

Draft Minutes
SRNWP Interoperability Workshop
ECMWF, Reading, December 1st – 3rd 2010

Attendees:

1. Terry Davies (TD), UK Met Office (Chair)
2. Rachel North (RN), UK Met Office (Programme Manager, Secretary)
3. Tom Green (TG), UK Met Office
4. Toon Moene (TM), KNMI (HIRLAM)
5. Philipp Glatt (PG), Meteo Swiss (COSMO)
6. Ulrich Schaettler (US), DWD (COSMO)
7. Alfred Hofstadler (AH), ECMWF
8. Nils Wedi (NW), ECMWF
9. Enrico Fucile (EF), ECMWF
10. Oldrich Španiel (OS), SHMU (ALADIN/LACE)
11. Claude Fischer (CF), Météo France (**ALADIN/LACE**)

Apologies: Tiziana Paccagnella, ARPA-SIM (COSMO)

Contents:

- Summary
- Actions
- Detailed notes

Key:

- Completed actions

1 st February 2011	Rachel North	initial draft

Day 1: 1st Dec 2010 PM

Session 1 : A review of Interoperability progress against Year 2 deliverables/timeline

Summary Day 1

- Discussions around GRIB2 and GRIB API.
- Initial discussion around upcoming new grids.
- Status reports from all the consortia.
- Discussion around checking/visualising adaptor output.
- Documentation review required
- Filled in 'contingency tables' detailing current status and expected progress with D4 (see Annex 1)

ACTION: RN to put the Programme Decision Document onto the EUMETNET portal.

ACTION: TM to send out information on how soil wetness index was applied for the HIRLAM case.

ACTION: RN/TG. Recreate both UM data sets, having checked the packing routine in the adaptor, and replace the versions on the data portal.

ACTION: RN to replace the UM documentation document on the ECMWF data portal.

ACTION: RN to ensure that a list of what has been achieved with each converter forms part of the project report.

ACTION: RN to ensure that we list what has been achieved with GRIB2 in the project report.

ACTION: All to make documentation suitable for a clickable web interface (HTML or indexed PDF).

ACTION: All to review documentation.

ACTION: RN to issue documentation guidelines for after completion of this phase of the project.

ACTION: ALL to discuss more widely within consortia which conversions are necessary and which are desirable.

ACTION: TD/TG to see how far they can go in taking ECMWF data and converting for UM LAM.

ACTION: ALL to highlight grid changes (and their implications) for the immediate future (out to late 2012)

Day 2: 2nd Dec 2010

Session 2: Working towards D4: four adaptors that transform LAM output to the standard output format and vice versa.

Session 3: The future: SRNWP Interoperability continuation discussion

Summary Day 2

- Review of Day 1
- Presentations from consortia on work plans for the coming year
- Discussion on delivering D4 (and interpolations)
- Discussed maintenance plan for Interoperability: management passes over to System Aspects Expert Team.
- Revised the draft D2 document.
- Discussion regarding continuation of Interoperability. Conclusion that we needed to get more feedback from consortia and from Ensembles SRNWP Expert Team.

ACTION: CF to contact EF with details for proposal to WMO for new GRIB2 template

ACTION: ALL (except CF, OS) follow ALADIN documentation style to recreate documentation for each consortium.

ACTION: ALL to add an appendix describing their vertical interpolation to the documentation.

ACTION: RN to change D2 document to reflect decision by ALADIN/LACE to develop new code rather than use existing. (Also the case for UM).

ACTION: ?? to pass the definition/description of the SWI to **EF**

ACTION: CF to circulate copy of Jean-Francois' presentation.

ACTION: US to find out what is documented about the 00UTC GME forecast run using ECMWF surface.

ACTION: ALL to exchange ideas, on request, on best practice when starting a model forecast from fields originating from another source.

ACTION: ALL to put user documentation for the software onto consortia web pages.

ACTION: ALL to review what data distribution systems exist in the consortia and see if appropriate to use for maintenance and testing adaptors.

