

**ATTENDANCE LIST**

**FRANCE**

T. Khan	ONERA, Châtillon	Vice-Chairman
		at the end of the day Chairman
P. - M. Lesne	ONERA, Châtillon	
		at the end of the day new Secretary

**GERMANY**

K. Rohwer	DLR, Braunschweig	Chairman
		at the end of the day former Chairman
J. Bühlmeier	Domier Luftfahrt, Wessling	IPoC

**ITALY**

M. Farioli	CIRA, Capua	
A. Minuto	Alenia, Pomigliano d'Arco	New IPoC

**SPAIN**

J. M. Pintado	INTA, Madrid	at the end of the day Vice-Chairman
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**SWEDEN**

A. Blom	FOI/FFA, Stockholm	
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**THE NETHERLANDS**

*Not represented*

**UNITED KINGDOM**

P. Curtis	[dst], Farnborough	
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**Secretary**

M. Gädke	DLR, Braunschweig	at the end of the day former Secretary
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**Excused**

FRANCE	R. Ohayon	ONERA, Châtillon	
	M. Mahé	Aérospatiale, Toulouse	IPoC
GERMANY	H. Schnell	EADS Airbus, Bremen	IPoC
	W. Riha	DLR, Bonn	
THE NETHERLANDS	H. Ottens	NLR, Noordoostpolder	
SWEDEN	H. Ansell	Saab AB, Linköping	IPoC
UNITED KINGDOM	R. Collins	BAE Systems Airbus, Filton	IPoC

**GoR – Structures and Materials,  
 45<sup>th</sup> Meeting, to be held at CIRA, Capua on 18/19 October 2001**

**AGENDA**

**Thu 18. October, 15:00 h Visit of Laboratories at CIRA**

(to be arranged according to the (scheduled) arrival of the confirmed participants)

**20:00 h Informal Dinner in Caserta**

**Fri 19. October, start at 9:00 h**

**1. Opening remarks and adoption of Agenda**

**2. Summary Records 44<sup>th</sup> GoR meeting**

**3. Action Items 44.1 to 44.16**

- |           |  |   |
|-----------|--|---|
| 44.1      | To ask for the responsibility for the update of the GARTEur web site   | K. Rohwer                               |
| 44.2      | To check confidentiality of EU-Proposal (Contract) ADMIRE  | M. Gaedke                               |
| 44.3      | Priority to finalizing the Final Report on AG 21   | H. H. Ottens                            |
| 44.4      | To inform Chairman AG 22 about giving a report on the next GoR meeting   | H. H. Ottens                            |
| 44.5      | To check the status of NLR contribution for AG 25  | H. H. Ottens                            |
| 44.6      | To check the status of CIRA contribution for AG 25   | M. Farioli/G. Di Vita                   |
| 44.7      | To mail viewgraphs of Aeronautic Days to GoR members   | K. Rohwer                               |
| 44.8      | To write a short paragraph on <i>Thermal conductivity, heat transfer</i><br>(to initiate meeting for forming an EG)      | M. Mahé                                 |
| 44.9      | To write a short paragraph on <i>Shock Wave Induced Damage</i><br>(to initiate meeting for forming an EG)                | R. Ohayon                               |
| 44.10     | To write a short paragraph on <i>Ground Vibration Test and Simulation</i><br>(to initiate meeting for forming an EG)     | R. Ohayon                               |
| 44.11     | To check in NLR on <i>Impact and Fatigue in Composites</i> ; to contact AECMA<br>(to initiate meeting for forming an EG) | H. H. Ottens                            |
| 44.12     | To check about specific Topic on <i>Smart Item</i>   | all                                     |
| 44.13     | To check the resp. National interest for <i>Material Properties during Curing</i><br><i>and Nano-Materials</i>           | all                                     |
| 44.14     | To confirm taking over GoR Chairman- and Vice-Chairmanship, resp.  | T. Khan & J. M. Pintado                 |
| 44.15     | To check for nomination of respective IPoC   | M. Farioli, H. Ottens &<br>J.M. Pintado |
| 44.16     | To check dates of GoR SM meeting with the upcoming XC meeting  | K. Rohwer                               |
| <b>4.</b> | <b>Final reporting on closed AG's and evaluation</b>   |   |
|           | SM-AG 17 <i>Cadmium Substitution</i>   | H. H. Ottens                            |
|           | SM-AG 20 <i>Fractographic Aspects of Fatigue in Composites</i>   | P. Curtis                               |
|           | SM-AG 21 <i>Multidisciplinary Wing Optimisation</i>  | H. H. Ottens                            |
| <b>5.</b> | <b>Progress reports on current AG's</b>  |   |
|           | SM-AG 22 <i>Design Methodology</i> (Final Report presentation)   | J. Wiggenraad                           |
|           | SM-AG 24 <i>Bird Strikes</i>   | P. Curtis                               |
|           | SM-AG 25 <i>Postbuckling and Collapse Analysis</i>   | K. Rohwer                               |
|           | SM-AG 26 <i>Initial Flaw Concept and Short Crack Growth</i>  | H. H. Ottens                            |
|           | SM-AG 27 <i>Fractogr. Aspects of Fatigue Failure in Complex Composites</i>   | P. Curtis                               |

