COMMISSIE VAN DE EUROPESE GEMEENSCHAPPEN

Brussel, 22.04.1997
COM(97) 164 def.

MEDEDELING VAN DE COMMISSIE

AAN DE RAAD, HET EUROPEES PARLEMENT
EN HET ECONOMISCH EN SOCIAAL COMITE

Evaluatie van het Gemeenschappelijk Centrum voor Onderzoek 1992-1996

ADVIES

VAN DE RAAD VAN BEHEER VAN HET GEMEENSCHAPPELIJK CENTRUM VOOR ONDERZOEK OVER DE EVALUATIE VAN HET CENTRUM EN ZIJN ACTIVITEITEN

Algemeen

1. Overeenkomstig het besluit van de Commissie van 10 april 1996 tot reorganisatie van het Gemeenschappelijk Centrum voor Onderzoek zal de Raad van Beheer in het bijzonder "de evaluatie van deze (onderzoeks)programma's door "visitatiecommissies" behandelen, samengesteld uit onafhankelijke deskundigen, en hun aanbevelingen opvolgen". Aangezien momenteel de evaluatie van het vierde kaderprogramma plaatsvindt, heeft de Raad van Beheer eveneens een evaluatie opgezet die in het verlengde ligt van de in maart 1995 gepubliceerde evaluatie (COM(95)60 def.) waarin een globale analyse van de vooruitgang werd gegeven door Sir Hermann Bondi. Een en ander is in overeenstemming met artikel 7, lid 3, van de beschikkingen van de Raad inzake de specifieke programma's van het GCO voor 1995-1998.[1]

2. Ook bij dit rapport zijn er weer afzonderlijke rapporten over alle GCO-instituten gevoegd alsmede een algemene evaluatie en samenvatting van de huidige situatie en aanbevelingen voor de toekomst door prof. Juan M. Rojo van de universiteit van Complutense, Madrid en voormalig staatssecretaris voor Universiteiten en Onderzoek in Spanje.

Advies

3. De Raad van Beheer heeft de evaluatierapporten van de afzonderlijke instituten en het algemene verslag over het GCO van prof. Rojo onderzocht en stelt met voldoening vast dat de in de vorige evaluatie gesignaleerde algemene vooruitgang doorzet. De meeste aanbevelingen in het vorige rapport zijn opgevolgd en vormen nog steeds een belangrijk instrument waarvan de Raad van Beheer gebruikmaakt om de vooruitgang te beoordelen en de weg voorwaarts uit te stippelen.

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[1] OJ L361, 31.12.94, p.114 en p.132

4. De Raad van Beheer stelt vast dat in de meeste gevallen ook de gebruikers van de GCO-diensten, zowel binnen de Commissie als daarbuiten, om hun mening is gevraagd. De Raad van Beheer wijst er met het oog op de taakstelling voor toekomstige visitatiecommissies op dat, nu de ondersteuning ten behoeve van de diensten van de Commissie toeneemt, deze vorm van feedback steeds belangrijker wordt.

5. Volgens het rapport van prof. Rojo is er in de twee jaar nadat het vorige rapport is verschenen vooruitgang geboekt op het gebied van projectmanagement, kwaliteitszorg en marketing, waar de Raad van Beheer met voldoening kennis van neemt, zij het met de kanttekening die ook prof. Rojo maakt, dat verdere verbeteringen mogelijk en noodzakelijk zijn. Bovendien moeten alle maatregelen die bijdragen tot de transparantie van de GCO-activiteiten, de toegankelijkheid van het Centrum verhogen en zijn imago verbeteren, worden genomen. De Raad van Beheer stelt met voldoening vast dat dit rapport en de rapporten van de zeven visitatiecommissies een belangrijke reeks aanbevelingen bevatten die een belangrijk uitgangspunt vormen voor de toekomstige koers van het Gemeenschappelijk Centrum voor Onderzoek. De Raad van Beheer zal deze aanbevelingen positief benaderen en zoveel mogelijk opvolgen. Dit geldt ook voor de aanbeveling dat het GCO zijn activiteiten selectief moet concentreren.

6. Wederom worden in alle rapporten de problemen genoemd in verband met het personeelsbeleid, met name de procedures voor de aanwerving van eersterangswetenschappers binnen de beperkingen van de vrij starre procedures van de Commissie. Dit is momenteel een bijzonder kritieke aangelegenheid voor het GCO, aangezien veel personeelsleden de pensioengerechtigde leeftijd bereiken. De Raad van Beheer zal bij de Commissie, via de commissaris voor Onderzoek, blijven aandringen op meer flexibiliteit wat deze administratieve aspecten betreft. Alle mogelijkheden van de bestaande regels zijn opgebruikt. De Raad van Beheer wijst dan ook op de aanbeveling van prof. Rojo dat thans dringend naar nieuwe benaderingen en structuren moet worden gekeken.

7. Tenslotte neemt de Raad van Beheer met genoegen kennis van de inspanningen die de directeur-generaal en zijn medewerkers hebben geleverd om de aanbevelingen van de vorige evaluaties op te volgen met het oog op de bekwaamheid van het GCO en de vervulling van zijn taken, waaronder het concurrentievermogen van de Europese industrie. De naleving van deze aanbevelingen heeft buitengewoon gunstige en zichtbare effecten op het Gemeenschappelijk Centrum voor Onderzoek gehad. De Raad van Beheer is dan ook van plan een beroep te blijven doen op het systeem van visitatiecommissies dat een bijkomende mogelijkheid biedt om de GCO-wetenschappers met de buitenwereld te confronteren.

8. De Raad van Beheer heeft grote waardering voor het zorgvuldige en waardevolle werk van prof. Rojo en de toewijding van de voorzitter van de visitatiecommissies en al hun leden en spreekt hierbij zijn dank uit aan alle betrokkenen.

Gemeenschappelijk Centrum voor Onderzoek GCO

1992-1996

Algemene evaluatie en samenvatting van de rapporten van de Visitatiecommissies

J.M. Rojo
Universidad Complutense
Madrid
16 december 1996

INHOUD

Samenvatting

Ik heb ten zeerste de indruk dat het GCO sinds de bemoedigende analyse van Sir Hermann Bondi *meer* vooruitgang heeft geboekt. Deze gestadige ontwikkeling is de verdienste van het management van het Centrum en van de begeleiding van de Raad van Beheer. Ook dient te worden opgemerkt dat *de meeste aanbevelingen* gemaakt in de vorige evaluatie effectief zijn uitgevoerd. Ik heb er alle vertrouwen in dat ook de aanbevelingen uit de uitstekende rapporten van de huidige Visitatiecommissies een grote hulp zullen zijn voor de instituten.

Overeenkomstig de richtlijnen van de Raad werden de *doelstellingen* van het GCO toegankelijker en heeft het Centrum zich meer *opengesteld* voor de buitenwereld. Het heeft in toenemende mate activiteiten ter ondersteuning van de diensten van de Commissie en van de beleidsmaatregelen van de Unie uitgevoerd en *grote netwerken met onderzoeksinstellingen, autoriteiten en industrieën* opgezet. Het Centrum heeft vooral snel gereageerd op de oproep om zich in alle opzichten *concurrerend* op te stellen: het heeft met succes werkzaamheden voor gezamenlijke rekening in het kader van het kaderprogramma van de Unie uitgevoerd en geraakt geleidelijk meer betrokken bij joint ventures met het bedrijfsleven. Met de vernieuwing van het managementteam is een nieuwe en krachtige aanzet gegeven tot projectcontrole, kwaliteitszorg en marketing *om de zichtbaarheid* van de wetenschappelijke en technische activiteiten *te verhogen* en de activiteit van het Centrum transparanter en begrijpelijker te maken. Bovendien merkt men dat de cultuur verandert, waardoor veel medewerkers er nu van overtuigd zijn dat het GCO profijt kan trekken uit zijn *meer concurrerende* houding. Dit succesvolle beleid moet onafgebroken steun krijgen en overeenkomstig het advies van een aantal Visitatiecommissies raad ik aan het nog verder aan te moedigen door *geleidelijk voor elk instituut een adviesgroep van gebruikers* op te zetten om tot meer relevante projectopdrachten te komen en de behoeften van de gebruikers en hun ideeën over de werking van de instituten te sturen, in het bijzonder wat de overdracht betreft.

Om zijn institutionele en concurrerende onderzoeksopdracht te volbrengen, moet het GCO als partner bijzonder gekwalificeerd zijn. Het doet mij genoegen vast te stellen dat het GCO erin geslaagd is een aantal centrale expertisegebieden te behouden en streeft naar de beheersing van een aantal nieuwe. Ter ondersteuning van dit streven naar kwaliteit, stel ik voor een permanente *wetenschappelijke adviesgroep* op te richten die onder de Raad van Beheer ressorteert. Die groep zou de kwaliteit van het lopende onderzoek moeten evalueren en met name de kwalitatief hoogstaande eenheden in de instituten identificeren en zou ook advies moeten verstrekken over het verkennend onderzoek. De adviesgroep kan ook kostbare informatie verstrekken aan de Visitatiecommissies.

Hoge kwaliteit wordt tegengewerkt door ongecontroleerde diversificatie. *Het maken van een keuze* is noodzakelijk. Het GCO is namelijk op te veel gebieden actief. Voor het GCO verdient het beslist de voorkeur op een beperkt aantal gebieden een eersterangsplaats in te nemen in plaats van een partner voor algemene toepassingen met een laag profiel te zijn. De activiteiten van het GCO moeten immers in het kader van de subsidiariteit worden bekeken. Het dient dan ook tot niets in de Lid-Staten bestaande installaties te kopiëren als daarvan geen duidelijk voordeel te verwachten is. Het GCO moet tevens routinewerkzaamheden vermijden, *ook al wordt daarom verzocht door derden.*

Om te garanderen dat de positieve ontwikkeling van het GCO doorzet, moet bijzondere aandacht worden geschonken aan het *personeelsbeheer*. Wat de *personeelswerving* betreft, maak ik ernstig voorbehoud voor de toekomst. Zoals reeds in eerdere evaluaties werd vermeld, moet er opnieuw op worden gewezen dat het problemen veroorzaakt wanneer wordt getracht een duidelijk voor de werving van ambtenaren ontworpen systeem te gebruiken voor de werving van hooggekwalificeerde wetenschappers. Het systeem is veel te star en te langzaam om te voldoen aan de eisen van 1996, laat staan aan die van de volgende eeuw. Ook al kon enige verbetering worden geconstateerd, toch is een radicale hervorming noodzakelijk. Ik stel voor dringend een werkgroep samen te stellen om dit probleem aan te pakken, met inbegrip van mogelijke wijzigingen in de bestaande regelingen. Ik hoop ten zeerste dat de recente omvorming van het GCO tot een onafhankelijk directoraat-generaal ertoe kan bijdragen dat aan de specifieke eisen van een onderzoekscentrum in de EG-structuur wordt voldaan. De *mobiliteit* is een ander belangrijk aspect dat nieuw leven moet worden ingeblazen. Door het stimuleren van de tijdelijke detachering van stagiairs-wetenschappers van andere instellingen en de regelmatige aanwezigheid van onderzoekstudenten, vooral op postdoctoraal niveau, moet de constante doorstroming van ideeën naar de instituten worden aangemoedigd.

Tot slot nog een woordje over *energie*. Ik deel volledig de bezorgdheid van mijn achtbare voorganger over de achteruitgang van het onderzoek inzake kernenergie. Los van de persoonlijke of politieke houding ten opzichte van kernenergie in de Lid-Staten, moeten wij ons blijven bezighouden met nucleaire veiligheid, afvalverwerking, non-proliferatie en andere vraagstukken. Deze problemen zijn grensoverschrijdend en verdienen onze aandacht op Europees niveau. Er dient op gewezen te worden dat het GCO op een aantal gebieden van de kernenergie een grote deskundigheid bezit.

Samengevat ben ik de mening toegedaan dat het GCO momenteel op de goede weg is en dat de huidige beleidsmaatregelen bruikbaar en bevredigend zijn en, gesteund door een doeltreffend management, het Centrum reeds hebben omgevormd tot een nuttige partner van de instellingen en de industrie in Europa. Opdat deze bevredigende trend aanhoudt, moeten, ten minste wat personeelsbeheer, kwaliteitsondersteuning en keuze van onderzoeksgebieden betreft, een aantal maatregelen worden genomen, waarvoor aanbevelingen worden gegeven.

1. Inleiding

Onderzoek, technologische ontwikkeling en demonstratie (OTO) is één van de belangrijkste beleidsaspecten van het huidige Unieverdrag aangezien het in economisch volume de derde plaats inneemt. De reden voor dit hoge profiel ligt in de overtuiging dat de basisdoelstellingen van de Europese Unie (EU), met name het *industriële concurrentievermogen en de verbetering van de kwaliteit van het bestaan*, alleen op de stevige grondvesten van wetenschap en technologie kunnen worden uitgebouwd. Hoewel de EU zich voortdurend en in toenemende mate met OTO heeft beziggehouden, is de nadruk die op de verschillende gebieden of zelfs op het soort activiteiten werd gelegd voortdurend gewijzigd. Ook de rol van het Gemeenschappelijk Centrum voor Onderzoek (GCO) werd herhaaldelijk aangepast.

Als gevolg van de teruglopende belangstelling voor onderzoek op het gebied van de kernsplijting zagen de in kernenergie gespecialiseerde instellingen in de Lid-Staten zich genoodzaakt een moeizaam omschakelingsproces te ondergaan. Het GCO was daarop geen uitzondering. In feite hebben een aantal huidige specialisaties, zoals milieu en veiligheid, dezelfde doelstellingen als sommige omgeschakelde nationale nucleaire centra. Het mag dan ook geen verbazing wekken dat het GCO in het verleden vaak een defensieve strategie volgde of dat de Europese besluitvormende organen in de voorbije jaren een aantal definities hebben vastgesteld in verband met de doelstellingen van het Centrum en met de verschillende evaluatieprocedures voor de prestaties ervan. De laatste, in 1994, was de door de Raad, het Parlement en de Commissie vastgestelde 'gewijzigde rol' van het GCO. Deze nieuwe rol benadrukte onder meer dat het GCO sterker bij 'concurrerende activiteiten' moest worden betrokken, vaak in een partnerschap met bedrijven.