ACTION: RN to remove "This shall be maintained ..." sentence from the D2 documentation.

ACTION: ALL. Each consortium to identify one or more products they would like to have which could come from Interoperability extension.

ACTION: RN to come up with a list of what we think we will deliver from the original list, and a list of what we will have failed to deliver.

ACTION: RN to request feedback from EPS/DA workshop in February.

ACTION: RN to get timetable for spring STAC.

ACTION: RN to highlight this issue to Tiziana/Chiara.

Day 3: 3rd Dec 2010 AM

Session 4 : Meeting Review and AOB

Summary of Day 3

- Review of Day 2 actions
- Discussions around future computing facilities and exchange mechanisms.
- Discussion on packing – should add a paragraph to the final report setting out recommendations.

ACTION: AH to mail out report on packing and compression to everyone.

ACTION: RN to compile draft version of project report by end of June 2011 to allow for vacations over the summer.

Detailed Notes from Day 1

Item 3: Programme Status Report

After the opening of the meeting and agreeing the agenda RN presented a programme status report, containing a review of the actions from the last meeting. People weren't aware of the existence of the Programme Decision Document.

ACTION: RN to put the Programme Decision Document onto the EUMETNET portal.

There was a brief discussion surrounding GRIB2 codes and requirements for the future. **EF** pointed out that there was now a quick (timescale a few months or so) procedure in place to add new parameters into the lists. This results in the parameter being marked as 'pre-operational' in the documentation. To add new grids is a longer process though, and in previous experience typically has taken about a year. **US** pointed out that the ICON grid generator takes a long time to run. This incorporates a netCDF component. The current situation with the UM UKV grid was then discussed. It was suggested that an example GRIB2 file should be created with the proposed template and that another met centre should then attempt to decode it in order to provide evidence that the template works. **US** noted that DWD are currently going through a similar proposal for their new grid GRIB2 template and it was suggested that UKMO & DWD should to provide each other with example files of the proposed templates and to try and decode them.

Items 4,5,6,7: Review of status with D3 - Overview & Detail from the Consortia

The status of D3 was covered in the presentation by **RN** on Item 3. Following on were the more detailed presentations from each consortium. Prior to the meeting, **CF** representing ALADIN/LACE asked to present at the start of Day 2, as he couldn't make it to the Day 1 session. He requested a summary of the Day 1 topics be given at the start of Day 2. **US**, representing COSMO, presented the status of the project there. At the beginning of 2010, much of the COSMO focus was on the coding of the vertical coordinate. Neither of the new GRIB2 vertical hybrid level types (118 & 119) is suitable for encoding the COSMO model output. As a result a proposal for a new vertical coordinate type was submitted to WMO. This proposal is now for validation. The GRIB API has also been established at some centres to be the official GRIB2 library. The performance of GRIB API for reading GRIB2 on NEC machines has been improved. Note that writing hasn't yet been considered. FieldExtra, the post-processing application, can now produce the parameters of the standard output format as a result of incorporating the GRIB API. In November, the first release of INT2LM, the interoperability adaptor, which uses the GRIB API, was produced. A GRIB2 test data set with the old-style coding of the vertical coordinate, produced by FieldExtra, has been provided. Another test data set with leveltype=150 has subsequently been added. Note no surface data has been included in the datasets. The minimum required documentation is not yet complete. A new data set will be put onto the data portal during the spring quarter which uses the new level type code. COSMO require clarification with variable encoding – **EF** suggested discussion to resolve. **TM** then presented the HIRLAM progress. The adaptor can now produce GRIB2 from HIRLAM format. HIRLAM are intending to keep converting GRIB2 to GRIB1. A test dataset has been provided on the data portal, as has the accompanying documentation. **TM** has implemented the soil wetness index conversion for HIRLAM.

ACTION: TM. Send out information on how soil wetness index was applied for the HIRLAM case.