**GoR – Structures and Materials, 45<sup>th</sup> Meeting**

**AGENDA (continued)**

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|--|--|
| <b>6. Report Chairman GoR SM</b><br>GARTEur Taxonomy/Technology Matrix<br>Update Basic Documents<br>Annual Report 2001   | K. Rohwer  |
| <b>7. Status reports on options for new activities/further new Ideas</b><br>Thermal conductivity, heat transfer<br>Shock Wave Induced Damage<br>Ground vibration test and simulation in the very low frequency range<br>Impact and fatigue in composites<br>Smart items<br>Material Properties during Curing<br>Nano-Materials | M. Mahé<br>R. Ohayon<br>R. Ohayon<br>H. H. Ottens<br>all<br>all<br>all |
| <b>8. Industrial Points of Contact (IpoC)</b><br>Italy<br>Spain<br>The Netherlands   | M Farioli<br>J. M. Pintado<br>H. H. Ottens                             |
| <b>9. Confirmation of new GoR SM Chairman and Vice-Chairman</b>  | K. Rohwer  |
| <b>10. Any other business</b>  |  |
| <b>11. Transfer of GoR SM Chairmanship and Vice-Chairmanship</b>   | K. Rohwer & T. Khan  |
| <b>12. Date and place of the next meeting</b>  | T. Khan  |
| <b>Closure at 15:30 h</b><br>(To be confirmed according to the transport needs)  |  |

**A lunch** in the CIRA canteen is foreseen at 13:00 (a break of 45 minutes should be foreseen)

## Summary Records

### 1. Opening remarks – Adoption of agenda

The Chairman opened the meeting and expressed his thanks to Mario Farioli (CIRA) for the hospitality. He welcomed the attendees, especially **Arturo Minuto** (Alenia) who is the new Industrial Point of Contact (IPoC) from Italy and **Pierre-Marie Lesne** (ONERA) who will act as the new GoR secretary. Special thanks were given to Mario Farioli for the local arrangements.

The agenda was adopted without any amendments or changes.

### 2. Summary Records 44<sup>th</sup> GoR meeting

The Summary Records of the 44<sup>th</sup> GoR meeting were approved.

### 3. Action Items 44.1 to 44.16

#### **AI 44.1:**

Klaus Rohwer did raise the topic concerning the responsibility for updating the GARTEur web site during the last XC/GoR meeting; the response was that the future of the web site is still under discussion. Paul Curtis commented the question by the statement that INTA (next Chairmanship of GARTEUR XC) has a person to take care of the web site.

The AI is closed.

#### **AI 44.2:**

M. Gaedke checked whether or not the EU-Proposal (Contract) ADMIRE is confidential. He got information that it can be distributed to the GoR members for personal use. The Project Description, Issue of GRD1-2000-25069, as submitted on September 12<sup>th</sup>, 2000 is attached as Appendix A.

#### **AI 44.3:**

Harold H. Ottens hasn't been able to join this 45<sup>th</sup> SM-GoR meeting and gave the following statement by E-mail for finalizing the Final Report on AG 21: *"The report is ready as a draft and is sent to the printer. A CD-Rom will be made with all available data in Excel spreadsheets. All Excel spreadsheets are ready. So finally I think that the final report in hard copy and the CD-Rom will be available and sent to the participants within a month."*

AI is closed.