Hoewel deze evaluatie betrekking heeft op de periode 1992-1996 (met volledige erkenning van de vorige evaluatie voor de periode 1992-1994, het Bondi-rapport), suggereert de introductie van de bovenvermelde gewijzigde rol van het GCO halverwege die periode dat vooral de nadruk moet worden gelegd op de prestaties van het Centrum in het kader van die *gewijzigde rol*, d.w.z. in de laatste twee jaar. Dat was ook de mening van de Visitatiecommissies die de afzonderlijke instituten van het GCO bezochten en in hun rapporten vooral aandacht hadden voor de nieuwe, meer *concurrerende* activiteiten. In die rapporten wordt de positieve ontwikkeling van de prestaties van het GCO in de laatste twee jaar benadrukt, wat de eerdere verwachtingen uit de Bondi-evaluatie bevestigt.

Het belang van de afzonderlijke rapporten van de Visitatiecommissies kan niet genoeg worden benadrukt aangezien de bezoeken op een zeer deskundige en professionele wijze plaatshadden. Afgezien van een beperkte inbreng op basis van persoonlijke ontmoetingen met de directeurs en het personeel van de instituten, is het grootste deel van deze evaluatie op die rapporten gebaseerd. De structuur van mijn eigen rapport ziet er als volgt uit: in deel 2 onderstreep ik een aantal belangrijke punten uit de afzonderlijke rapporten en tracht ik gemeenschappelijke elementen te ontdekken. Daarna volgt een meer algemene bespreking van wat het GCO de laatste vijf jaar heeft bereikt (deel 3), waarbij ik rekening hou met de in de overeenkomstige besluiten van de Europese instellingen vastgestelde doelstellingen. Uitgaande van de positieve ontwikkeling van het Centrum werp ik in deel 4 een blik in de toekomst op zoek naar die O&O-problemen die het GCO doeltreffender kan aanpakken dan

de nationale laboratoria. Deel 5 tenslotte bevat een aantal conclusies en aanbevelingen. Aangezien die laatste eerder algemeen zijn, dienen zij te worden beschouwd als een aanvulling op de specifieke aanbevelingen van de Visitatiecommissies voor de afzonderlijke instituten (samengevat in bijlage II).

2. Toelichting bij de individuele instituten

De volledige rapporten van de afzonderlijke Visitatiecommissies zijn opgenomen in bijlage I. Zij omvatten een evaluatie van de activiteiten van de instituten met het oog op de in de besluiten van de Raad vastgestelde doelstellingen, alsmede een aantal specifieke aanbevelingen voor de toekomst. In dit tweede deel selecteer ik uit die rapporten enkele richtlijnen die ik verhelderend of representatief vind voor de huidige problemen.

Het Instituut voor Referentiematerialen en -metingen (IRMM):

* Het instituut lijkt een belangrijke plaats in te nemen in de EU-structuur van de sector. Indien het instituut niet bestond, zou een centrum van dit type moeten worden opgericht.

* Het instituut heeft blijkbaar een bevredigende deskundigheid en erkenning bereikt, in het bijzonder wat nucleaire referentiemetingen betreft. Het beschikt ook over speciale experimentele installaties.

* De procedures voor de boekhouding en het beheer moeten worden verbeterd en aan de speciale rol van het instituut worden aangepast.

* Het originele onderzoek mag niet worden verwaarloosd. In dat opzicht lijkt het verstandig 10% van de middelen voor verkennend onderzoek uit te trekken.

Het Transuraneninstituut (ITE):

* Naar mijn mening is dit het hoogst gekwalificeerde instituut van het GCO. Alles moet in het werk worden gesteld om die status te behouden, in het bijzonder wat de werving betreft omdat een aantal mensen binnenkort met pensioen gaat.

* Het instituut is er ook in geslaagd een aantal concurrerende activiteiten in zijn vroegere, hoofdzakelijk op onderzoek gerichte werkzaamheden te integreren.

* Vermijd in gebieden te blijven die routine worden: als dat toch het geval is, draag het werk dan liever over aan andere instellingen. De creativiteit moet op alle gebieden worden gestimuleerd (b.v. op het gebied van analyses ten behoeve van de veiligheidscontrole).

* In de twee richtingen van het verkennend onderzoek kwamen onlangs in andere Europese laboratoria een aantal vernieuwende ideeën tot stand (met name de energieversterker en de afvalverbrander). ITE moet die evalueren, aan de Commissie verslag uitbrengen en eventueel een netwerk opzetten.

Het Instituut voor Geavanceerde Materialen (IAM):

* Dit sterk geherstructureerd instituut geniet erkenning op het gebied van de hoge-temperatuurmaterialen, maar op andere gebieden is er nog ruimte voor verbetering. Er moet worden vermeden te diversificeren in gebieden die reeds voldoende worden onderzocht.

* De toekomst van het tritiumlaboratorium (ETHEL) moet worden onderzocht met het oog op de ontwikkeling van ITER en de ermee samenhangende fusieprogramma's. Er moet worden nagegaan hoe relevant deze faciliteit is ten opzichte van de faciliteiten in de Lid-Staten.

* Het feit dat er in vergelijking met vroeger minder wetenschappers worden uitgewisseld met bekende externe instellingen wekt bezorgdheid. Dit lijkt mij een kritiek probleem.

* De overdracht van kennis aan anderen lijkt toe te nemen; toch is het beter dat het instituut zich blijft bezighouden met generiek en voorbereidend onderzoek in plaats van het eigenlijke industriële onderzoek. De Visitatiecommissie is van oordeel dat werkzaamheden voor gezamenlijke rekening moeten worden aangemoedigd.

Het Instituut voor Systeemengineering, Informatica en Beveiliging (ISIS):

* Dit instituut is ontstaan uit de samenvoeging van twee vroegere instituten. Er is een nieuwe directeur aangesteld, die uiteraard nog bezig is met het definiëren van de doelstellingen en procedures. De leiding toonde een goed begrip van de problemen en een grote vastberadenheid en zal daarvoor in de toekomst worden beloond.

* De laatste tijd heeft het instituut veel moeite gedaan om samen te werken met externe onderzoeksinstellingen en met de industrie. Die concurrerende houding moet worden gestimuleerd en gesteund. Het voorstel om personeel uit te wisselen met de directoraten-generaal van de Commissie lijkt positief voor het versterken van een gebruikersgerichte benadering.

* In het algemeen is de kwaliteit bevredigend. Misschien moet het grote aantal door het instituut onderzochte materies worden afgestemd op de gebieden met het hoogste niveau van deskundigheid. Op een aantal gebieden lijkt het wenselijk het wetenschappelijk leiderschap te verbeteren.

* Het instituut beschikt over een aantal unieke installaties waarvan de prestaties op het hoogste niveau moeten worden gehandhaafd. Er wordt toegegeven dat deze installaties intensiever door externe gebruikers moeten worden aangewend.

Het Instituut voor Milieuzaken (EI):

* Het instituut lijkt op de goede weg om zowel institutionele als concurrerende activiteiten met een behoorlijk kwaliteitsniveau uit te voeren. De leiding wil er het 'leidende instituut van Europa' met een 'grote zichtbaarheid' van maken, maar moet daarbij rekening houden met de toenemende activiteiten op die gebieden op nationaal niveau en moet zijn activiteiten zeker zorgvuldig uitkiezen.

* Naast een goede managementcontrole lijkt de leiding het ontstaan van nieuwe ideeën met succes te stimuleren. Daarzonder zouden de institutionele en concurrerende activiteiten niet doeltreffend kunnen worden uitgevoerd.

* Op dit gebied zijn de institutionele activiteiten van cruciaal belang. Zo kwam het EI tot verbazingwekkende resultaten bij de vergelijking van verontreinigingsmetingen die in blinde tests door verschillende nationale referentielaboratoria werden uitgevoerd met afwijkingen van meer dan 50%. Het effect van dit werk op de uitvoering van het milieubeleid kan niet genoeg worden benadrukt.

* Ik steun volledig het voorstel van de Visitatiecommissie om de activiteiten inzake wateronderzoek en beheer van de watervoorraden tot hun volle capaciteit uit te bouwen. Samen met de vereiste wetenschappelijke kwaliteit is een onafhankelijke en neutrale referentie op dit gebied onontbeerlijk.

Het Instituut voor Ruimtevaarttoepassingen (SAI):

* Dit instituut heeft een unieke ervaring op het gebied van teledetectie en aardobservatie. Een strengere controle op de wetenschappelijke kwaliteit (het stimuleren van publicaties in vooraanstaande tijdschriften) en de deelneming aan concurrerende projecten (een betere definitie van specifieke doelstellingen en mijlpalen) zouden het instituut ten goede komen.

* Daar teledetectie algemeen van aard is en bijdraagt tot de oplossing van talrijke problemen, moet de neiging van het instituut om zich in te veel onderwerpen te specialiseren worden tegengegaan. Het verdient de voorkeur de activiteiten van het instituut te beperken tot zijn centrale expertise (teledetectie en toepassing van netwerken).

* De interdisciplinaire aanpak vereist meer samenwerking met andere instellingen, met name het Instituut Milieuzaken.

Het Instituut voor Technologische Prognose (IPTS):

* Dit nog vrij nieuwe instituut bouwt gaandeweg een stevige reputatie op bij zijn klanten en begint de nodige infrastructuur op te zetten om aan hun toekomstige behoeften te voldoen. Wegens zijn vestigingsplaats moeten de communicatie en het world-wide-web maximaal worden ontwikkeld. Het instituut moet zijn hoge kwaliteit nog aantonen en zijn volledige erkenning bereiken.

* De eerdere aanbevelingen inzake de personeelswerving voor Sevilla en de Europese Waarnemingspost voor Wetenschap en Technologie (ESTO) werden gevolgd.

* De algemene aanbevelingen over het maken van keuzes gelden nog meer voor het IPTS. Op gebieden waarop de Europese industrieën en laboratoria reeds een lange traditie hebben moet het werk niet worden aangemoedigd.

* Het instituut gebruikt zijn geografische ligging om inzake mediterrane en Noord-Afrikaanse problemen een leidende positie te bereiken. Naar mijn mening moet deze benadering nog

krachtiger worden, misschien, zoals de Visitatiecommissie aangaf, door een programma te ontwikkelen op een ander gebied dan technologie, werkgelegenheid en concurrentievermogen (TEC).

3. Algemene evaluatie van de prestaties van het GCO

In zijn rapport over de periode 1992-1994 verklaarde Sir Hermann Bondi dat 'het GCO goed op weg is op veel van zijn activiteitsgebieden een centrum van uitnemendheid' te worden. Tot mijn genoegen kan ik twee jaar later bevestigen dat er op weg naar die doelstelling aanhoudend vooruitgang is geboekt. Wanneer men de vijfjarenperiode van 1992 tot nu bekijkt, kan men zonder meer zeggen dat het GCO met succes een specifieke plaats heeft ingenomen in het Europese OTO-systeem en dat het zijn rol met een almaar grotere deskundigheid vervult.

Overeenkomstig de richtlijnen van de Raad werden de *doelstellingen* van het GCO *toegankelijker* en heeft het Centrum zich meer *opengesteld* voor de buitenwereld. Het heeft in toenemende mate activiteiten ter ondersteuning van de diensten van de Commissie en van de beleidsmaatregelen van de Unie uitgevoerd en heeft grote netwerken met onderzoeksinstellingen, autoriteiten en industrieën opgezet. Met de vernieuwing van het managementteam is een nieuwe en krachtige aanzet gegeven tot projectcontrole, kwaliteitszorg en marketing *om de zichtbaarheid* van de wetenschappelijke en technische activiteiten *te verhogen* en de activiteit van het Centrum transparanter en begrijpelijker te maken. Bovendien merkt men dat de cultuur verandert, waardoor veel medewerkers er nu van overtuigd zijn dat het GCO profijt kan trekken uit zijn *meer concurrerende* houding. Misschien is het nog te vroeg om de nieuwe taakverdeling onder de instituten te beoordelen aangezien sommige fusies en heroriënteringen pas onlangs plaatshadden, maar het is duidelijk dat de coördinatie tussen de instituten nog moet worden versterkt.

Er dient op gewezen te worden dat een commercieel gericht beheer nooit in tegenspraak kan zijn met wetenschappelijke en technologische *kwaliteit*. Er is geen sprake van overdracht als er geen significante ideeën of know-how zijn om te worden overgedragen. De nadruk mag niet uitsluitend op het aantonen van het 'nut' van een activiteit worden gelegd; om concurrerend te worden, moet aan de erkenning en de selectieve ondersteuning van de kwalitatief hoogstaande eenheden in de instituten de hoogste prioriteit worden verleend. In feite is het GCO erin geslaagd een aantal centrale expertisegebieden te behouden en streeft het naar de beheersing van een aantal nieuwe gebieden, hoewel veel aandacht moet worden geschonken aan het wervingsbeleid als men wenst dat die beloftevolle trend aanhoudt. Ook ziet het ernaar uit dat de beheerprocedures van het GCO *minder bureaucratisch* en meer transparant zijn geworden. Gelet op beide punten schenkt het voldoening dat het GCO onlangs een onafhankelijk directoraat-generaal is geworden aangezien een systeem dat duidelijk is ontworpen om administratieve diensten te leiden niet erg bruikbaar is in een OTO-centrum.

Hoewel de huidige situatie van het GCO vertrouwen inboezemt, blijven een aantal zorgpunten bestaan. Ik verwijs naar de belangrijkste door de Visitatiecommissies geconstateerde problemen, die volledig met mijn eigen ervaring overeenkomen.

1. *Personeel.* Deze aangelegenheid van gemeenschappelijk belang is beslist het *sleutelwoord* voor de toekomst van het GCO. Er moet op worden toegezien dat het grote aantal pensioneringen dat voor de komende jaren wordt verwacht, wordt gecompenseerd door zeer deskundige jongere mensen in dienst te nemen. De procedures voor de personeelswerving zijn nog allesbehalve efficiënt. De hele wervingsprocedure moet zo worden aangepast dat contracten van drie jaar kunnen worden gebruikt om de OTO-vaardigheden van toekomstige kandidaten voor tijdelijke (semi-permanente) banen te testen. Ik ben van oordeel dat alleen een algemene evaluatie tot een aanzienlijke verbetering kan leiden en raad dan ook aan daartoe een speciale werkgroep op te richten. Aangezien vaak wordt gezegd dat zeer noodzakelijke hervormingen in strijd zijn met de regelgeving van de EU, kan die werkgroep misschien adviseren een aantal van die regels voor OTO-centra te wijzigen.