Then **TG** presented the progress with the UM adaptor. The decision was taken to split the file conversion from the model specific utilities. Although the decision was taken to develop a stand-alone adaptor, in practice the decision to adapt an existing utility was taken. UM proprietary format requires a lat-lon grid, the horizontal interpolation is done by the converter. Vertical interpolation is done by UM specific utility. Experiences with the GRIB API were then shared. There were issues with data time/validity time. What was the outcome of this discussion? The question of whether we should be using bitmaps for land-surface fields was posed (answer: yes). All coding has been implemented trying to use version independent keys to ensure backwards compatibility for GRIB1. There were problems with setting pressure level values, which are defined in hPa. How to set 10Pa, for example? The UM requires summary information at the start of the file. This requires scanning through GRIB files for level information, then going through each message. Additionally, the UM has vertical staggering so parameters can be on either 'theta' or 'rho' levels and it has to be identified which. Questions were then asked as to whether there's an easy way to change row ordering? (answer: ??) Plus, should GRIB2 files contain all levels in PV array? (answer: yes) The talk then moved on to data conversion. Successful conversion of UM to GRIB2 standard output format has been achieved. This file was then ingested into the reconfiguration module and converted back to UM proprietary format successfully. ECMWF GRIB2 in regular lat-lon format is also being successfully ingested. A short discussion followed about whether any grid exists which does not have a row at the equator. It was noted that GRIB2 visualisation is currently an issue at the Met Office. However, recently access has been given to the 'Visual Weather' forecaster workstation tool, and this provides a visualisation mechanism which is independent of GRIB API. The UM data file on the data portal needs replacing, as does the documentation.

ACTION: RN/TG. Recreate both UM data sets, having checked the packing routine in the adaptor, and replace the versions on the data portal.

ACTION: RN to replace the UM documentation document on the data portal.

Discussion then turned to methods for ensuring that file conversions had been successful. **EF** noted that the `grib_compare` tool, which comes with the ECMWF GRIB API will be used for the ECMWF switch to operationally output GRIB2 files rather than GRIB1 files. This was successfully used in the switch from GRIBEX to GRIB API. It is designed for ECMWF data but is possible to define your own keys. Metview4 is now available at ECMWF which can visualise GRIB2 files. There was also a quick discussion on packing.

ACTION: RN to ensure that a list of what has been achieved with each converter forms part of the project report.

Item 8: Discussion related to completion of D3

Regarding GRIB2 it was suggested that we can encode everything we want to currently. It was noted that we haven't yet tried surface fields, and there are still issues with level codes. The sample files don't yet contain the level codes which correctly describe the data and should be assigned. As part of the project report we should list what has been done here.

ACTION: RN. Ensure that we list what has been achieved with GRIB2 in the project report.

There followed a discussion about representation of time within GRIB2, concerning data time, validity time, forecast step, and step units. GRIB1 limits the options because of the space available to encode the step: 1 octet, hence decimal value 255. GRIB2 doesn't have the same limitation. However, in the GRIB API there is a third way – you choose the units. **EF** clarified that the time headers in GRIB2 are in the template (product definition) apart from some headers (reference time) which sit in section 1 (Identification section).

Discussion then turned to the documentation. It was agreed that the GRIB API is adequately documented. Subsequently, the decision was made to put the documentation into a specific form – with the suggestion that we follow a template that would allow for viewing as online documentation (i.e. having an indexed file, or clickable contents). It was stressed that we should communicate if the documentation is inadequate. The documentation needs 2 strands, documentation of parameters and documentation of grids & model details. It was agreed that we should follow the ALADIN/LACE documentation as a good example. In the following discussion about parameters **EF** highlighted that the parameter description could be missing in the ECMWF GRIB API parameter documentation. This is a current focus. A short discussion surrounding the paramId descriptor followed.

ACTION: All to make documentation suitable for a clickable web interface (HTML or indexed PDF).

ACTION: All to review documentation.

ACTION: RN to issue documentation guidelines for after completion of this phase of the project.