#### **AI 44.4:**

As Harold H. Ottens couldn't join this 45<sup>th</sup> SM-GoR meeting he gave the following statement by E-mail for the Chairman's report on AG 22: *"The Action Group has had a meeting on September 11-12<sup>th</sup> at SAAB in Sweden. Minutes were sent to the participants. It is anticipated that a final report will be ready before the end of 2001. A meeting will be held at 30-31 January 2002 to investigate the possibilities of a new EG. I propose to have a report on AG22 at the next (46<sup>th</sup>) GOR meeting."*

In respect to a new AG Klaus Rohwer and Tasadduq Khan informed the GoR about their ideas concerning the existing E-mail information exchange amongst themselves and Florence Roudloff, ONERA, who will act as the EG-Chairperson. Both stated that the proposed content should be restricted. For purpose of information the ONERA E-mails are partly cited hereafter:

*"The GARTEUR group AG22 is going to the end and we are planning to start a new group ...*

... The title will probably be: "Analysis and Repair Of Composite Structures" (AROCS) and all the partners involved in AG22 are interested in participating to this group. We are also going to contact some of the partners involved in the Brite-Euram project EDVCOS (Agusta, Alenia, INTA) as well as Dassault Aviation."

"The subject of the new group will probably be larger than the previous GARTEUR group ...  
... About repairing, two possibilities have been discussed:

1. Panels with a repair patch would first be considered. The panel would be impacted on or near the patch and such a panel would be studied. SAAB, DASA and BAE Systems seemed to be very interested in the modelisation of the behaviour of such panels.

2. The objective of this point would be to answer the following question: "After impact, do we have to repair or not?" This point deals with the prediction of damage growth. The idea would be to allow damage growth and have inspection intervals timed such that any damage cannot grow to a critical size during the period between inspections. Up-to-now, there is a no-growth concept and in order to allow growth, modelisation has to progress a lot.

Tasks are not defined yet but fatigue loading would be studied (DLR, ONERA, SAAB, FOI/FFA are interested). Postbuckling with delaminations would also be studied since AG22 showed that postbuckling was difficult to obtain (modelisation with Finite Elements) and that there is still a lot to do...

... some partners will start with the modelisation of several defects (BAE Systems, ONERA ...)"

AI is closed.

**AI 44.5:**

Due the absence of Harold H. Ottens on this 45<sup>th</sup> SM-GoR meeting he gave the following statement by E-mail for the status of NLR contribution to AG 25: "NLR has provided its contribution."

AI is closed.

**AI 44.6:**

Mario Farioli informed the GoR about the settled status of CIRA's contribution to AG 25, which will be done now by Dr. Aniello Riccio. In addition the Chairmanship of this AG was shifted from Dr. Kerstin Edlund, SAAB to Dr. Adam Zdunek from FOI/FFA; the GoR recommended that Dr. Zdunek to contact Dr. Riccio, CIRA and vice versa to shift documents (**Action item 45.1** ⇒ **A. Blom & M. Farioli**).

**AI 44.7:**

The Viewgraphs presented by Klaus Rohwer on the Aeronautics Days have been included in the Summary Records of the 44<sup>th</sup> GoR Meeting as Appendix H (pp. 81 – 113).

AI is closed.

**AI 44.8, AI 44.9, AI 44.10, AI 44.11, AI 44.12 and AI 44.13:**

- To write a short paragraph on *Thermal conductivity, heat transfer* and to initiate a meeting for forming an EG (M. Mahé);
- To write a short paragraph on *Shock Wave Induced Damage* and to initiate a meeting for forming an EG (R. Ohayon);
- To write a short paragraph on *Ground Vibration Test and Simulation* and to initiate a meeting for forming an EG (R. Ohayon);
- To check in NLR on *Impact and Fatigue in Composites*, to write a short paragraph and to initiate a meeting for forming an EG (H. H. Ottens);

- To check about specific Topic on *Smart Item (All)* and
- to check the respective National interest for *Material Properties during Curing and Nano-Materials (All)*

Items were shifted to Topic 7 *Status reports on options for new activities/further new Ideas*.

AI's are closed.

**AI 44.14:**

The confirmation for taking over GoR SM Chairman- and Vice-Chairmanship was shifted to Topic 9.

AI is closed.