2. *Uitwisseling van onderzoekers.* Deze maatregel kende vroeger veel bijval in sommige instituten, in het bijzonder omdat daardoor de deskundigheid en de opleiding van jonge onderzoekers op nieuwe gebieden worden ondersteund. Ook wordt het werken in netwerkverband erdoor vergemakkelijkt. Toch lijkt het aantal uitwisselingen erop achteruit te gaan, een trend die moet worden omgebogen.

3. *Het maken van keuzes.* Het Centrum is op te veel gebieden actief. Voor het GCO verdient het beslist de voorkeur op een beperkt aantal gebieden een eersterangsplaats in te nemen in plaats van een partner voor algemene toepassingen met een laag profiel te zijn.

4. *Beheer en boekhouding.* Sinds het vorige rapport is er enige vooruitgang geboekt (b.v. een snelle oplossing voor personeelsproblemen bij projecten voor derden). Toch zijn er nog heel wat verbeteringen nodig. Er wordt voorgesteld de algemene boekhoudkundige procedures te evalueren.

5. *Coördinatie.* Ook al is er sinds het vorige rapport verdere vooruitgang geboekt, toch is een grotere coördinatie tussen de instituten noodzakelijk. Het Directoraat Programma's lijkt over zeer weinig personeel te beschikken en moet worden onderzocht.

6. Kernenergie. Afgezien van zijn historische oorsprong is het GCO de opslagplaats voor heel wat Europese kennis op dit gebied, misschien wel het enige waarop het voor een aantal deelgebieden als echte Europese leider wordt erkend. Dit kapitaal mag geenszins worden verwaarloosd.

4. Toekomstverwachtingen

Het GCO heeft drie soorten activiteiten als opdracht: institutionele, concurrerende binnen het kaderprogramma en concurrerende daarbuiten. De positieve respons die in de onderzochte periode op deze uitdaging wordt gegeven wijst erop dat de tijd misschien rijp is voor een verdere stap waarbij de activiteiten van het GCO geleidelijk zouden worden toegespitst op die activiteiten waarin de *Europese toegevoegde waarde* volledig tot uiting komt. Met andere woorden betekent dit dat niet meer de vraag moet worden gesteld of met de infrastructuur en het personeel in het GCO iets nuttigs kan worden gedaan, maar veeleer de positiever gerichte vraag of er O&O-gebieden of -activiteiten zijn waarvoor een Europees onderzoekslaboratorium wenselijk of zelfs noodzakelijk is. De algemene OTO-

beleidsmaatregelen van de Europese Unie steunen immers op het beginsel van de subsidiariteit. Zoals algemeen bekend is, beschikken de Europese Lid-Staten over een aantal uitstekende laboratoria, zowel in hun universiteiten of nationale instellingen als in hun industrieën. Men kan zich afvragen of er op Europees niveau plaats is voor een instelling die *doelgericht onderzoek* uitvoert. Als het nut van een dergelijk centrum kan worden aangetoond, kan verder worden nagegaan of het GCO momenteel in staat is aan die eisen te voldoen.

Op basis van de conclusies van de Raad van 26 april 1994[1] kunnen drie mogelijke gebieden worden overwogen waarop het GCO werkelijk een Europese toegevoegde waarde kan bieden:

Het *eerste* gebied zou bestaan uit specifieke en moeilijke problemen waarvan de oplossing een *kritische massa* aan wetenschappelijke en technische *expertise* vergt. Die expertise zou worden aangemoedigd door briljante wetenschappers uit de verschillende Lid-Staten te integreren in eersterangseenheden met een kritische massa. Hun kennis zou in het Europese OTO-systeem doordringen via adequate netwerken en partnerschappen. Het *tweede* gebied zou het ontwikkelen, in stand houden en beheren van *grote experimentele installaties* zijn, die niet zelfstandig door de Lid-Staten kunnen worden geëxploiteerd. In het verleden zijn in Europa in het kader van de transnationale samenwerking tussen verschillende landen een aantal grote experimentele installaties opgezet of gerenoveerd. Het *derde* gebied zou bestaan uit onderzoeks- en ontwikkelingsactiviteiten waarvoor *onpartijdigheid* en *neutraliteit* noodzakelijk zijn. Het spreekt vanzelf dat die kwaliteiten geen praktisch nut zouden hebben als ze niet gepaard gingen met wetenschappelijke kwaliteit en erkenning.

Nu komt de cruciale vraag of men realistisch kan verwachten dat het GCO momenteel op die drie gebieden competent is:

- *In de eerste plaats* wordt zijn mogelijke rol van gastheer voor *expertise eenheden* geanalyseerd. Natuurlijk gaat het zowel om *wetenschappelijke* als *technische* expertise. Het bereiken van die expertise is geen gemakkelijke taak: als een instituut weinig prestige heeft, zal het moeilijk de beste wetenschappers kunnen aantrekken en bijgevolg nog verder stagneren. Men moet toegeven dat het GCO in het verleden zelden een referentiepunt is geweest, maar zoals in deel 3 is uitgelegd verbetert de situatie voortdurend. De huidige leiding is erin geslaagd het moreel en de vastberadenheid van het personeel te verbeteren, dat nu in zijn eigen mogelijkheden lijkt te geloven. Toch merkt men nog enkele bureaucratische overblijfselen; zo benadrukken sommige ambtenaren bij het beschrijven van hun werk vooral *hoe* zij iets zullen aanpakken, maar niet *wat* zij zullen doen. Nieuwe, veelbelovende ideeën moeten in alle instituten ten volle worden gesteund.

  Aangezien alle steun selectief moet zijn, zou precieze informatie over de externe evaluatie van de kwaliteit van de verschillende groepen erg nuttig zijn voor de leiding van de instituten. Ik ben van oordeel dat de Raad van Beheer (en de Visitatiecommissies voor hun periodieke evaluatie) voordeel zouden hebben bij de oprichting van een *wetenschappelijke adviesgroep*. Die zou de kwaliteit van het lopende onderzoek moeten evalueren, in het bijzonder wat de identificatie van

[1] PB nr. C 126 van 7.5.1994, blz. 1.

kwalitatief hoogstaande eenheden in de instituten betreft, en zou ook advies moeten verstrekken over het verkennend onderzoek. Men mag niet vergeten dat alleen kwalitatief hoogstaande eenheden een Europese toegevoegde waarde kunnen bieden aan hun concurrerende partnerschappen met de Europese industrieën en instellingen.

Bij het streven naar hoge kwaliteit is op een aantal gebieden verbetering wenselijk. Om een hoog niveau te handhaven, moet ervoor worden gezorgd dat de beste jonge wetenschappers solliciteren en dat een doeltreffende selectie plaatsheeft. Zowel mijn advies over personeelshervormingen als mijn aanbeveling over het maken van keuzes zijn hier van cruciaal belang. Een andere suggestie in verband met mobiliteit lijkt eveneens relevant. Het is altijd moeilijk eersterangswetenschappers of -technologen die goed geïntegreerd zijn in andere instellingen, op een permanente basis aan te trekken. Hun integratie in de GCO-groepen voor beperkte (maar niet te korte) perioden zou evenwel enorme voordelen kunnen bieden. Misschien kan de vroegere gewoonte van de instituten om externe wetenschappers te integreren verder worden uitgebouwd door de ontwikkeling van een speciaal programma waarbij gebruik wordt gemaakt van sabbatsverlof en van geschikte stimulansen om die hoog aangeschreven wetenschappers aan te trekken.

- Dan kom ik tot de *tweede* functie, het *beheer van grote installaties*, die eveneens referentiepunten voor netwerken met andere Europese instellingen kunnen worden. Er dient op gewezen te worden dat geen van de grote installaties die de laatste tijd in Europa werden opgericht, onder leiding van het GCO werden ontwikkeld. Zelfs de eerste Europese tokamak (JET), die door het kaderprogramma van de EU werd gefinancierd, werd buiten het GCO ontworpen en ontwikkeld. De positieve ontwikkeling van het GCO, waarop in dit rapport voortdurend wordt gewezen, kan de houding van de Lid-Staten in de toekomst veranderen. Er moet worden nagegaan hoe de nog bestaande hinderpalen te boven kunnen worden gekomen. Ook de nieuwe artikelen 130 K, L en N van het Unieverdrag kunnen het vervullen van deze opdracht vergemakkelijken.

- Tenslotte wens ik de functie van *onpartijdigheid* en *neutraliteit* te behandelen. Er wordt vaak gezegd dat het GCO de beleidsmaatregelen van de Unie moet ondersteunen, maar al te vaak denkt men daarbij aan routinewerk of administratief werk. Dit is beslist een verkeerde aanpak en creatief en origineel werk is hierbij onmisbaar. Dit is misschien de rol waarin het GCO de laatste tijd het duidelijkst vooruitgang heeft geboekt. Die rol moet verder worden ondersteund, maar er mag niet uit het oog worden verloren dat die steun zinloos wordt als de kwaliteit van het GCO-onderzoek tekortschiet. Een subtiel evenwicht tussen het eerste en het derde gebied is dan ook noodzakelijk.

Tenslotte, is de ontwikkeling van een onafhankelijk kennisorgaan voor wetenschappelijke en technologische prospectie van cruciaal belang om de inbreng van de verschillende Lid-Staten aan te vullen teneinde de grondslagen van de toekomstige kaderprogramma's te formuleren. De vroegere kaderprogramma's hadden vaak te lijden van een gebrek aan neutrale en erkende wetenschappelijke en technologische prospectie. Sommige programma's waren dan ook weinig meer dan een lijst van de belangen van de Lid-Staten, vaak met weinig Europese toegevoegde

waarde. Bij deze taak moet het GCO nog aan prestige en erkenning winnen, maar de voordelen kunnen enorm zijn.

5. Conclusies en aanbevelingen

Ik heb ten zeerste de indruk dat het GCO sinds de bemoedigende analyse van Sir Hermann Bondi aanzienlijke *meer* vooruitgang heeft geboekt. Deze gestadige ontwikkeling is de verdienste van het management van het Centrum en van de begeleiding van de Raad van Beheer. In het bijzonder dient te worden opgemerkt dat *de meeste aanbevelingen* gemaakt in de vorige evaluatie effectief zijn uitgevoerd.

De opdracht om op concurrerende wijze te werk te gaan en de positieve reactie op die uitdaging in de verschillende instituten had een aantal gunstige gevolgen:

- ✧ Kwaliteitscontrole (de concurrentie met de nationale teams, de noodzaak om potentiële gebruikers aan te trekken, enz.)
- ✧ Openstelling van de GCO-groepen voor de buitenwereld, bijvoorbeeld via netwerken, enz.
- ✧ Verbetering van de beheerprocedures, zoals kwaliteitszorg, projectbeheer en actieve marketing.

De eerste aanbeveling heeft dan ook betrekking op het *handhaven en steunen van de huidige beleidsmaatregelen*. Er moet evenwel op worden gewezen dat, zelfs voor het bestendigen van de huidige vooruitgang, een aantal verbeteringen noodzakelijk zijn, met name wat het personeelsbeheer betreft. Met het oog op de toekomst moet ernaar worden gestreefd van het GCO een instelling te maken die de Europese OTO-gemeenschap een reële Europese toegevoegde waarde biedt. Daarvoor zijn verdere aanpassingen noodzakelijk. Hieronder vat ik een aantal aanbevelingen samen die voortvloeien uit de analyse van de vorige punten:

a) Aanbevelingen voor specifieke acties

- Stel *met spoed* een speciale groep experts samen, met ook specialisten in de Europese wetgeving, om advies te geven op het gebied van de rechtspositie van het *personeel* en de wervingsprocedures, *met inbegrip* van mogelijke wijzigingen in bestaande regelingen.

- Ga na welke mogelijkheden er zijn om een speciaal programma op te zetten voor het opnemen van eersterangswetenschappers in de GCO-laboratoria tijdens hun sabbatsverlof, waardoor de eerdere individuele acties van de instituten kracht worden bijgezet. Zorg voor een doorlopende doorstroming van onderzoekstudenten, met name op postdoctoraal niveau, naar de instituten.

- Zet een externe *wetenschappelijke adviesgroep* op die onder de Raad van Beheer ressorteert en de kwaliteit van het lopende onderzoek evalueert, in het bijzonder om de kwalitatief hoogstaande eenheden in de instituten te identificeren, alsmede om advies te verstrekken in verband met het verkennend

onderzoek. De groep zou ook hulp kunnen bieden bij de selectie van nieuw wetenschappelijk personeel en bij uitwisselingen.

- Zet *adviesgroepen van gebruikers* op in die instituten waar zij nuttig zouden zijn (bijvoorbeeld ISIS) en breid die op basis van de opgedane ervaring uit tot alle instituten.

b) Aanbevelingen voor het algemene beleid

- Vermijd een te groot aantal onderwerpen in de instituten. Spits de aandacht eerder toe op die activiteiten die leiden tot een eersterangsstatus op een beperkt aantal gebieden.

- Leg in mededelingen over de activiteiten van het GCO de nadruk op de in de instituten van het GCO *bereikte* resultaten in plaats van op organisatorische aangelegenheden. Publiceer en verspreid regelmatig nieuws over die resultaten. Selecteer indien mogelijk die gevallen waarvoor het GCO *grote* erkenning heeft gekregen (in tegenstelling tot 'het opsommen van klanten').

- Stimuleer een omgeving waarin originele en veelbelovende ideeën kunnen ontstaan. Steun die ideeën om de mogelijkheden ervan na te gaan. Moedig de publicatie ervan in vooraanstaande tijdschriften aan om erkenning te krijgen. Zorg ervoor dat er voldoende inspanningen worden geleverd voor verkennend onderzoek.

- Vermijd routinewerkzaamheden, *ook al wordt daarom verzocht door derden.* Stop met bepaalde activiteiten en draag ze over aan andere centra wanneer ze geen Europese toegevoegde waarde meer hebben. Wees wat dat betreft evenwel voorzichtig op gebieden waarop het GCO *exclusieve* installaties heeft.

- Neem de nodige stappen om het GCO te steunen als kandidaat voor grote Europese installaties in de toekomst. Ga de mogelijkheden van de artikelen 130 K, L en N als 'drijvende kracht' na.

