This probably leaves only the first two or three alternatives above.

"Corresponding global MSC expression" means that there is an MSC expression in the decomposition which has the same operator and corresponding operands. A corresponding operand is recursively the same as the whole decomposition corresponding to an instance (within a diagram).

Corresponding to an action in the decomposed instance there should be "something, but not nothing" in the decomposition. This is not trivial since it may be very difficult to distinguish between what is supposed to correspond to the action and what corresponds to the (say: messaging) before and after the action.

Conditions correspondence is also non-trivial. B905 gives one possible answer.

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<sup>4</sup> The corresponding condition should refer to the same name possibly through qualifier.

"Corresponding global MSC reference" refers to the principle of Commutative Decomposition as decided by Decision 98-04.

## **Data and Control Structures**

André Engels presented B908. Clive Jervis (Motorola) presented B917. Some unresolved questions arose:

1. Mixed data languages in one MSC?
2. Constrained values (whatever within a range)
3. Parameters for the MSC itself? The creation parameters will then be parameters for the MSC.

### **The investigation by the Ass. Rapp. for Data**

Clive Jervis was appointed Associated Rapporteur for Data in MSC.

Clive Jervis investigated a model with the following properties and problems:

1. Every variable has a scope (e.g. an MSC expression). How is the variable defined?
2. The variable is set only once in the scope
3. Every other occurrence of the variable within the scope is given the acquired value
4. The setting of a variable must occur as the first use of the variable within the scope, but we may not be able in general to determine whether this is true.
5. What if a variable has no value when it occurs the first time in its scope?
6. How should datatypes be defined?

The following classification was reached:

#### *Variables*

- fixed scope, well defined
- once in scope, have fixed/acquire one value
- can have different values each time in scope

#### *Possible Scopes*

- HMSC
- MSC
- Inline Expression
- Operand area / MSC body

#### *Possible Bindings*

- unbound
- static binding
- dynamic binding

### *Opportunities For Binding*

- MSC reference expression
- Instance creation
- Gates

It was pointed out that there is a major difference whether the variables are symbolic values or interpreted as (programming) variables. Typically when the variables are considered symbolic values, their scope is an MSC or a subpart of an MSC. If variables are to be understood as programming variables, their scope is more naturally an instance.

### **Jan Docekal's investigation**

Jan Docekal investigated some scenarios of how users will utilize variables. He thought that the users will want to test the internal state of the system, and this internal state may or may not be affiliated with message parameter data.

He also thought that users would like to apply variables to define which alternative to choose in an alternative expression and to define loop termination.

### **The investigation by the Ass. Rapp. for Time**

Ina Schieferdecker investigated based on our discussion and proposed model where data should occur within MSC.

The discussion revealed that the group wanted variables

- as parameter to the MSC name (in the header). The actual parameter would be in MSC references.
- as parameter to messages.
- as parameter to instance.
- as parameter to timer (as actual parameter)'
- in conditions
- possibly in operator expressions. This would mean that more general "array-like" expressions could be defined.

### **Time and Performance**

The Ass. Rapp. for Time, Ina Schieferdecker presented a risk analysis for performance concepts (B914). A decision 98-08 was unanimously reached.

Ina Schieferdecker presented B912. Questions raised:

1. Example given for durations where the intervals could (or could not) all go together. If the intervals do not go together, is this an error or only the empty trace or a trace ending in deadlock?
2. The interval between two msc-events restrict the duration that may pass between these events. The actual duration must be taken from the interval. Commutative diagrams may be interpreted in different ways:

A (max,+)-semantics:

An event occurs immediately in time after all preceding durations have ended. This implies that all actual time intervals can be chosen from the intervals independently from each other. This implies that in a "legal trace" of an MSC, some but not all preceding intervals of an event to its predecessors may be longer than specified. But it is impossible that all preceding intervals are longer than specified or that they are shorter than the minimum interval length.

2.B hard deadline-semantics:

Hard deadline semantics mean that an event must occur in between the interval. In a "legal trace" of an MSC, ALL intervals must be satisfied. Time inconsistencies in an MSC may occur since dependencies between the given intervals may reveal that no actual trace can satisfy ALL interval constraints, i.e. there is no legal trace. The analysis of timing analysis is to be discussed.

We will interpret MSC with the hard deadline-semantics.

### 3. Timing relating to non-orderable events?

Olaf Kluge presented B911. We decided that Olaf would work on the more general concept of *critical region*. Also decomposition of critical regions will be investigated.

Ina Schieferdecker presented B913. Everybody agreed about the extended notation for timers.

Ina Schieferdecker presented B914. The "start of an MSC" was recognized to be a difficult concept as there is not always possible to define that given that MSCs reference other MSCs. The Rapporteur provided an example that showed that more general parameterized timestamps would be needed. Regarding the syntax for time stamps, many comments came. Telelogic will provide a large example of an MSC and send that to the Ass. Rapp. for Time who will supply them with different suggestions for time stamp syntax.