**AI 44.15:**

For nomination of respective IPoC from Italy, The Netherlands and Spain see Topic 8 *Industrial Points of Contact (IPoC)*.

AI still open for The Netherlands and Spain (**Action item 45.2** ⇒ **H. H. Ottens & J. M. Pintado**).

**AI 44.16:**

The planned date (9 / 10 May 2002) for the next GoR SM meeting (46<sup>th</sup>) as mentioned in the Table of the SR 44 as Appendix K (pp. 119-120) was not conflicting with the upcoming XC meeting, but has to be shifted to another date due to holidays in France and Sweden, see in addition Topic 12 *Date and place of the next meeting*.

AI is closed.

**4. Final reporting on closed AG's and evaluation**

**SM-AG 17 Cadmium Substitution:**

On behalf of Harold H. Ottens as the Monitoring Responsible Klaus Rohwer informed the GoR that Chris Smith, QinetiQ (*former DERA*), Chairman of AG 17 was instructed by Eric Maire, GARTEur XC secretary, that the actual report number is TP 128. Chris Smith regards the report as complete He intends to send hard copies and an electronic version in the beginning of November following the delivered distribution list.

Things are on a good way.

**SM-AG 20 Fractographic Aspects of Fatigue in Composites:**

Klaus Rohwer reported to the GoR on an information exchange amongst the acting Chairman of the GARTEur SM AG 20 group, the GARTEur XC and himself. M. Hiley is currently in the process of organising the ultimate distribution of the Final Report TP 112, which was issued in June 2001 for this activity. When the proposal for this group was approved by the XC, the original proposal stated that distribution of the final report would be '*GARTEUR Limited*'. Having completed the study, the group have now come to the conclusion that the report should be issued as '*GARTEUR Open*'.

The AG Chairman had contacted all members of AG 20 by email several months ago (and spoken to them at a recent AG27 meeting) and informed them of the planned change. All were advised that they should contact him within November. In addition he was informed by Eric Maire, GARTEur XC secretary, that the change in classification from '*Limited*' to '*Open*' can only be approved by the XC,

who has therefore suggested that an additional item 'Approval for open reporting (of the AG20 report) as per rule 0.6 summary table related to technical publications' be included for discussion at the next GARTEur XC meeting (under Any Other Business). A copy (revised title page) of the report (without figures) for information was sent to the GoR SM Chairman.

Things are on a good way and the GoR concluded that the AG is closed.

**SM-AG 21 Multidisciplinary Wing Optimisation:**

As the Monitoring Responsible, Klaus Rohwer reported to the GoR about an E-mail of the AG Chairman P. Arendsen that he is working hard on finalising the Final Report of this Action Group. In addition the statement of Harold H. Ottens as mentioned under AI 44.3 will be repeated here: "The report is ready as a draft and is send to the printer. A CD-Rom will be made with all available data in Excel spreadsheets. All Excel spreadsheets are ready. So finally I think that the final report in hard copy and the CD-Rom will be available and send to the participants within a month."

Joachim Bühlmeier informed the other GoR members that Fairchild/Dornier is involved in a comparison between NASTRAN and LAGRANGE. The company changed their design by taking over the developed wing optimisation and does have now a Multidisciplinary Wing Optimisation Group working. He offered a presentation for the next (46<sup>th</sup>) GoR SM meeting, but time will be needed (Action item 45.3 ⇒ J. Bühlmeier).

**5. Progress reports on current AG's**

**SM-AG 22 Design Methodology (Final Report presentation):**

The AG Chairman, J. F. M. Wigenraad, NLR was unable to attend this GoR meeting and to give a presentation of the GARTEur TP 122 as the Final Report of the AG entitled *Design Methodology for Damage Tolerant Composite Wing Panels*. In addition it should be mentioned, that Harold H. Ottens, as the Monitoring Responsible, couldn't join this 45<sup>th</sup> SM-GoR meeting, but he gave the following statement by E-mail for the Chairman's report on AG 22: "The Action Group has had a meeting on September 11-12<sup>th</sup> at SAAB in Sweden. Minutes were sent to the participants. It is anticipated that a final report will be ready before the end of 2001. A meeting will be held at 30-31 January 2002 to investigate the possibilities of a new EG. I propose to have a report on AG22 at the next (46<sup>th</sup>) GOR meeting." the activity was postponed to the 46<sup>th</sup> GoR SM meeting (Action item 45.4 ⇒ H. H. Ottens).