Een opmerking over het evaluatieproces zelf

In het algemeen lijkt het evaluatieproces zelf aan zijn oorspronkelijke doel te beantwoorden. De vorige evaluaties hebben bijgedragen tot een aanzienlijke verbetering van verschillende aspecten van het GCO-beheer. Toch kunnen een aantal aspecten nog worden verbeterd:

- De taak van de Visitatiecommissies kan worden ondersteund door een externe evaluatie van de kwaliteit van de resultaten van de instituten en door een overzicht van de beoordeling van de gebruikers wat overdracht, concurrerend partnerschap en aanverwante vraagstukken betreft. De voorgestelde groepen kunnen die leemte opvullen.

• Volgens het eerste punt van de taakstelling van de Visitatiecommissies moet de evaluatie betrekking hebben op *alle* doelstellingen van de beschikkingen van de Raad van 15 december 1994[2]. De rapporten van de Visitatiecommissies lijken evenwel nogal onevenwichtig verdeeld wat de verschillende doelstellingen betreft; zo lijkt de zesde doelstelling van het GCO, "bij te dragen tot een vermindering van de wetenschappelijke en technologische ongelijkheden tussen de Lid-Staten", geen zichtbare rol te hebben gespeeld in de evaluatie.

Dankwoord

Ik dank de Raad van Beheer en de leden van het management van het Centrum en van de Visitatiecommissies voor de zeer nuttige gesprekken die ik met hen voerde. De gedachtenwisseling met Sir Hermann Bondi over het rapport was voor mij een grote hulp. Ik dank de heren H.J. Helms en S. Lloyd voor hun waardevolle hulp bij de opstelling van dit rapport. Ook dank ik mevrouw P. Garcia de la Rasilla voor haar voortdurende hulp tijdens het evaluatieproces.

[2] PB nr. L 361 van 31.12.94, blz. 114 en blz. 132.

ANNEX I

JOINT RESEARCH CENTRE
JRC

REPORTS OF THE VISITING GROUPS TO THE JRC INSTITUTES 1996

CONTENTS

N.B. Annexes I and II mentioned in each Visiting Group report are given at the end of this overall evaluation report as Annexes III and IV, respectively

Rome, 22 November, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR REFERENCE MATERIALS AND MEASUREMENTS

A-1h

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Institute for Reference Materials and Measurements (IRMM), Geel, Belgium

I. Introduction

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 16 and 17 September, 1996 at the Institute for Reference Materials and Measurements at Geel in Belgium, reviewing its work, meeting the staff and visiting the laboratories and other installations.

The present exercise follows that performed by Visiting Groups in 1993 and 1994 and the implementation of recommendations made at that time will be an important factor to be considered.

Since that time, certain changes have occurred and the JRC has become independent from DG XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions. The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI. This action is managed by the Commission Secretariat General together with the interested Directorates General.

The particular aims and objectives of the Institute for Reference Materials and Measurements are defined as follows:

- to make available reference materials and carry out reference measurements of the highest quality and integrity,

- to respond to basic harmonisation efforts of the Commission on European level,

- to contribute to maintain the wealth and prosperity in Europe by supporting European enterprises to strengthen their international competitivity,

- to provide its share in caring for the population by cooperation in surveillance systems such as nuclear safeguards and consumer protection,

- to provide assistance and service on request from national and European institutions,

- to serve the Commission as its independent Centre of Reference with a growing potential and by consolidation of competence, directed towards becoming a cooperative European reference and standards institute in the long term,

- to provide nuclear and analytical nuclear measurements for all Commission services and in support of the European nuclear industries.

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present, which requires assessments to be made covering the past five years, it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than by a programme oriented approach.

The presently applied system of visits by teams of independent experts covering the whole spectrum of activities of each individual institute has been proven and widely accepted as the best practical method of assessing the JRC and indeed is that favoured for many other research organisations worldwide.

The present evaluation will therefore cover the period from Autumn 1993, when the last visit took place, up to the present time, and together the two reports will review the whole period in question.

II. General Observations

The Institute, both for its unique facilities as an advanced installation for sophisticated preparation of biological and environmental reference materials, combination of ultra-clean chemical laboratory and modern mass spectrometry, high energy resolution accelerators for neutron and charged particle production - LINAC and Van de Graaff and the excellent preparation of staff in these areas, operates in an almost unique situation in Europe, where such advanced activities, especially in the nuclear field, are not practised in the Member States to the extent they were ten years ago and it holds a lead position in the world in some of its specialist areas.

The Visiting Group is convinced of the need for a European institute of this type and believes the IRMM has to maintain European leadership in the field of reference materials and measurements and sustain a key role parallel to that in similar institutions in the USA and Japan.

Particular attention has to be given, therefore, to the recruitment of specialized staff, in order to maintain this role. Consideration should be given to easing the burden imposed on the Institute by some internal European Commission procedures.

During the two days spent at the IRMM a presentation of the Institute and its programmes was made by the Director. In addition, the Visiting Group had the opportunity to listen to several presentations by IRMM senior staff on the major topics of work and was able to visit a number of laboratories and facilities. The presentations were generally of good

standard evidencing the competence and the professionalism of the staff.

The Group would like to thank all those concerned.

However, as stated in the previous report of the Visiting Group (September 1994), the Group believes that two days is an insufficient period of time for reviewing the Institute and its work according to the Terms of Reference detailed in Annex II.
A few documents should be checked in detail to understand if the Institute is well managed. Moreover, it would be more useful to have a global presentation of the Institute in terms of projects (institutional, competitive, etc.) as well as the activities of units.

In visiting the Institute, particular attention was paid, therefore, to the above-mentioned report published by the Commission in Evaluation of the Joint Research Centre and its Multi-annual Programme 1992-1994, COM(95)60 final of 8 March, 1995 and the follow up of the Visiting Group Recommendations listed in document CA(95)54 of 18 August, 1995 for the JRC Board of Governors. It was felt that it was important to see how much progress had been made in following the initial recommendations.

Owing to the unique role of IRMM, the majority of the work carried out by the Institute falls within the area of institutional research and institutional support. For this work the Institute has well defined users, but not, for the majority of its activities, customers in the true sense of the word. The Visiting Group therefore missed an opportunity to verify the parameter of "the satisfaction of the customer".

Evidently with its specialised modern or modernised equipment and facilities the Institute appears rather expensive and it is not yet fully equipped for commercial activities.

The Visiting Group believes that accounting procedures should be thoroughly overhauled, preferably with the guidance of outside professionals, in order to carry out the work in the most efficient way.

III. Scientific and Technical Activities

III.1 Nuclear Physics and Measurements - NPM

The unit performs world class work that is essential in a society where nuclear power is a fact of life.

The unit is equipped with a 150 MeV linear electron accelerator and two Van de Graaff accelerators. The linear accelerator was refurbished in April 1995. In this original core activity area of the Institute, equipment and scientific staff are found to be of a level to be expected in an international institute of high repute. Some of these scientists, however, are approaching retirement age. If the Institute wishes/has to maintain leadership in this field, the recruitment policy based upon a reserve list of prior validated general applicants cannot be applied. This recruitment policy, in fact, is totally unsuited for the recruitment of specialist scientists at the highest level. For many of the posts that will become vacant in the coming five years, there are only a very few world class scientists who would be able to continue the work at the leading edge of nuclear science. The present rule, if applied to the NPM unit entails the danger of a descent into mediocrity and the recruitment of excellent scientists is mandatory for the future of the Unit and its value for the money invested.

The Director of IRMM and the Governors of the JRC should have the freedom to target the best candidates from anywhere, firstly in Europe and then in the world, and in addition to recruitment procedures, the use of the scheme of visiting scientists is recommended as it allows competences to be drawn from anywhere, on a temporary basis. The value of a continuing highly competent staff on a permanent basis should, however, not be underestimated.

The NPM's work is predominantly associated with meeting "Treaty obligations" and it is funded under specific programmes. With due respect to the Treaties, orientation towards present priorities is recommended.

It is recommended that, every five years, a critical review of the actual need against activity is carried out.

In the previous report concern was expressed about the ability of the NPM unit to meet the Council Conclusions of 26 April 1994 on the Role of the JRC, in that the JRC should pursue and reinforce its move towards a more competitive approach on the basis of a genuine customer-contractor relationship.

Attempts have been made in this direction, but a better cost accounting procedure has to be set up. In particular, the market oriented work has to be done, in finding a better compromise and encouraging collaborations with all Member States without concentrating on private power companies in a few Member States.

III.2 Stable Isotope Measurements

The Visiting Group believes that this unit has the potential to become the international centre for chemical metrology and traceability. However goals and timescales for achieving this have to be more clearly defined.

The world class work of the group involved in traceability and the associated IMEP (International **M**easurement **E**valuation **P**rogramme) work must be developed and networking through such organisations as EURACHEM, CITAC, etc., should be a fundamental part of this unit's activities.

There appears to be a need for a major improvement in the cost accounting system used, as calculation of real costs is necessary for the activity. Likewise, it is recommended that an infrastructure be set up to bring this Unit more to the attention of the potential market.

The issue of replacement of senior staff on retirement is not as critical as in the case of NPM, however, it is also necessary to ensure continuity of staff quality in this field.

III.3 Reference Materials

The Management of Reference Materials Unit (MRM) has made excellent progress in commercialising the supply of BCR (**B**ureau **C**ommunautaire de **R**éférence) certified reference materials, but in so doing has highlighted the fundamental structural weakness in both the infrastructure and the management systems needed to adopt a commercial role. It is necessary that the Commission, in requiring the JRC to adopt a more commercial approach, makes fundamental changes to the accounting and management procedures presently used.

The following highlights areas of particular concern:

a) Much of the existing stock of BCR Reference Materials has now fallen under the responsibility of the MRM unit. It is recommended by the Visiting Group that IRMM ensures that recent EC, and relevant national, regulations concerning the packaging, labelling and storage of hazardous goods and the production of Statutory Health and Safety Data Sheets are fully observed and that the Commission makes available adequate additional resources to ensure that the IRMM can observe all applicable regulations in full, now and in the future.

b) The BCR "Trademark" has significant commercial value, but has not been registered as a trademark.

c) Reference Materials sold by the IRMM are produced by contractors to the Commission, funded by the SMT (Standards, Measurements and Testing) Programme. Whilst there is an established and reasonably comprehensive quality procedure that should be followed by these contractors, there is no obvious mechanism to ensure that these procedures are followed. The MRM unit must have the responsibility for controlling the quality of all candidate reference materials, and developing with the contractors a stability testing programme. This may include acting as a sub-contractor to the main contractor. The best solution would be for the MRM unit to take over the project management of this part of the procedure from the SMT unit in Brussels.

d) The product liability status of the MRM unit is somewhat ambiguous in respect of reference materials manufactured by contractors working under the SMT Programme.

e) The excellent facilities of the sample preparation unit could be better utilised by offering custom preparation of candidate reference materials if the unit were able to easily enter into *ad hoc* commercial arrangements.

f) The accountancy procedures of the JRC are not completely suitable for an organisation involved in daily commercial transactions, as they do not allow the IRMM to manage received funds in an efficient way for this type of transaction. Unless improvements can be made to the procedures with higher efficiency the direct selling of certified reference materials by IRMM is not feasible and could be made entirely through authorised distributors.

g) The procedure followed, once the analytical work has been completed and the report drafted, appears to be very slow. This is due to the need to refer decisions to a body that is only called infrequently.

h) The replacement of certified reference materials originally produced by SMT contractors is a primary role of the MRM, yet they do not have sufficient project management officers nor a statistician to perform the administrative and statistical activities that would have been undertaken by the SMT and contractors, respectively, when the reference materials were first certified.

i) The lack of a better and more transparent accounting system including all costs: salaries of the people involved in this activity, equipment/machine hours, buildings, energy, etc., does not allow a full understanding whether the activity is a profitable one rather than playing an institutional role (i.e. paid service) for the EC Member States.

III.4 Analytical Chemistry

The activity of this unit concerns reference materials and methods, metrology, life and environmental sciences, materials analysis and the safety of products. The majority of the work falls into the nuclear area. With regard to non-nuclear activity, the only customer of the unit is the Commission. This, of course, guarantees the line of work is developed along the aims of the Institute but makes it more difficult to find a valid method for checking performance in a field where it is normally rather easy to judge competitivity. Further clarification of goals, as well as a system for evaluating the efficiency of the work, is, therefore, recommended.

The Visiting Group was very impressed by the first attempt at the application of quality criteria.

IV. Implementation of Research

IV.1 Mission

The Visiting Group judges that the stated mission for IRMM falls well inside the overall mission of the JRC. It is noted that the JRC is now an autonomous Directorate General of the Commission and it is hoped that this will open up wider possibilities for further development and implementation of the mission of the JRC and thereby that of IRMM.

IV.2 Transfer

Transfer both inwards and outwards with the outside world is generally good, however, more contacts should be made with industry. This could help to form objectives, develop management skills and facilitate technology transfer.

IV.3 Output

This was seen to take diverse forms such as data, reference materials, certificates, as well as articles in learned journals, presentations at conferences, etc. The publication of papers in journals, or posters at scientific meetings seems to be one of the important elements of assessing the performance of staff members. (Further elements are the two yearly reports which consider the full professional activities of the staff).

In the time available it was not possible to make anything but a superficial judgement of the quality of the work, but from the number of IRMM publications which are accepted by respected journals it seems that the work done is of high quality. Nevertheless, it should be checked how many publications are relevant to the same subject.
More effort towards patents is desired.

IV.4 Networking

This essential function seems to be well established, but it seems that more support could be given if the various unit managers could have more flexibility in the funding of networking activities.

IV.5 Quality

It is strongly recommended to realise, laboratory by laboratory, EN 45001 accreditation for those laboratories which work for third parties. Priority should be given to those units for which their customers require such registration. ISO 9002 certification is recommended for Reference Materials production.

An overall approach for the whole Institute according to ISO 9001 is not seen as urgent and is certainly not the most practical nor the easiest way to ensure overall quality. The magnitude of this work cannot be underestimated. When determining the scope of registration for accreditation, the involvement of other JRC units in centralized administration must not be overlooked and there may be difficulties in making sure that work done for the IRMM by other JRC sites is included in the scope of IRMM registration.