## General Maintenance

### Grammar

Jan Docekal presented B909 and we walked through the changes. See the Decisions section for what changes were accepted and rejected.

### Remote Procedure Calls

The Ass. Rapp. for Maintenance Ekkart Rudolph presented B904. The discussion aroused arguments about the general notion of critical region. It was agreed that the notion of critical region was associated with the discussion of remote procedures. Ekkart Rudolph suggested 4 different instance areas strong sequencing, coregion, critical region, and undefined (?). The discussion in addition identified a special kind of critical region which could be called *suspension region* where no events could occur. Ina Schieferdecker pointed out that this resembled her *idling time* from Geneva 98.

It was generally felt that the **return** of the remote procedure should also include the name of the called procedure.

## Next meetings

Experts meeting in October, in conjunction with ETSI MTS meeting in Sophia Antipolis October 20-22 1998.

Next SG 10 meeting in February 1999 proposed 4-11. February.

Editorial meeting for Z.120 early summer of 1999 (possibly in Lofoten, Norway) to make the final touch.

Final meeting of the study period January 10-18 2000

## Action List

Items that are successfully accomplished are removed from the action list. Please consult earlier minutes to find action items having been deleted.

#	Topic	Responsible	Deadline
98-07	Update Master List of Corrections with the decisions concerning Dangling Events	Rapporteur	98.07 check!
98-09	Correct Master List of Correction should be corrected for the <mscxpr area>	Rapporteur	98.07 OK?
98-12	Contribution on specific aspects of time: <ul style="list-style-type: none"> <li>• events and actions</li> <li>• synchronization mechanisms</li> <li>• timers and time requirements</li> </ul>	Ass. Rapp. for Time	98.07 OK?
98-13	Investigate semantics of critical region	Olaf Kluge	98.08
98-14	Investigate syntax of critical region and decomposition of critical region	Rapporteur	98.08
98-15	Time intervals for non-orderable events such as e.g. MSC references and MSC expressions	Ass. Rapp. for Time	98.09
98-16	Absolute timing must be further investigated	Ass. Rapp. for Time	98.09
98-17	Investigation of timestamp syntaxes	Ass. Rapp for Time + Telelogic	98.09
98-18	Investigate the syntax of remote procedures further	Ass. Rapp. for Maintenance	98.09
98-19	Distribute last working version of Z.120 in Word 97 to the members of the ITU MSC group	Rapporteur	98.07
98-20	Distribute Annex B in Acrobat to the members of the ITU MSC group	Rapporteur	98.07



98-21	Substitution of lists of conditions must be scrutinized	Rapporteur	98.09
98-22	Suggestion for an MSC document diagram (and corresponding textual grammar). This should include a package concept	Rapporteur	98.09
98-23	Suggestion for static requirements and semantic interpretation of decomposition	Rapporteur	98.09
98-24	Jan Docekal will investigate the need for mixed instance oriented and event oriented grammar with Verilog and Cinderella. Ekkart Rudolph will be kept informed	Telelogic	98.07
98-25	Suggestion for data in MSC based on our current discussion	Ass. Rapp. for Data	98.09
98-26	Investigate further parallel continuation (such as in decomposed instances) considering either conditions or gates+messages	Telelogic (with the help of Rapporteur)	98.09

## Decisions

The decisions of the MSC group are registered in this table below. The decision may of course be overturned by a new decision, but we shall require especially strong arguments undo an earlier decision.

#	<i>Decision</i>
98-01	TD 44 with minor editorial changes should be recommended as Z.120 Annex B
98-02	From now on Annex C should be obsolete
98-03	The semantics of Decomposed instances should be built upon interpreting the instances as references based on TD 40 by the Ass. Rapp. for Maintenance.
98-04	“Commutative decomposition” should be the restriction which should replace the restriction that decomposed instances are not to be covered by MSC references.
98-05	General order symbols will have dotted lines
98-06	MSC will not be enhanced by an architectural description at this point in time
98-07	MSC textual language should preferably be a language which is possible to describe by an LALR(1) grammar.
98-08	MSC-2000 will include quantified time and possibly some concepts for quantified non-determinism (probabilities of alternatives). Other performance aspects will be left to other description techniques to be used in conjunction with MSC.
98-09	Time and duration expressions will follow from our general handling of data since time and duration will be data types and these will be provided as default types.

98-10	Timers are extended with a <i>maximum time</i> , and the default maximum time is infinity.
98-11	Substitution grammar for substitution of conditions should be made as backward compatible with MSC-96 as possible by introducing parenthesis and not the suggested radical syntactic changes.
98-12	All grammatical changes that do not lead to change in the textual language suggested by Telelogic were accepted.
98-13	Textual language changes accepted: <ol style="list-style-type: none"> <li>1. <b>label</b>-keyword for event names</li> <li>2. <b>after</b>-clause</li> </ol>