A preliminary discussion around D4 then finished off the day, starting with an attempt to fill in the 'contingency tables' supplied by **RN** in the initial talk. A review of the status at present was followed by detailing the expected status at close of project. The discussion concentrated on the work required to use global fields to start the LAMs. The resulting 'contingency table' can be found in Annex 1 [PMN: **RN** will put them on the EUMETNET portal, for access, as well as circulating with minutes]. **AH** made the point that it is OK to say 'we haven't done it because there is no requirement' for a particular conversion. **TM** highlighted that AROME is being configured to run on a rotated lat-lon grid, and it is not known what effort will be needed here, or where it will come from. **US** stated that in 2012 GME will be replaced by ICON. A test data set with the ICON grid should be forthcoming in the spring quarter. It was pointed out that we should discuss/highlight any potential grid changes out to late 2012.

ACTION: All to discuss more widely within consortia which conversions are necessary and which are desirable.

ACTION: TD/TG to see how far they can go in taking ECMWF data and converting for UM LAM.

ACTION: All to highlight grid changes (and their implications) for the immediate future (out to late 2012)

Detailed Notes from Day 2

Day 2 started with a review of the first day's discussions and actions given by **RN**. The slides from this can be found in the accompanying presentation, [SummaryOfDay1.pdf](#). There followed a short discussion surrounding items that had been brought up in the summary. It was decided not to pursue any idea of a library of grids at the present time. A discussion surrounding what we do for validation of the resulting data. **TG** mentioned that the Met Office forecasters use the Visual Weather software as part of their forecasting toolkit. This was now able to take GRIB2 data, and would be an independent check for looking at the data file contents. **OS** also knew of this and has access to it.

Item 2: Deliverable D4

The LAM→LAM 'contingency table' from **RN**'s presentation yesterday was discussed, and filled in. This is also in Annex 1. It was pointed out that any conversions already done by one consortium should be easy to implement for another consortium.

Item 3: ALADIN/LACE review of status with D3, and work for D4

CF presented a summary of the ALADIN/LACE progress with their adaptor. Configuration 901 was the previous way of initialising Arpège from ECMWF IFS in GRIB1 format. This has been modified to read in GRIB2 using the ECMWF GRIB API. An extra step has to be performed if there is a change of grid (configuration 927, aka 'Fullpos'). These are all implemented for GRIB1. Configuration 901 can't do geometry, so a way to incorporate 'Fullpos' had to be found. This led to a change in strategy, to develop new tools. So adaptors '903' and '902' have been/are being developed. Configuration 902 will include the necessary interpolations for the initial start files. A two-step approach is being taken in terms of both complexity and validating. The first prototype for the post-processing adapter (Configuration '903') doesn't yet take GRIB2 input, but it handles the horizontal interpolations and produces the output 'FA file'. The second prototype (configuration '902') will extend this to handle surface and vertical interpolations and spectral transforms. The point was made that ALADIN's rotated Mercator plane projection will need to be supported in GRIB2. Would this need a proposal for a new template submitting? (answer: yes)

ACTION: CF to contact EF with details for proposal to WMO for new GRIB2 template

The ALADIN/LACE documentation was overhauled as a result of the December 2009 workshop. As a result this is now a completed action. Everyone agreed that the ALADIN/LACE documentation was a good example, and suggested that it was used as a 'template' for others to follow.

ACTION: ALL (except CF, OS) follow ALADIN documentation style to recreate documentation for each consortium.

It was also agreed to add an appendix on vertical interpolation to the documentation.

ACTION: ALL to add an appendix describing their vertical interpolation to the documentation.

The work plan for 2011 involves training new staff on the interoperability-related tools, and getting them to contribute to the development and testing. There will need to be a continuation of the adaptor development, to finalise for post-processing ('903') and to extend it to be able to create files for initialisation of the model. Testing various consortia output with the adaptor also needs to be done.

ACTION: RN to change D2 document to reflect decision by ALADIN/LACE to develop new code rather than use existing. (Also the case for UM).

There was clarification from **EF** that v1.9.5 of the GRIB API software is now stable, and this contains some of the modifications concerning optimisation of the code on the NEC platform. **EF** also noted that he has been through the model level parameters in the ECMWF GRIB2 documentation and that all required information should now be there. It was pointed out that the soil wetness index now needed adding.