The need to secure the right calibre of senior level scientists to replace those shortly to retire has already been highlighted. The importance of this issue and the damage to the IRMM (and the JRC) which is inevitable if existing procedures are not eased, cannot be over emphasized.

Additionally, consideration should be given to retaining pensioners on a 6 month to 1 year consultancy basis, to ensure a smooth handover.

The plan to employ scientists on a 3-year non-renewable contract is a doubtful improvement, as experience with this type of appointment in U.S. universities shows that, at best, the employee is productive for only 20 to 24 months. The first six months are spent learning, 18 months working, and much of the last year in finding a new job.

IV.6 Areas of concern

The Visiting Group identified a number of areas where problems arise from the requirements of the European Commission itself. Improvements would lead to better management.

V. Executive Summary

The Visiting Group judges that the work undertaken by the Institute is of high quality. The management is professional and adequate for a research institute. The scientific staff is competent and knowledgeable. IRMM has a valuable role to play in maintaining leadership in reference measurements and reference materials. However, the Institute is clearly hampered in its work by the procedures and requirements stipulated by Community regulations. This is evident in the case of the Management of Reference Materials Unit, where commercialisation is stronger. Therefore, it could be difficult to acquire further work from third (non EU) parties. IRMM should develop as a European centre of fundamental research with fully adequate funding. Clear objectives and efficient, preferably on-line, project management are, however, necessary. These would stimulate performance, generating peer pressure on individuals and further improving value for money.

The Visiting Group welcomes the exploratory research carried out at the Institute. This is seen both as a means of exploring possible new areas of activity for the Institute and of trying out ideas for later incorporation into core activities. In order to guarantee long term developments and competence, 10% of the budget should be spent on "free" fundamental research work.

Work on nuclear measurements and data should continue, as well as work on IDMS (Isotope Dilution Mass Spectrometry).
Quality assurance criteria have to be applied for those laboratories which work for third parties, including other Commission services.

VI. Recommendations

VI.1 S&T Activities

The JRC has to continue to remain a centre of excellence, producing world class output and for this reason attention should be paid to the maintenance of a suitable level of resources, especially in the core activity.

As regards the NPM unit, it must avoid in future giving advantages, in terms of profits, to private nuclear industry in a few countries.
More effort should be concentrated on chemical metrology, but a critical review of the proposals is necessary.

It is recommended that the MRM unit become the EU centre of excellence in the preparation of biological and environmental reference materials. Big business is not expected in the reference materials area. Selling and dispatching of reference materials have to be carried out fully according to the actual laws and directives of Member States of the EU. The sample preparation area, coupled with the analytical facilities and the MRM unit provide a critical mass. However, the organisation needs to be restructured so this unit remains a true world class centre.

VI.2 Infrastructure

It is recommended that the facilities of the Institute are available, to a higher degree than at present, on a broad market and not only reserved for specific groups of researchers.

VI.3 Management

The management of JRC Institutes should have the possibility to use commercial "head hunting" agencies to target specific people and employ them on competitive terms.

Recruitment should be based on ability and if necessary, schemes should be found to attract human resources from all over the world.
The Director should have greater flexibility in selecting, promoting and removing scientific staff and the internal progress review system should be better oriented towards the needs of the Institute (efficacy and efficiency).

With the role of the JRC, as given by the Community, the need for a business like approach is even more necessary.

The accounting procedures applied by the Institute should be thoroughy overhauled, preferably with the guidance of outside professionals, and whenever possible, operational decisions delegated to unit management.

Improved accounting procedures should include all relevant parameters and also encompass depreciation of equipment Objectives should be stated in clear forms and milestones set up to mark progress defining cost and time parameters.

Selected staff from each Unit should follow a marketing course.

Roskilde, 20 November, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR TRANSURANIUM ELEMENTS

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Institute for Transuranium Elements, Karlsruhe, Germany

I. INTRODUCTION

1. A group of scientists and industrialists experienced in various aspects of nuclear fuel and actinide research and development (R&D) and among whom were three representing customers, was invited by the Board of Governors of the Joint Research Centre (JRC) to evaluate the work of the JRC's Institute for Transuranium Elements (ITE) in Karlsruhe, Germany. Members (see Annex I) visited the Institute on 21 - 23 October, 1996 and assessed the Institute and its activities on the basis of the Terms of Reference set out in Annex II.

2. The visit comprised a presentation of the Institute and its programmes by the Director and presentations by unit heads on the following activities:

   A: Institutional Research in Fuel Cycle Safety
   B: Institutional Scientific and Technical Support Activities
   C: Competitive Activities under the Framework Programme
   D: Competitive Activities outside the Framework Programme.

3. Discussions were held with staff responsible for the organisation, finance and management of the Institute; future scientific perspectives were examined and a number of laboratories were visited.

4. The following report is, in its structure, based on the report of the February 1994 Visiting Group[1] and refers particularly to the implementation of the recommendations contained in that report.

II. ACTIVITIES AT ITE

1. The Visiting Group noted that the structure of the JRC's, and thereby the ITE's, 1995-1998 programme differs from that of the former 1992-1994 period. The specific programmes under the Framework Programme now comprise both research and scientific-technical support activities, plus exploratory research. The competitive activities are not alone work for outside third parties, but also participation in the Community shared-cost action programmes and Community programmes outside the Framework Programme.

2. The ITE's programme and projects during the 1995-1998 programme period are distributed as follows:

   - Specific Programmes
     - Basic Actinides Research
     - Safety of Nuclear Fuels
     - Mitigation of Long Lived Actinides and Fission Products

1. *Evaluation of the Joint Research Centre and its Multi-annual Research Programme 1992-1994, COM(95)60 final, 08.03.1995, pp. 63-78*

- Spent Fuel Characterisation in view of long term storage
- Safeguards Research and Development
- Scientific-technical Support on Safeguards for DG XVII (Euratom Safeguards Directorate General), including detection of illicit nuclear materials and support on Safeguards for Directorate General I (for the IAEA)
- Competitive Activities
- Exploratory Research

III. SPECIFIC PROGRAMMES

Institutional Research

1. *Basic Actinides Research*

Basic Actinides Research with the objective of performing experimental and theoretical studies of the solid state and physico-chemical properties of actinides and actinide compounds, elucidating their electronic structure and its effect on their behaviour under conditions of technological relevance.

The new user laboratory is welcomed and all efforts should be made to facilitate access. It is an excellent training ground for young scientists with a scope for increased international collaboration and output in the form of scientific publications.

This is an absolute core activity for the ITE. The Institute has, for many years, gained the position of the leading laboratory in Europe in this field, and that should also be maintained in the future as basic knowledge on actinides is essential for a proper understanding of the safety of the nuclear fuel cycle and reactor safety.

2. *Safety of Nuclear Fuels*

Here the research contributes to improvements in nuclear safety by studying phenomena which occur in light water reactor fuel rods at extended times of operation and which may endanger the integrity of fuel rods, and by improving fuel fabrication technologies from the safety point of view.

The Visiting Group notes that ITE has unique equipment with demonstrated capability to perform structural investigations and basic studies to determine the safety limits of Light Water Reactor fuel. Third Party Work in that direction should be encouraged, whereas institutional research may be more limited.

Further development of high temperature measurement techniques applicable to irradiated fuel should continue as institutional research, but for a limited period.

Fuel performance code development should be seen primarily as a tool to support nuclear fuels safety investigations.

3. *Mitigation of Long Lived Actinides*

Mitigation of Long Lived Actinides and Fission products, where the research aims to minimise secondary actinides and other radionuclides with long half-lives in the nuclear fuel cycle.

This useful research with selected studies is based on long experience at ITE and should continue at its present level.

4. *Spent Fuel Characterisation*

Spent Fuel Characterisation in View of Long Term Storage has as its objectives to characterise unprocessed spent fuel with respect to its behaviour under long-term storage conditions, to determine its radiotoxic potential and to investigate the leaching of this waste form, under realistic conditions.

The Visiting Group agrees with the research, for which it sees a continuing need.

5. *Safeguards R&D*

Safeguards R&D is strategic research in an area where the JRC is responding to a Treaty requirement. The rather limited research assigned to ITE is concerned with analytical measurement techniques, including the establishment of methods for environmental monitoring. It is discussed further below.

6. *Radionuclides for medical applications*

This activity forms part of the objectives of the specific programme 1995-1998 as institutional research. The highly specialized capability of the Institute has been fruitfully utilized to provide specific nuclear isotopes for medical and other non-nuclear applications. A good example is the Institute's collaboration with the medical community in the clinical trials of α-immunotherapy for certain types of cancer. This is an effective way for the Institute to contribute to research in other areas. However, once the need for specific nuclear isotopes becomes routine, the Institute needs to concern itself with how to transfer the technology so that the research mission is not threatened by more routine production requirements.

7. *Exploratory Research*

The Visiting Group welcomes the exploratory research carried out at the ITE. This research should, however, be performed on a theoretical level, as long as there is no manifest expression of interest.

Exploratory research is being carried out in two directions:

- the theoretical development of innovative fission concepts like, e.g., the use of subcritical fission assembly with external neutron source;

- the analysis of different options to dispose of excess plutonium like, e.g., particle fuel in gas reactors. Knowing that the new fuel type needs probably about two decades before being introduced on an industrial scale, this programme arouses some controversial discussion.

Institutional Support

The JRC in general, and the ITE in particular, has an important activity in providing scientific-technical support to the implementation of nuclear safeguards as required by the Euratom Treaty, thus to the Safeguards Directorate General (DG XVII) and to the IAEA in the framework of the Non-Proliferation Treaty and the corresponding agreements with EU Member States.

At ITE the institutional support services committed to safeguards are primarily in the form of analytical services provided to the EURATOM Inspectorate (DG XVII). These services are in transition from a system

where samples are transported to the Institute for analysis to a system where a significant portion of the analyses are carried out on-site. The establishment and continuous staffing of on-site analysis laboratories (at Sellafield and Cap de la Hague) is a cost-effective approach to safeguarding large through-put reprocessing facilities. However, it is a challenging assignment for both the technical and management staff of ITE that, among other things, will require a very disciplined application of quality assurance principles.

The collection and analysis of environmental samples has been demonstrated to be a very powerful tool for strengthened safeguards. Both the IAEA and EURATOM Inspectorate are proceeding to the routine implementation of environmental sampling as a means to detect undeclared nuclear materials and activities. Implementation requires the existence of ultra-sensitive analytical methods that can detect and characterize nuclear material which may be present in a sample in femtogram (10^{-15} g) quantities. The IAEA does not have the capability to do most of these analyses and has proceeded to develop a network of analytical laboratories around the world that provide a whole suite of analytical methods. The IAEA places a great importance on the efforts at ITE to establish a clean laboratory for handling environmental samples and the developing capability to do individual particle analysis. This capability is important to EURATOM and Community Member States for their own needs but, for the IAEA, the developing capability at ITE not only provides needed capability and capacity to the network, but it also provides a necessary political balance. This work is a vital ingredient in the continuing evolution of the non-proliferation regime and it needs continued emphasis.

Safeguards R&D is very limited at the present time, representing less than 3% of the institutional budget. This investment seems inconsistent with the effort committed to the routine analysis of safeguards samples, which amounts to 30% of the institutional budget.

An effort needs to be made to improve this ratio, both in terms of improved analytical methods and in identifying new areas where the unique capabilities of ITE can contribute to more cost-effective safeguards.

The analytical capabilities of the Institute in support of the forensic analysis of illegal or vagabonding nuclear material goes alongside the safeguards activities and is a relatively modest, but extremely important undertaking. In the view of the Visiting Group, Institute management has given this work a high priority and should be encouraged to maintain a capability to respond to requests as the need arises.

IV. COMPETITIVE ACTIVITIES

Particular attention was given to ITE's activities in Work for Third Parties and in the competitive field, Competitive Activities (shared cost actions, other Community Programmes), where the goals set by the Council for 1995-1998 seem to be more than met.

The Visiting Group feels that it is wise to continue in this direction (foreseeing future budget restraints in basic fields) and as, for the time being, basic research does not seem to be negatively affected.

The competitive activities also add a welcome additional opportunity for collaboration with industry, national research centres and universities.

V. QUALITY MANAGEMENT (QM)

The Group was informed about the QM activities and appreciates the standard already achieved. The way QM is implemented demonstrates that the driving force has been on immediate demands from customers, especially in areas of safeguards and post-irradiation examination of fuel rods.

The consolidation of a number of specific QM plans to one quality management system for the whole Institute may increase efficiency and also improve the competitiveness of the Institute for third party work. The introduction of such a complete system will, however, require a good QM understanding, especially from the scientific staff and the Group, therefore, fully supports the Institute's support of a step-wise approach with a certification of the quality management system in at least one area in 1997.

The Group also recommends the Institute's proposal to achieve the ISO 90001 certificate and to consider accreditation according to EN 45001 or similar. It is the Group's opinion that accreditation should be aimed for, in due time, in order to demonstrate the institutional competence of the Institute and to fulfill demands from markets, including licensing authorities.

The step-wise approach to certification and accreditation is therefore reasonable and recommended by theVisiting Group.

VI. COLLABORATION

The Group took notice of the effective international collaboration in practically all research areas of the Institute, either with other research organizations or with industry.

The following types of collaboration are at the moment either limited or non-existent:

- collaboration with other institutes of the JRC;
- exchange of scientists/technicians with other oganizations via temporary secondments of ITE staff.

The Visiting Group sees possibilities for fruitful, wider collaboration with other JRC institutes, notably the Institute for Advanced Materials (Petten and Ispra). Temporary secondments of ITE staff to national bodies may consolidate existing collaborations or lead to new ones. Participation in competitive activities may be useful to this end.

VII. ORGANIZATIONAL MATTERS

As for the discussions on the scientific aspects of the ITE activities, the Visiting Group acknowledges with pleasure the discussions and clear information provided on organisational, financial and managerial aspects of the Institute.

The salient points discussed were:

1. The Group noted the objective of ITE to conform, by mid 1997, to the Radiation Protection Ordinance of German law and that in view of the renewal of the nuclear operating licence, at the latest on 31st October, 1997.

2. The Group enquired about the direct expenses of the ITE during 1995. For a total institutional budget of 31.4 MECU (without competitive income) the staff expenses amounted to 15.3 MECU; technical services, health physics/physical protection, administration and overheads were in total 12.6 MECU; institutional support 1.1 MECU and Fuel Cycle Safety research 2.4 MECU. Of the latter there was an extraordinary expenditure on waste disposal, while 1 MECU was expended on functioning of the laboratories and new acquisition of scientific equipment.