For more details – especially for initiating a new Exploratory Group as successor of SM AG 22 – see statements under Top 3 AI 44.4.

**SM-AG 24 Bird Strikes:**

As the Monitoring Responsible, Paul Curtis, [dstl], presented a 10 pp. Summary 2001 report – attached hereto as Appendix B – with one change mentioned already in the 44<sup>th</sup> GoR SR: the Chairperson is still Michelle Willows but she is now with QinetiQ.

**SM-AG 25 Postbuckling and Collapse Analysis:**

The Monitoring Responsible, Klaus Rohwer, gave a 6 viewgraphs report on the objective, the activities, the status, results, management and actions based on Adam Zdunek's report, who is acting as the new AG Chairman. Rien van Houten, NLR took over the Vice-Chairmanship (for more details see Appendix C).

**SM-AG 26 Initial Flaw Concept and Short Crack Growth:**

Due the excused absence of Harold H. Ottens, NLR as the new Monitoring Responsible on this 45<sup>th</sup> SM-GoR meeting he gave the following statement by E-mail for the status of SM AG 26. "No meeting is held yet. The meeting planned for October is postponed".

The GoR took note of the existing time delay and the following comments were made: The concept is understood, but the phenomena are not. A discrepancy exists between the mechanics and the modelling. The GoR agreed upon the proposal of Anders Blom, FOI/FFA, to ask the AG Chairman, Mr B. Palmberg, FOI/FFA, to give a description of the AG – programme and send it to Tasadduq Khan, ONERA (**Action item 45.5 ⇒ A. Blom**).

The work is closely connected to the EU funded ADMIRE project (see statements under Topic 3/Al 44.2 and in addition Appendix A).

**SM-AG 27 Fractographic Aspects of Fatigue Failure in Complex Composites:**

The Monitoring Responsible Paul Curtis, [dstl], presented an 8 pages Summary of Progress of the status, objectives, progress, results and the future studies of the AG (see Appendix D).

**6. Report Chairman GoR SM**

- **GARTEur View**

Klaus Rohwer reported about the task of the XC/GoR to set up a GARTEur View with the objectives to identify medium and long-term drivers, to identify technical areas that GARTEur could undertake, and to highlight technical areas, which would make GARTEur an attractive forum for European Industry to co-operate. During two XC/GoR workshops drivers, sub-drivers were identified. Furthermore, recent and current GARTEur projects and future needs for research were identified within the GoR SM. In the form of two matrices, separately for civil and for military aircraft (Appendix E1 shows the version presented whereas Appendix E2 shows the new issue updated on 23.11.2001). They are specified which project is very relevant / relevant / not relevant to which driver / sub-driver. Mr. Papparone, CIRA has prepared a document using these GARTEur View matrices as starting point.

- **GARTEur Taxonomy/Technology Matrix**

There has been a lengthy discussion about a suitable form of the GARTEur Taxonomy with respect to Structural and Material aspects. Klaus Rohwer presented two viewgraphs of the final version of the GARTEur Taxonomy in which the GoR's – especially the GoR SM – amendments are included (see Appendix F). Alessandro Amendola, CIRA, XC member, stressed the importance of a convincing picture of the GARTEur activities. Intention of GARTEur View and Taxonomy is to further co-ordinated European research in aeronautics. To that end input from the different GoR's are expected.

- **Update Basic Documents**

Klaus Rohwer informed about movements to update the GARTEur Basic Documents and to improve the AG working conditions. In that respect B. Williams, QinetiQ, Chairman GoR AD, has worked out a position paper (Appendix G) about 'The Future direction of GARTEUR Aerodynamics' and Klaus Rohwer has put together some comments (Appendix H) from the GoR SM perspective.

### **Annual Report 2001**

Klaus Rohwer –is going to set up the SM contribution to the GARTEur Annual Report 2001. He mentioned that the procedure will be the same as last year and asked the Monitoring Responsables of the different SM AG's to put pressure on the AG Chairmen for providing the inputs. Templates should be in the hands of the respective Chairmen.