ACTION: ?? to pass the definition/description of the SWI to **EF**

Item 4: COSMO work plan

US presented the plan for COSMO. The two software tools modified for Interoperability, Fieldextra and INT2LM, need to have the horizontal interpolation added which deals with the Lambert/Mercator grid type (to allow processing of French data). Pre-operational runs with the new DWD ICON grid will happen in approximately a year, so by the end of next year, ICON → COSMO must be available. Code can be provided for horizontal/vertical interpolations from ICON to rotated (or not) lat-lon grids.

Item 5: HIRLAM work plan

TM stated that the first priority for HIRLAM is to get the GRIB2 IFS → HIRLAM finalised. A point was made about being able to 'piggy back' onto the ICON → COSMO code. A discussion then started about the longer term outlook for HIRLAM. However, the Soil Wetness Index parameter has been implemented into the HIRLAM adaptor.

Item 6: Met Office work plan

TG presented a summary of the work required at UKMO for D4. The interpolations need to be included, horizontal in the adaptor and the vertical interpolations in the UM-specific utilities. Focus so far has been on the global implementation. In addition UM fieldsfile only supports (rotated) lat-lon grids at the present time. Initial attempts to interpolate from other models have started with the ECMWF output. There is a need to share the vertical interpolation code between two tools, one for creating initial conditions and the other which creates lateral boundaries. Limited area model initial conditions haven't yet been attempted, and there's a need to create and test lateral boundary conditions to enable a UM LAM to start. Regarding surface fields, the equivalent of the current basic ECMWF GRIB1 conversion of soil moisture has been completed; however the SWI approach needs to be implemented. The question was asked as to what the approach to bitmap packing in GRIB2 is? (answer:) In terms of formal testing, there is a requirement to be able to restart from ECMWF (operational back-up), so there is a need to keep the existing capability. The interoperability adaptor is already an operational executable so the majority of the code is well

tested. However, it needs a better user interface. For example, it currently tries to convert all fields possible.

Item 8: Discussion

TD stated that the intention is there to implement a surface solution in the UM. **CF** explained that the situation at ALADIN is that the IFS → ISBA testing and work has been done by a Portuguese colleague. Jean-Francois Mahfouf gave a presentation to **MetFAM??**

ACTION: CF to circulate copy of Jean-Francois' presentation.

The Soil Wetness Index is roughly linear with surface fluxes. This work has been implemented in the 901 configuration, and HIRLAM have implemented it in the HARMONIE context. So, in future the tendency will be to use the ALADIN/ARPEGE surface, and there is little inclination to take the work further due to the complication, both already found and yet to be tackled. ALADIN don't see any EPS application either. The aim is to have surface analysis and cycling for ensembles. **TD** asked about testing, stating that it is difficult to beat a control in an experiment containing science changes, so trying to do it from independent data seemed like a good idea. A discussion surrounding this point followed. For example, if HARMONIE wants to run from IFS/HIRLAM fields, then a cold start from IFS HIRLAM/IFS combination soil is performed, and a 2-3 day spin-up is assumed. As a result the problem of matching the surface has never arisen. **NW?** pointed out that it is ECMWF's intention to run the surface scheme at a much higher resolution. **US** then stated the DWD position. There is an IFS to GME conversion, then a GME forecast is started from the resulting data. There is also an equivalent process for IFS to COSMO.

ACTION: US to find out what is documented about the 00UTC GME forecast run using ECMWF surface.

CF stated that an exchange of best practice would be useful here.

ACTION: ALL to exchange ideas, on request, on best practice when starting a model forecast from fields originating from another source.

A discussion about the FLake model followed. (Were there any conclusions from this??) This led to a discussion about parameters in GRIB2. [PMN: I have since seen a document containing definitions for lake specific parameters. Has everybody seen this?]

Did we come to a conclusion about what surface solution to provide, and the reasons for this??