   The ITE management expressed the need for new competitive activities to maintain that acquisition level. The Visiting Group shared that view.

3. The Group took notice of the age distribution of the high level scientists and of the ITE management staff. A large number of people (70% at the managerial level) are going to retire within 5 years.

4. The Visiting Group expressed some concern about the efficiency of the coming scientific staff under the new scheme of non-renewable 3 year contracts.

5. The project/programme management system at the Institute confirmed its good working and helped:

   - to educate young scientists in the management of their own activities;

   - to cope with a still increasing number of smaller projects. It was reported that the Institute, at present, manages around 50 projects.

VIII. FOLLOW UP OF THE RECOMMENDATIONS OF THE 1994 VISITING GROUP

8 recommendations were given by the 1994 Visiting Group and the follow-up of these recommendations was discussed in-depth between the Group and the management of the Institute. The Group noted with satisfaction that most of the recommendations have been followed.

The following were especially noted:

(i) the effort to establish a user facility for European scientists in the area of actinide research,

(ii) the increased effort to introduce results from Third Party Work into the institutional research, and

(iii) the contribution of the Institute to the establishment of on-site laboratories for analysis of samples taken by safeguards inspectors.

The recommendations of the 1994 Visiting Group regarding flexibility in the distribution of personnel between units have been followed to a certain extent by improving the coordination between the units. It is, however, the Group's opinion that more could be done regarding this point.

As regards the recommendation that the work at the Institute could be further disseminated by further increasing the number of post-graduates and post-doctoral fellows in the Institute, this has not led to significant changes. On the contrary, a certain decrease has been noted which, according to the management, reflects the termination of the Human Capital and Mobility theme of the JRC specific programme in 1994.

This point will be further addressed in the recommendations of the present report.

IX. RECOMMENDATIONS

- As a general observation the Visiting Group confirms the high international position of ITE in its field of activities proven by the extensive scientific collaboration with research centres and universities world-wide and by the amount of applied work executed by it for paying customers in Europe and Japan.

  The Institute should be allowed to maintain this position, which is essentially based on the human resources available. The Institute is facing the almost simultaneous retirement of several leading scientists.

  Their replacement with equally highly qualified personnel should be given the highest priority.

  Arrangements should be made for a smooth transfer of know-how by early appointments or alternatively, by employment of pensioners for a limited period.

- As a specific observation, the Group confirms that the ITE has a world-wide reputation in the field of basic actinide research and it is recommended that this position should be maintained. An important initiative in this area has been the establishment of a user's laboratory for actinide research and it is recommended that this initiative is followed up by steps to facilitate access to the laboratory and to introduce newcomers into the complex field of actinide research and the related safety issues.

- As another specific observation the Group confirms the extensive contribution of ITE to the implementation of nuclear safeguards, especially in the form of analytical services. The Group notes that the safeguards research at ITE is very limited and it recommends a strengthening in order to ensure the development of improved and more cost-effective analytical methods to the benefit of later routine safeguards analyses.

- With regard to human resources, it is recommended that ITE should draw together in an optimal fashion all available competencies in the Institute, for example, when organising large projects involving more than one unit. ITE should also let management at all levels profit from the project management system of the Institute, and from an improved transparency of the Institute systems for cost accounting.

- With regard to new staff it is recommended that the Institute should be allowed to follow an early planning and the necessary flexibility in recruitment porocedures for the new concept of 3-year non-renewable contracts for staff employment and that adequate arrangements be maintained to continue to host young scientific fellows, including Ph.D students, at the Institute.

  With regard to the concept of 3-year contracts ITE should try to benefit most by careful planning of the activities of the new staff in the contract period foreseen.

  The Group believes that in some highly specialised research areas of the ITE, 3 year work periods will be too short.

- Concerning management issues the Group recommends that the Institute should continue the necessary efforts with adequate resources in order to maintain the existing nuclear authorizations: this is a *sine qua non* condition for the perenniality of ITE.

- In the important area of certification and accreditation of the activities the Group suggested a stepwise approach.

Paris, 26 November, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR ADVANCED MATERIALS

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Institute for Advanced Materials (IAM) at Petten, The Netherlands and at Ispra, Italy

I. Introduction

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 17 and 18 September, 1996 at the Institute for Advanced Materials in Petten, The Netherlands and the 14 and 15 October, 1996 at the Institute's location in Ispra, Italy, reviewing its work, meeting the staff and visiting the laboratories and other installations.

The present exercise follows that performed by Visiting Groups in 1993 and the implementation of recommendations made at that time will be an important factor to be considered.

Since that time, certain changes have occurred and the JRC has become independent from DG XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions. The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI.

The particular objectives of the Institute for Advanced Materials are defined as follows:

- to conduct basic and technological research on advanced industrial materials;
- to conduct prenormative research in engineering materials to contribute in European industrial and safety standards;
- to validate non-destructive methods for checking the integrity of large critical industrial plants and components;
- to stimulate the industrial application of advanced materials with industrial interests;

- to integrate the fragmented research and resources in European institutions through networks running projects on critical industrial plant components;
- to improve the dissemination of information on materials and structural aspects by networking schemes, in particular towards Small and Medium sized Enterprises (SME's).

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present, which requires assessments to be made covering the past five years, it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than by a programme oriented approach.

The presently applied system of visits by teams of independent experts covering the whole spectrum of activities of each individual institute has been proven and widely accepted as the best practical method of assessing the JRC and indeed is that favoured for many other research organisations worldwide.

The present evaluation will therefore cover the period from Autumn 1993, when the last visits took place, up to the present time, and together the two reports will review the whole period in question.

II. General Observations

In July 1995 a new Director was appointed to lead the Institute and in January 1996, in a JRC reorganization, the activity on solar energy and tritium handling laboratory, both in Ispra, were transferred to the IAM from the former Institute for Systems, Engineering and Informatics and from the former Institute for Safety Technology, respectively. Furthermore, a simplification of the Institute's internal structure was carried out in September 1996, to better correlate unit tasks and competence, to simplify management, improve efficiency, to respond better to today's situation and prepare for the future.

In evaluating the Institute, the Visiting Group was particularly interested to explore the effect of these and other changes which have occurred since the last review in 1993, especially in the light of the recommendations made by the Visiting Group at that time. The status of these recommendations, which were systematically followed-up, was reported to the JRC Board of Governors in mid-1995 in which nine of the fourteen recommendations had been completed and one, the transfer of non-destructive testing staff, had to be delayed due to customer requirements and will be completed by the end of 1996. Of the four other recommendations, Commission rules limit directors' authority, particularly where recruitment procedures are concerned. The adoption of a plan to install a simplified procedure for short three year contracts will hopefully bring some benefits in that respect. Mobility of "permanent" staff is another much debated issue and limited by family and working practices in the JRC; further incentives should be sought to improve both temporary and longer term mobility. JRC-IAM is now a source of advice and information on advanced materials and their performance in the field and is a collaborator with the Institute for Prospective Technological Studies in this respect. Finally, in accordance with the recommendation, an important increase in the amount of computer modelling is noted with satisfaction in all areas of the Institute's research activities.

III. Scientific and Technical Activities

As a result of the reorganization and reassignment of activities at the beginning of September 1996, the Institute is at present organized into the following functional units based on scientific or technical activities:

- Materials Engineering	PETTEN
- Surface Engineering	ISPRA
- Structural Component Integrity	PETTEN
- Structural Materials and Tritium Technology	ISPRA
- Energy Systems Testing	ISPRA
- Cyclotron	ISPRA
- Testing, Analysis and Mechanical Engineering	PETTEN
- High Flux Reactor*	PETTEN

III.1 Materials Engineering

The Visiting Group noted with approval the significant growth of networking in this area since the last visit. It was apparent that considerable effort had been made to the development of modelling and towards maximising responsiveness to the needs of the end-user. It is in the materials engineering area that the Institute's most recognized and successful core-competencies are to be found at the present time. Areas of mechanical properties and complex corrosion continued to be of great importance in practical large-scale and in environment sensitive applications in metallic, ceramic and composite materials, with considerable demand for investigations from third party clients. However, where research on processes for the improvement of composite materials is concerned the Group warns against straying too far from the development of coating techniques into the field of process development, an area more appropriate to the industrial sector. It is recognised that work in this area of interfaces has already led to a number of patents and that some of the activities relate to Brite-Euram or EUREKA projects where further work is evidently justified. Interface engineering has largely developed since the last review and is now providing some useful and challenging results and the characterisation of composite materials still requires much work.

The Visiting Group noted that experimental work on the Marangoni effect had reached a successful conclusion and that applications could now be studied using modelling techniques. The high-power laser should be made available to the workshops for general use if found to be suitable.

The proposed venture into the area of materials recycling and environmental considerations raises issues of some concern and may be an appropriate matter for future activities. However, a cautious approach is advised; there being quite some activity in the area already and a careful appraisal of the value of a contribution at the present time should be made before beginning.

* *The High Flux Reactor (HFR) is not comprised in the 4th Framework Programme and is not reviewed in this report. It is customer driven and has a separate review mechanism.*

The Visiting Group considered that the High Temperature Materials Data Bank was now providing an efficient client service and that the part played by Institute scientists in evaluating data and the interactive operation with other important European research centres was providing a unique facility. It was, however, important to avoid a situation where mundane operational or IT jobs were being carried out by skilled research staff and the opportunity of outsourcing such tasks should be constantly borne in mind to maximise the materials orientation. The achievement was recognised and the unit is encouraged to extend its activities to encompass other areas as is envisaged.

There was good evidence in several sectors in the Materials Engineering Unit of some hard managerial decisions having been taken, in view of priorities and available resources.

III.2 Surface Engineering

This activity area was in its infancy at the last visit in 1993. Today, the equipment has been commissioned and experimental work is in progress. Tasks are now more clearly defined and are carried on in three sectors dealing with plasma assisted chemical vapour deposition, thick films and thin films respectively.

Plasma Assisted Chemical Vapour Deposition (PACVD) is being extensively studied at Ispra and the techniques developed are being shown to have a large range of potential industrial applications. The sector collaborates in the *IPACERC* on helicopter turbines, *INBORN* on boron nitride and titanium carbide films for optical use, *CERCODERM* on ceramic coatings for dental application and *HALU* on hard coatings with lubricant dispersion. The first project is a EUREKA one and the three others are under BRITE/EURAM. There is also a Brite/Euram proposal on turbine blade coatings and the unit is operating a network "TEMPUS" as part of the COPERNICUS network. This is obviously an active area in which the Institute is playing a leading role in a very promising field and until full industrialisation of this group of techniques is achieved, the Visiting Group sees a very useful future for the activity. In concentrating the surface engineering activities in Ispra, the unit has recently received staff and equipment from Petten.

Thick film research includes an activity on biomedical applications in which surface modification techniques are applied to prosthetic joint surfaces to improve tribological properties, to improve adhesion of implants and on the adhesion of glass-ceramic coatings to titanium alloys as a substitute for gold or noble metal alloys in orthodontics. The work is carried out in association with a network of hospitals as a concerted action. The area is considered to show some promise as an area for future development, but in which standardisation is lacking, but attention must be paid to the activities of manufacturers. Other thick film activities concern the improvement of land-based gas turbine blade protective coatings to meet higher temperature service conditions. The work is a result of a EUR Directive on increasing power generator efficiency to greater than 50% and is thus of considerable importance to manufacturers and operators.

The Thin Film sector is doing original work on the synthesis of high hardness coatings using various techniques and their characterisation. Systems under exploration are B-N-C, where diamond-like properties are encountered, in collaboration with five other European research organisations, low friction coefficient Ti-B-N based hard coatings for dry machining of materials and possible substitutes for conventional zinc coatings, Brite/Euram Shared Cost Actions exist for the latter two subjects, but such research should remain generic. The Visiting Group

was impressed by the characterisation laboratory which is particularly well equipped and with the expertise shown by those working there.

III.3 Structural Component Integrity (SCI)

Five important European networks covering various aspects of structural integrity and inspection in both nuclear and non-nuclear environments had been set up and SCI is the operating agent to ensure their impartial functioning. Thus the Unit has a key role in managing the input needed to set up structural integrity codes of practice and standards. Development appeared satisfactory.

The Visiting Group advises that all the more important networks should be critically examined for their contribution to European technology. Subsidiarity in relation to other international or national networks is an important consideration here. In view of the more specific safety requirements and engineering codes of practice applied to nuclear applications and to the wider range of needs met with in other industries, it is suggested that networks serving these different categories should be kept separate.

With reference to the European Network for Evaluating Steel Components (NESC), the Group felt concerned that full participation by US or Japanese interests could injure the European competitive position. Perhaps some form of associate membership with limited access to data of possible industrial sensitivity could be envisaged.

It was recognised by the Visiting Group that since the 1993 evaluation, the work of the Non-Destructive Evaluation unit had been considerably consolidated with a high standard of equipment and experienced staff. It was noted, however, that the recommendation to move all unit staff to Petten would only be complete at the end of the present year. It was understood that the delay had been caused by pressure from local customers to complete certain work before relocating the whole unit.

It was felt that after the move was completed, a more research oriented approach could bring useful benefits and in that connection, the Visiting Group welcomed the work on ageing of materials which is a particularly important issue and brings a scientific activity to the more technological side of the unit.

The Institute's European Networks Advanced Information Systems (ENAIS) now has a web site on INTERNET and is engaged in making available advanced data handling and transformation facilities in the NDE field and maintaining an information network in the area. A European Network on Structural Integrity information and technology Transfer (ENSIT) is being set up and these information activities will be followed by the Group with interest. However, care must be exercised in avoiding duplication of services and some coordination at Institute level is desirable. As remarked above, outsourcing should be used wherever feasible and recruitment of staff should concentrate on securing materials competencies wherever possible.

Component integrity and testing is helping to provide the link between the materials specimen and engineering component scales. The whole area of model development and validation for component behaviour prediction is of considerable industrial importance and the difficult experimental techniques developed are believed to be unique. In view of this, the strong emphasis placed on the use and management of networking is encouraged.