#### **7. Status reports on options for new activities/further new Ideas**

- To write a short paragraph on *Thermal conductivity, heat transfer* and to initiate a meeting for forming an EG (M. Mahé);

No input so far

- To write a short paragraph on *Shock Wave Induced Damage* and to initiate a meeting for forming an EG (R. Ohayon);

No input so far

- To write a short paragraph on *Ground Vibration Test and Simulation in the very low frequency range* and to initiate a meeting for forming an EG (R. Ohayon);

No input so far

- To check in NLR on *Impact and Fatigue in Composites*, to write a short paragraph and to initiate a meeting for forming an EG:

As Harold H. Ottens was prevented from coming to this 45<sup>th</sup> SM-GoR meeting he gave the following statement by E-mail for the check in NLR: *"The topic Impact and fatigue in composites is one of the topics that will be discussed in the EG meeting following the AG 22 meeting. NLR has not made up its mind yet."*

- Smart items

#### **Action Items 45.6 ⇒ M. Farioli**

- Material Properties during Curing

Mario Farioli presented a short description of G. Di Vita, for this activity (see Appendix I).

- Nano-Materials

Tasadduq Kahn offered a presentation on Nano Tubes and possible applications in composites.

#### **Action items 45.7 ⇒ T. Khan**

- Interchange ability

Paul Curtis distributed a one page description for an alternative materials and design selection methodology for composite structures (see Appendix J).

- Moisture Distribution

Paul Curtis distributed a two pages description for a design tool for modelling moisture distribution and its effect in complex composite structures (see Appendix K).

The Table of all the possible new activities - distributed with the Summary Records of the 44<sup>th</sup> GoR SM meeting – was presented by M. Gaedke. During the discussion the individual contributions were updated and new ones were added see Appendix L.

**8. Industrial Points of Contact (IpoC)**

**Italy** Mr Arturo Minuto from Alenia in Pomigliano d'Arco introduced himself by a short presentation as the new Italian IPoC.

**Spain** José Maria Pintado stated that no nomination could be mentioned so far.

**The Netherlands** Even though H. H. Ottens couldn't attend the 45<sup>th</sup> GoR meeting, he stated by E-mail that the situation is still open.

Last two actions still open (**Action item 45.2** ⇒ **J. M. Pintado, H. H. Ottens**).

**9. Confirmation of new GoR SM Chairman and Vice-Chairman**

Tasadduq Khan from ONERA, active GoR SM Vice-Chairman (foreseen as regular successor for Chairmanship) and José Maria Pintado from INTA (foreseen as successor for Vice-Chairmanship) declared their willingness to take over these duties and were elected unanimously.

**10. Any other business**

Michael Gaedke presented the updated co-ordinates as attached to the SR 44 and asked the GoR members to check again their files. Anders Blom gave statements for the P.O. Box and Paul Curtis submitted his new name card.

Klaus Rohwer mentioned that the GARTEur SM files have to be transferred to ONERA by surface mail and electronically (**Action Item 45.8** ⇒ **K. Rohwer & M. Gaedke**)

Michael Gaedke is asking the GoR members along with this SR 45 to check again their updated co-ordinates in the attached Appendix M and to send them to the new GARTEur SM secretary Pierre-Marie Lesne, ONERA.

**11. Transfer of GoR SM Chairmanship and Vice-Chairmanship**

Dr. Tasadduq KHAN, Director Materials and Structures (DSG/MAS) from ONERA Centre de Châtillon, Paris took over the monitoring of this 45<sup>th</sup> GoR SM meeting.

**12. Date and place of the next meeting**

Tasadduq Khan informed the GoR that the planned date (9/10 May 2002) for the next GoR SM meeting (46<sup>th</sup>) has to be shifted due to holidays in France and Sweden.

The GoR agreed upon the following schedule for the next GoR SM meetings:

No.:	Date	Place	Status
46 <sup>th</sup>	22/23 Apr 2002 alternatively [16/17 May 2002]	Paris Châtillon, ONERA with informal meeting on Apr 22 <sup>nd</sup> or May 16 <sup>th</sup> , exact date to be specified	<b>Action Item 45.9</b> ⇒ <b>T. Khan</b>
47 <sup>th</sup>	17/18. Oct 2002 alternatively [17/18. Oct 2002]	Madrid, INTA or CASA to be specified.	<b>Action Item 45.10</b> ⇒ <b>P. - M. Lesne.</b>