Item 1: Maintenance plan for Interoperability

Each consortium has its own maintenance plan, and is responsible for that. This should be capable of surviving 'business as usual' processes. **TG** stated that the UM adaptor sits within the UM framework, and so will be maintained there. **US** noted that the COSMO adaptor is basically part of operations. Testing switches can be part of the annual adaptor testing routine. The aim is for the System Aspects Expert Team to become the management team for Interoperability. Model changes should be announced via the System Aspects Expert Team mailing list. A suggestion was made that a website based on wiki for maintenance and management would be useful. **TD** stated that he would like one piece of documentation. It was agreed that

each consortium should also put their documentation onto their consortia web page, where it could be accessed easily. **Did we also agree here to put the sample file documentation onto web pages?**

ACTION: ALL to put user documentation for the software onto consortia web pages.

Methods of updating documentation and informing colleagues were discussed. **AH** then highlighted the GISC project, and a conversation on this followed. **AH** confirmed that ECMWF would be happy to leave the Interoperability data portal as is and accessible after the end of the project, assuming that no additional requirements (space or maintenance) were needed.

ACTION: ALL to review what data distribution systems are exist in the consortia and see if appropriate to use for maintenance and testing adaptors.

It was agreed that we need to explicitly state what we want people to do at the end of the project in a set of recommendations. Obviously, these can only be guidelines as people cannot be forced to adopt processes, however they should be encouraged to follow them. Then the existing draft D2 deliverable document was discussed and suggestions made for modification. [PMN: Please see the revised D2 document circulated with the minutes]. It was proposed, and agreed, to put the software documentation (user guide) as an annex of the Interoperability documentation. Agreement was reaffirmed to produce test data sets annually, in time for the adaptor testing procedure which will be carried out prior to the EWGLAM/SRNWP annual conference.

Change to guidance on surface field application and to identify. Item 4 reword appropriately. What did my notes mean here? Agreed to remove the sentence "This shall be maintained on the EUMETNET Interoperability portal and in a readme file alongside sample generated standard output files" from the second bullet point of the 'software maintenance method' paragraph. Consortia can maintain the documents on their own websites.

ACTION: RN to remove "This shall be maintained ..." sentence from the D2 documentation.

Item 2: Continuation of Interoperability

TD went through the background of the EurEPS proposal (which failed last time it was presented to Assembly #REF#). It was pointed out that high resolution EPS is going to be the future strategy for many NMS's. Then the options proposed in the document 'A potential follow-on project for SRNWP Interoperability: document to facilitate discussion' were debated. Delegates were asked to explain what it would mean for them if there was no funding for continuation. All pointed out that without a formal programme it was difficult to justify spending time on the work, and almost impossible to justify travel to a meeting to discuss the work. A formal programme structure encourages focus, and enables meeting preparation etc. **NW** pointed out that perhaps this was a good reason continuation of the project, in terms of maintenance. A 'prototype' has been developed, now there is a need to do a quasi-'operational' phase. Would this give options for further research?

ACTION: ALL. Each consortium to identify one or more products they would like to have which could come from Interoperability extension.

A forecast of what will be delivered (by the end of the current project) has been covered previously in this meeting. A list of what actually is delivered will form part of the project document. Resources are a reason we haven't delivered all that was specified.

ACTION: RN to come up with a list of what we think we will deliver from the original list, and a list of what we will have failed to deliver.

It was proposed that we should highlight that coordination of GRIB2 was the major reason we failed to deliver the original specification. It was suggested that we should think about retrospectively adding a GRIB2 deliverable to the project outputs, as this was a much bigger task than was previously identified.

ACTION: RN to request feedback from EPS/DA workshop in February.

ACTION: RN to get timetable for spring STAC.

It was then highlighted that we should get feedback from the EPS/DA workshop in February with this timetable in mind.

ACTION: RN to highlight this issue to Tiziana/Chiara.

Detailed Notes from Day 3

Item 1: Summary of Day 2

RN went through summary from Day 2, and subsequent list of actions arising from that. The slides from this can be found in the accompanying file `SummaryOfDay2.pdf`.