III.4 Structural Materials and Tritium Technology

The research activities performed by this unit are related mainly to the EU Thermonuclear Fusion programme and indeed, this part of the programme was described as being similar to an "Association", the form adopted by research laboratories performing tasks under the EU Fusion Research programme in Member States. With present doubts about the ITER (International Thermonuclear Experimental Reactor) project the Visiting Group finds it difficult to discuss the future relevance of these activities. It may be wise, therefore, to examine the experimental mechanics and microstructural modelling part of the activity in relation to work performed elsewhere in the Institute. Much of the hydrogen interaction work and that on fluid separation and catalysis has high technological relevance to other fields of application. Therefore, the Visiting Group was pleased to note the efforts already undertaken in the units to create interest in alternative applications for their developments. Spin-off from such advanced R&D is in any case highly desirable.

The Experimental Mechanics and Microstructural modelling sector appeared to be well equipped for its tasks and the brittle material characterisation work on high purity chromium and its alloys was noted as was that on silicon carbide fibre/silicon carbide matrix composite materials. A network on photothermal hardness measurements has been set up and the method seems promising for some industrial applications; proposals are being prepared for a Brite/Euram thematic network and for a research project and two proposals on other subjects have been put forward and one on nuclear safety is in execution. Such proposals are strongly encouraged by the Group.

The Hydrogen Materials interaction sector develops coatings on structural materials for fusion reactor first wall, diverter and breeding blanket to reduce the permeation of hydrogen isotopes. Good results have been obtained using aluminide coatings on steels and silicon carbide fibre/silicon carbide matrix composite materials and spin-off into aerospace and petrochemicals sectors is being investigated. The Group hopes that alternative applications for this know-how will prove possible.

Work on Fluid Separation and Catalysis has made important original contributions to tritium handling technology and in this area, technology transfer to other applications would appear to be particularly promising.

The European Tritium Handling Laboratory (ETHEL) is a large facility, unique in the quantities of tritium that can be managed and in the size of components that can be tested. Such a facility will be essential when the new generation of fusion machines is undertaken. Years of careful preparation and testing have demonstrated the safety of the installation and a licence to operate at designed levels of tritium is expected shortly from the national authorities concerned. It is evident that the standards achieved are of a quality not encountered elsewhere.

III.5 Energy Systems Testing

This unit comprises two sectors, the European Solar Test Installation (ESTI) and Energy Systems Analysis and Support (ESAS). The Unit, although somewhat remote from the Institute's other core activities, was seen to be very well organized and managed and rendering a worldwide service to major photovoltaic module manufacturers and installers as well as providing consultancy and monitoring support to research and demonstration projects in the energy sector.

The ESTI applied for accreditation under EN 45001 "General Requirements of Test Laboratories" at the end of 1995, was audited in June 1996 and was informed by the "Electrical Test" Commission of *COFRAC* of a successful outcome in September. The laboratory also undertakes R&D into various aspects of photovoltaic technology and has sold 600 irradiance sensors for the validation and intercomparison of photovoltaic systems throughout the world; an improved device is under development. The laboratory also provides PV module approval to international standards IEC 1215 and calibrates reference devices to IEC 904.

The Visiting Group was also presented with selected projects from ESAS including monitoring services, Demand Side Management services and participation in the development of three databases in support of Directorate General XVII (Energy). Other actions for DG XVII include setting up a laboratory for measuring electricity consumption and harmonic distortion in office appliances, the creation of climatic severity indicators, criteria for standards in the solar thermal energy sector, the integration of solar energy in buildings and many others besides. The sector is also concerned with energy project evaluation and participates in a number of shared cost actions. The sector also provides technical scientific and administrative support to the Ispra ECOCENTRE project. This is a pilot project for the energetic and ecological modernisation of ageing research centres with future application to other sites. The Visiting Group considered the extensive portfolio of work for other Directorates General and outside clients and successful SCA participation as evidence of excellence, efficiency and acceptance of the central role of this unit.

III.6 Cyclotron

At the last visit in 1993 it was seen that utilisation of the cyclotron had fallen to a low level and that there was very little interest from outside customers. The Visiting Group is pleased to report that the situation has been reversed by persistent efforts by the unit's staff and management and that in 1996 44% of the 1,580 Mio ecu costs were derived from competitive sources, the third party contract share being 34.8%. The predicted figures for 1997 are 51% and 2,150 Mio ecu respectively with assured third party contracts providing 44%.

The facility's main activities centre around two principal lines. The first, surface performance studies using thin layer activation (TLA) techniques for wear testing for industrial applications and biomaterial development. TLA is also applied to a wide range of corrosion problems and includes an engine test facility is under construction in collaboration with the automobile industry. Radioisotope production is the second line and includes isotopes for environmental studies such as Pd, PT, and Rh release from exhaust gas catalysers and short half-life isotopes for biomedical purposes in the region. Both lines are expanding at the present time and the cyclotron is proving to be a very useful tool.

III.7 Testing, Analysis and Mechanical Engineering

This group of activities provides technical services for Institute units engaged in research and development and success or failure is reflected in that of the user units.

III.8 High Flux Reactor

(Not reported here). The Institute also makes some use of the HFR for analytical work such as neutron scattering and for irradiation creep,

creep/fatigue and in-pile thermal fatigue irradiations for thermonuclear fusion materials research.

IV. Implementation of Research

IV.1 Mission

The Institute's mission is to contribute through knowledge on advanced and conventional materials to enhancing the technical and scientific infrastructure of Europe and thereby its industrial competitiveness and citizen welfare; mainly in the energy, transport, environment, life science, manufacturing and nuclear sectors.

The Visiting Group sees that the Institute fills an essential place at European Union level, somewhat akin to that of the National Institute for Science and Technology (NIST) in the US and others elsewhere. The field of materials is a generic one, with implications common to most human activities, industrial as well as social in which rapidly changing conditions are generating fresh requirements, which are demanding a steady stream of new materials or novel conditions of application for existing ones. Pre-normalisation, characterisation and the supply of reliable information, together with the interpretation of the scientists' results and their translation into models usable by the engineer and manufacturer, requires collaboration on an international scale. We believe that this institute goes some way towards fulfilling this need in the EU context within its area of competence.

Management and staff with whom the Visiting Group had direct contact, gave the impression that this mission was understood and accepted. At a more detailed and practical level, however, the acceptance of rigorous project control and a formal quality management system by the individual scientist is still in the future. We are pleased to see the efforts of the Director and his senior staff to improve this.

IV.2 Transfer

Transfer of results, know-how and information to the final user is still considered to be the critical point in Community research in general, and every opportunity must be seized to market the Institute's products and services. In that respect, the Institute appears to be conscious of its role as a European Centre and conferences, seminars and workshops (on ongoing and future projects) clearly play an important and visible part in its operations and are considered to be one of its fundamental tasks.

Publications such as reports, monographs, poster-session contributions and conference papers are maintained at an appropriate level for an institute in which some of the output is raw data, especially in the case of contract work for third parties, where confidentiality is also a consideration. We believe that the public status of the Institute dictates that whenever possible, such work must be published at an early date. Other than the EUR technical reports, publication is in reputable reviewed scientific or technical journals or in books. One criticism is that detailed lists of publications do not appear to be available. The Group believes that all output, except that of an explicitly sensitive nature, should appear on an openly accessible and frequently updated list, if only as a showcase to the outside world.

The Visiting Group noted a steady improvement in the two-way communication between the Institute and the outside world, particularly with the development of an extensive system of networks in all appropriate branches of the Institute's activities. At the same time, a healthy relationship with third party clients had emerged,

although sometimes inhibited by staff availability and the lingering feeling among certain scientists that such work carried a lower priority. The new generation of scientists and tighter project control was improving the situation. In that respect, the success of doctoral students in obtaining PhDs for research performed at IAM and the presence of visiting scientists clearly had an important revitalising and invigorating effect on permanent staff, apart from the valuable training received by themselves. The reduction in numbers in comparison to the previous period is regretted and it is hoped that this important European function can continue at its old, or an even higher level in the future. The Institute and indeed the entire JRC must be seen as an important meeting place for the up and coming scientists and as a means of sowing the seeds of "natural" European networks that can endure throughout their working life. In this respect, the presence of senior visitors on attachment from other organizations can play an important role and enhance the reputation of the Institute. "Open door" activities are seen as being essential to the health of any Europe-wide scientific institute, at the same time providing coordination through experience to future scientists. The education aspect is considered to be an important service to the citizen and as such, worthy of further consideration.

In general, the Institute's track record in transfer to the outside is good to very good and the management is encouraged to further efforts in this direction. Collaboration with other JRC institutes is seen as a sector where improvement is needed and problems have also become evident in performing work for other Commission services.

IV.3 Quality

From the presentations and laboratory visits by the Visiting Group, publications, success in contract work for third parties and participation in Shared Cost Actions, we are able to form the opinion that the Institute is well equipped with a well trained and professional staff. In most cases, the work is judged to be of a high, and in certain cases, excellent quality.

Principle reservations lie in the more practical matters of ensuring that schedules are maintained and that overall quality is transparently demonstrated. These points are becoming of much greater importance than in the past and experience in many other research organizations is showing that scientific excellence is no longer sufficient to provide customer confidence but that overall quality of management also has to be demonstrated. The Visiting Group understands that the Director has these difficult matters in hand and looks forward to a successful outcome, but suggests that credibility outside could be further enhanced with an annual quality audit by an acknowledged external expert.

IV.4 Areas of concern

* Follow-up and project management. This is being actively pursued and a system is expected to be implemented during Summer 1997.
* Total Quality Management: a comprehensive system will be installed before Autumn 1997. However, an external audit is also desirable.
* Competence map of staff: at present lacking but under preparation for strategy planning.
* Recruitment: particularly in view of demography. This remains a continuing problem.
* Decline in the number of doctoral students and post-doctoral fellows.

* Future investment plan: this is being developed in line with the strategic planning.
* Work for industry: needs immediate action to secure contracts. A means of anticipating delays in formalities is highly desirable. (i.e. a small financial advance, staff allocation, etc.....)

V. Executive Summary

The Visiting Group points out that the visit has taken place at a time when it is particularly difficult to assess all the activities in the Institute and that a strict comparison with results of the previous visit will not be easy. This is partly due to the units transferred from the previous Institute for Systems Engineering and Informatics and the Institute for Safety Technology. These comprise the European Tritium Handling Laboratory (ETHEL) and the Energy Systems Testing activities.

Following the acquisition of these new fields, the new Director set about reorganising the Institute into a more rational structure by concentrating closely related activities into new functional units and assembling all surface-related research at Ispra. The action was launched on 1 September 1996 and was thus only a few weeks old at the time of the visit. The new functional units are shown in Chapter III. Scientific and Technical Activities.

At the present time, a detailed future strategy for the Institute is under development to meet the new demands that will arise with the fifth Framework Programme and to further enhance competitiveness and prepare for the future by developing the Institute's competence.

The most apparent change, other than the transfer of activities from other Institutes in Ispra, and the recent internal reorganization has resulted from the introduction of competitive bidding for work both in Shared Cost Actions (SCAs) and in providing services to other Commission Directorates General. Participation in SCAs is considered by the Visiting Group to be a fruitful method of working with the outside world and the Institute's success in the area is noted favourably. Whilst impressed by the number of contacts with programmes such as BRITE/EURAM, the Group feels bound to draw the management's attention to the dangers of diluting its area of core-competence by spreading its activities too thinly over too wide a horizon. A realistic and cautious approach is advised in building on its present success.

It is very encouraging to note a much more positive staff response to the competitive challenge where, in many cases, even older staff members have shown their conviction of its value to the JRC. Healthy progress has been made in this respect, but some pockets of doubt still remain.

In view of the experience and expertise of the staff and the extensive worldwide contacts enjoyed by the Institute, the Visiting Group suggests that greater attention should be focussed on the provision of regular training courses on suitable subjects for outside participants.

As a mark of the Institute's recognition by other bodies, the Visiting Group notes with satisfaction the positive reference made to a number of the Institute's activities by the European Committee for Standardization (CEN) in a recommendation recently published as an "Addendum to the CEN/STAR contribution for the preparation of the Vth Framework Programme". Specifically mentioned are advanced materials, photovoltaic energy, solar energy, energy conservation, materials for clean technologies, plant and component ageing and inspection methods, as areas in which contributions are made by the JRC to standardization in the European Union.

VI. Recommendations

* Except in third party work activity should be sited near, but upstream of industrial research.

* Some work, particularly in the coatings sector, needs examining to see that it remains generic or pre-competitive.

* Provision of open access databases is encouraged with attention to possible outsourcing of routine tasks.

* Where logistics allow, duplication between Ispra and Petten activities or important equipment should be avoided.

* Characterisation of materials is an important core competence for the Institute.

* Shared Cost Action participation is favourably considered and to be encouraged.

* Seek to collaborate more with other JRC institutes.

* Expedite work underway to introduce project management and total quality management in the Institute.

* Recruitment of scientists is still a problem needing further attention.

* The educational role of the Institute should be enhanced and the number of doctoral students and post-doctoral fellows increased.

* Staff mobility, although better, could be increased with short term attachments.

* Seek improved methods of bringing forward the starting date of industrial third party contract work.

* Seek contacts with the best experts in Europe for every (new) field of activity.

London, 11 November, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR SYSTEMS, INFORMATICS AND SAFETY

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Institute for Systems, Informatics and Safety (ISIS), (Ispra, Italy)

I. Introduction

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 12 and 13 September, 1996 at the Institute for Systems, Informatics and Safety at Ispra reviewing its work, meeting the staff and visiting the laboratories and other installations.

On 5 and 6 September a preliminary visit was made to the Institute by the Chairman and one of the members of the Visiting Group who was not able to join the subsequent meeting held on 12 and 13 September.

The present exercise follows that performed by Visiting Groups in 1993 and the implementation of recommendations made at that time are an important factor to be considered.

Since that time, certain changes have occurred and the JRC has become independent from DG XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions. The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI.

The mission of the Institute for Systems, Informatics and Safety is defined as follows.

- ISIS is the impartial centre of expertise of the European Union in the science and technology of safety management, the multi-disciplinary analysis of industrial, socio-technical and environmental systems and the innovative application of information technology.

ISIS develops and applies its expertise and unique test facilities in many fields, including:

- nuclear safety and the safeguarding of nuclear materials
- industrial and transport safety
- seismic protection of buildings and civil engineering works
- natural resource and environmental management
- support to antifraud measures
- preservation of cultural heritage and architectural work.