Item 2: AOB

TD talked about the future of NWP and computing facilities – the possibility that in the near future shared resources will be being used is now a real one. The future requirements of projects like SESAR were noted. The question was raised as to whether there would be a new search for a Responsible Member (now referred to as a Coordinating Member since inception of the EIG/GIE), or whether the UK Met Office would be happy to remain. The justification is that things are being done that need to be done (e.g. GRIB2 capability) even though the costs are being totally covered. **CF** stressed the need for agreements to be renewed, which adds extra overheads. However, the general feeling is that it's good to have a bit of formalisation. **CF** highlighted that Piet Termonia will be taking over Programme Management of the ALADIN consortium. The conversation then turned to packing and compression. It was pointed out that most activities don't need full resolution. High resolution models at the grid point level contain just no skill, which is why ensembles are being used. The point was made that there should only be exchanges at the resolution that needs to be exchanged. **AH** pointed out that there had been a report to the ECMWF TAC re. packing and compression.

ACTION: AH to mail out report on packing and compression to everyone.

ECMWF have implemented second order packing, which will be in the GRIB API very soon. It is very similar to JPEG packing but cheaper. JPEG compression is very costly in operations, and performance can vary across platforms. In addition, the code cannot be controlled and comes with restrictions. The important thing to remember is that different computers require different packing strategies. The important thing is that it's all about representing data in the most appropriate way. It was decided that the final Interoperability report should contain a paragraph on packing: raise the issue, indicate current practices, highlight future possibilities, spatial compression, resolution compression, and physical compression.

The question was asked whether we should provide grid information. The answer is that each consortium should publish the grid information, for the more 'exotic' grids. **AH** pointed out that we should be using self-describing GRIB2 as the framework, as far as possible. **TD** pointed out that if you've got to create the grid yourself then you'll need an algorithm, or a piece of software, to do it.

The question was posed about putting exchange mechanisms in the report. So far what the exchange mechanisms are going to be have been deliberately left out. We could put in some options. **TD** pointed out that initially it should be bi-lateral exchange. If you then have the same request from everyone else, it would be sensible for others to pull the data rather than you pushing it. There followed a discussion about data exchange and the merits of requesting information about exchange facilities.

Then the subject of software exchange was discussed. **TD** thinks there is a software exchange mechanism in place, which has no limitations for research purposes, but will mean the software can't be used in operations for at least two years. Where is this stated? If, for example, you share and modify code then you could share copyright but there will need to be an explicit statement of copyright. Members need to be aware of issues relating to IPR for jointly shared development code. There was mention then of short proposals containing information relating to IPR issues.

AH mentioned that **RN** can send any queries regarding the INSPIRE directive and ECMWF either to him and he'll pass them on, or directly to Manuel Fuentes.

Item 3: Agree Outcome of Meeting

1. Have discussed Interoperability future activities, and have activities to follow up.
2. Have a work plan to take us up to the end of the current phase.
3. Have a list of specific actions to complete
4. **RN** to compile final project report by end of June to allow for vacation time in the summer.

Do we need another meeting before the end of the project? ECMWF are currently looking at web conferencing facilities.

The meeting then decided that a web conference would suffice, to discuss the end of project reports.

[PMN: It was decided at the 5th Assembly meeting in November 2010, that in principle all current projects under the EUMETNET forecasting umbrella would continue until the end of 2012, in order that the Roadmap drafting teams could be free to determine the best course to benefit members thereafter. This means that we have been requested to submit a continuation proposal to EUMETNET STAC in the Spring.]

Annex 1: Contingency tables

LAM → LAM

	ALADIN	COSMO	HIRLAM	UM
ALADIN				
COSMO				
HIRLAM				
UM				

Global → LAM

	ECMWF	ARPEGE	DWD ICON	UM
ALADIN				
COSMO				
HIRLAM				
UM				

Key:

black background – not applicable

grey background – intend to complete

blue background – already complete

red background – don't expect to complete by August 2011