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present, which requires assessments to be made covering the past five years, it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than by a programme oriented approach.

The presently applied system of visits by teams of independent experts covering the whole spectrum of activities of each individual Institute has been proven and widely accepted as the best practical method of assessing the JRC and indeed is that favoured for many other research organisations worldwide.

The present evaluation will therefore cover the period from Autumn 1993, when the last visits took place, up to the present time, and together the corresponding reports will review the whole period in question.

II. General Observations

The Institute for Systems, Informatics and Safety (ISIS) was created following a reorganisation of the JRC at the beginning of 1996 by the merger of the Institute for Systems, Engineering and Informatics (ISEI) and the Institute for Safety Technology (IST).

Some sectors of the two former Institutes were allocated to other JRC Institutes and today the scientific and technical activities of ISIS are grouped into the following Units:

- Industrial Hazards
- In Pile Experiments
- System Modelling and Assessment
- Safeguards and Verification Techniques
- Software Technologies and Automation
- Advanced Techniques for Information Analysis
- Structural Mechanics

These blocks, plus one on the

- Sicily Project

are used for the discussion in this report.

The above activities are performed and financed within one or more of the scientific and technological objectives specified in the Council Decisions of 15 December 1994 and its annexes, as indicated in the introduction to this report. These include institutional and competitive work within the 4th Framework Programme of Community RTD activities and competitive work outside the Framework Programme. In comparison with the past, the new possibility of bidding for Shared

Cost Actions (SCA) was given to the JRC by the above Council Decisions.

The Visiting Group noted that ISIS made full use of the various possibilities mentioned above, performing in each Unit a mix of institutional and competitive work.

Whereas in some Units the institutional work within the Framework Programme predominates, in other Units the competitive work reaches 60% of the total. The Visiting Group noted in particular the good rate of success in participating in Shared Cost Actions, and welcomed the wider relationships formed with partners in these projects.

For the visits to the laboratories and presentations of the activities, a selection of topics was made, in cooperation with the Director of the Institute, during the preliminary visit of the Chairman a week before the general meeting. As indicated in the following, the more relevant and recent activities were reviewed in detail for each scientific/technical Unit. A special session was devoted to debate governance issues, with participation of representatives of the JRC administration.

The criteria used for the analysis of each observed scientific/technical activity were based on four main tests:

- Mission: Is it proper to the Institute and to the JRC? Is it useful? Is it well understood?
- Transfer: Are parallel and upstream ideas accepted and implemented? Is transfer of science and technology out into external institutions and industry performed in an efficient way?
- Quality: Is the work rigorous, fresh and creative? Are the results commensurate with resources consumed?
- Competition: Has a good degree of success been obtained in competition, particularly in SCA's? Has the competitive work been usefully integrated with institutional work?

The assistance given by the Director and staff to the Visiting Group was well structured and openly provided.

III. Scientific and Technical Activities

III.1 Industrial Hazards

Under the Institutional Research chapter, experimental investigations in prototypical conditions on safety of nuclear reactors and industrial plants are carried out in two major facilities (FARO - **F**uel melting **A**nd **R**elease **O**ven and STORM (**S**implified **T**ests **O**n **R**esuspension **M**echanism), modelling activity is also performed to evaluate the experimental results and to validate models. A Major Accident Hazards Bureau has been set up to serve as a Community documentation centre on industrial risk. Support is provided to the Commission services also on environmental matters, with some new activities concerning biotechnology and bioenergy.

The Visiting Group focussed on four themes:

- Major Accident Hazards Bureau
- Biotechnology
- Severe Core Melt Experiment - FARO facility
- Aerosol Behaviour - STORM facility

The Group noted that the Major Accident Hazards Bureau, set up for support to DG XI, is an ordered data collection which does not appear, however, to have a proactive nature. Quality of input information depends entirely on reporters in Member States, and may therefore be variable.

The biotechnology activity, although appropriate for the Institute (institutional support to DG XI), calls for scientific skills unusual for the Institute - or indeed the JRC. Quality should be carefully monitored by external reference.

The visit to the FARO facility gave an initial impression of repetitive and costly procedures in long duration experiments. However, it was made clear that the mission of this facility, with its large scale and high melt temperatures for uranium oxide, makes a valuable contribution to institutional and international research on Nuclear Safety.

The work on aerosols appears to have an appropriate and clear mission, is of good quality and good transfer capability to the users. The project is forward looking and is likely to be fruitful in the Nuclear Safety field and other applications can be envisaged outside the nuclear world, both for catastrophic and non-catastrophic conditions.

III.2 In Pile Experiments

This activity is concerned with technical/scientific support to the experiments in the PHEBUS-FP (Fission Product) facility at Cadarache (France). A small team from the Institute is detached there with the role of "local laboratory management".

The mission and the potential for transfer of this action seem to be appropriate, as part of the institutional research on Nuclear Safety.

III.3 System Modelling and Assessment

This activity encompasses theoretical investigations and development of models and numerical codes, both for nuclear and non-nuclear plant safety, development of decision support systems, particularly multicriteria decision models for environmental management and integrated environmental assessments.

New activities cover, amongst others, the study of human factors in transport safety and energy management in multimodal transport.

The Visiting Group inspected the following activities in the nuclear field:

- Reactor Safety Modelling
- Process Plant Safety

and in the non-nuclear field:

- Integrated Environmental Assessment
- Hydro Systems Modelling
- Integrated Systems Modelling
- Transport Safety
- Demo ECC-AIRS (Aircraft Incident Data Base)

The Group considered that the system integration work underlying most of the above activities is appropriate for the Institute with its broad scientific capability. Indeed the high competitive element, around 60% of the non-nuclear field listed above, indicates external respect for the Institute's capability in this work. Participation in Shared Cost Action projects was seen to sharpen missions and improve transfer.

The Group noted, in particular, the good potential for the work on human factors within the Transport Safety activity, aimed at computer aided interactive training. The desirability of standardised reporting of air traffic safety incidents, envisaged in AIRS, was noted. The utility of such data and analytical tools would clearly be enhanced if a European standard could be accepted by ICAO (International Civil Aviation Organisation) as a United Nations standard. The JRC should be encouraged to finalise the definition of AIRS promptly: this could encourage the US authorities to follow a European lead, rather than selecting one of the currently competing North American systems.

The Hydro Systems Modelling activity seems to be appropriate, but judgment on its value depends on further assessment against experiments.

III.4 Safeguards and Verification Techniques

The development and implementation of several techniques required for the safeguards control of nuclear material are carried out mainly within institutional research and institutional support, especially for the benefit of EURATOM and IAEA safeguarding authorities. They include mass and volume determination techniques for liquids in tanks, non-destructive measurement techniques, sealing and identification methods, performance assessment of instruments and components, and computerised systems for nuclear material balance evaluation.

Detailed presentations were made to the Visiting Group on the following laboratories and projects:

- **PER**formance **LA**boratory for safeguards - PERLA
- Safeguards **TA**nk **ME**asurement Laboratory - TAME
- Safeguards Sealing Bolts
- Safeguards Instruments Performance Assessment
- Animal Tagging

The Group concluded that this activity corresponds to a clear and appropriate mission for the JRC, where its independence from Member States and its impartiality vis-à-vis any industrial interest play a valuable role.

The Group appreciated the high quality of the work performed in this field and considers that an effective transfer of the know-how takes place, particularly through mechanisms such as the training of the safeguards inspectors and the training of trainers for Russia, as well as through the development of measurement devices for use in the field. The substantial research that supports this institutional function may produce interesting spin-offs in other fields. The Animal Tagging work, started recently, is an example of such a spin-off.

III.5 Software Technologies and Automation

Institutional support activities are performed in fields concerning software dependability measurements and methodologies, multi-media network applications for Earth Observation data, development of surveillance and remote sensing systems for safeguards applications. Inter-institute contracts cover part of the above activities. Institutional research is related essentially to robotic technology for remote handling applied to fusion reactors and to some work on safeguards.

Competitive activities concern, e.g., sensor based robot control and 3-D reconstruction of indoor environment.

The Visiting Group reviewed by presentations and visits:

- Multimedia Network Applications
- Dependable Software Applications
- Sensor Based Applications
- Heavy Robotics (ROBERTINO facility)

The Group welcomed the transfer mechanism set up through Internet (World Wide Web) for the Earth Observation data.

The Group noted that the work on dependable software is serving the Commission as institutional support. In order to check whether this work is actually up to best practice, an element of competition would be advisable.

The test of competition can also usefully be applied to the robotic measurements performed under the heading Sensor Based Applications, as nowadays there are many places where this kind of work is performed. The work on Brain Waves, developing control systems for severely disabled people, would benefit from active exchange of ideas with researchers in parallel fields. This project is at a very preliminary stage, and the results achieved were therefore quite limited.

The Group was informed that prospects for new utilisations of the ROBERTINO facility and of the know-how built around it exist and are actively pursued. They concern subjects like laser welding for heavy components, tanker inspection systems, multi sensor data fusion in heavy robotics and software for safety critical control. In general, ROBERTINO may become the host for a variety of heavy robotics experiments. The practicality of such alternative uses for this expensive facility should be checked urgently, in view of the imminent decline in the Fusion Programme.

III.6 Advanced Techniques for Information Analysis

This chapter covers techniques for data analysis and handling, high performance computing and networking, and photonic technologies. The institutional part of the work is carried out in support of the Commission (DG III and UCLAF). About 60% of the work is competitive.

The following activities were presented to the Visiting Group:

- Photonics
- Antifraud: UCLAF
- Neural Networks
- High Performance Computing and Image Processing

The Group appreciated that some effective transfer of the competences in photonics took place through the application of photogrammetry techniques to the Sicily project.

The antifraud activity is considered to be appropriate to the Institute's mission, it appears to give valuable support to the antifraud unit of the Commission and it has been proven in competition.

The activity on neural networks is developing a valuable technique, which could be of wider application, both within the JRC and externally in competitive projects.

Under High Performance Computing and Image Processing, advanced achievements in 3-D holographic images were presented. They are protected by patents and may have industrial potential. The Visiting Group recommends testing these revolutionary concepts on a panel of potential users.

In this case, and in others where patents have been taken, the Group concluded that transfer and commercialisation would be improved if the initiating Institute took the responsibility and reward for exploitation.

III.7 Structural Mechanics

Work is concerned with experimental activities in the field of the safety assessment of civil engineering structures exposed to earthquake loading and in the field of transient dynamic response of materials and mechanical components under impulsive phenomena. Development and validation of computational methods in connection with this experimental activity are performed.

Two main facilities are used:

- the reaction wall ELSA (**E**uropean **L**aboratory for **S**tructural **A**ssessment)
- a **L**arge **D**ynamic **T**est **F**acility (LDTF)

In reference to the objectives set out in Council Decisions 94/918 EC, the Structural Mechanics Unit has:

a) contributed considerably to Institutional Research Activities (prenormative research in the field of structural safety and research on Car safety) and

b) successfully participated in several competitive research projects.

On the other hand, referring to the recommendations formulated in the Evaluation Report issued in 1995 (COM(95)60 final), diversification and spreading of activities were kept at a reasonable level, especially in view of the new customers' demands (as imposed by the new "competitive approach").

At the level of this Unit, mechanisms to set scientific objectives, monitor progress and evaluate outputs were not clear. At present there is a vacancy for Head of the Unit.

Most of the research activities were of good scientific quality, taking advantage of the opportunities and funding conditions.

Further senior management effort is needed to:

a) improve guidance to the numerous and excellent young researchers;

b) scrutinise more thoroughly the wealth of test results and scientific findings;

c) promote publication of papers containing conclusions of broader significance.

It is concluded that this Unit made efficient and economical use of resources available.

The Unit has taken successful initiatives in creating external scientific links with Universities, Research Centres, Industry and Regions of Member States. Competitive research projects were won via such collective undertakings.

This scientific work has contributed towards an improvement of European competitiveness in the field of earthquake engineering and dynamic testing. The use of advanced computer packages has strengthened the scientific bases in this field.

III.8 Sicily Project

This activity is a good example of work for third parties performed within the framework of the regional development policy of the European Union.

The size of the project and the number of partners involved require an efficient management. The Visiting Group noted that a good project management system has been put in place at ISIS for this purpose and the work is effectively coordinated and under control.

IV. Implementation of Research

IV.1 Mission

The mission of the Institute as broadly recalled in Chapter I of this report, is judged to be appropriate, considering the mix of institutional research and support activities allocated and the competences existing at the Institute. The substantial competitive activities recently developed improve transfer and ensure clarity in the results of the Institute's work.

There is a need continually to recharge the basic scientific competencies within the Institute, to support continuing competitive activities; this requires a good balance among exploratory, institutional research and support and competitive activities.

In order to enhance the relevance of the project missions, the formation of Programme User Advisory Boards is supported.

IV.2 Transfer

The increased volume of competitive work, particularly the newly established participation in Shared Cost Actions and in PHARE and TACIS, has improved transfer. Relationships with external research organisations and with European industry, are both wider and increasingly project driven.

Transfer out is generally good and very good in some cases, as in Safeguards, where methods and techniques developed at the Institute are passed directly to the operating bodies (both EURATOM and IAEA), including through specific training courses for inspectors.

Transfer in and out is also particularly effective in cases such as the research in ELSA, where good networks of collaborative laboratories have been established. This is also the case for Safeguards and for the major facilities in the field of nuclear reactor safety.

However, for further improving transfer and for providing a direct route to market for products, the Visiting Group suggests that the feasibility of incubator structures, like a Science Park or an Innovation Business Centre on the JRC site, should be evaluated.

The Visiting Group considered that the present arrangements for administering patents were not conducive either to practical definition of inventions, or to active commercialisation. If the rights in patents were to be transferred from DG XIII to the innovating Institute, the incentive for commercial exploitation would be joined to the necessary technical competence.

IV.3 Quality

Useful routine skills exist at the Institute, some others are available from outside and, in general, they are tested by competition. Exceptional competences exist as well, notably in groups dealing with safeguards measurements and control techniques, reactor safety, heavy robotics, decision models for integrated environmental assessment and structural mechanics, particularly around the ELSA facility.

The Visiting Group noted that the internal Scientific Committee is now working well, and is active in promoting idea exchange, both intra and inter-Institute. In particular, the Scientific Committee seems effective in peer review of exploratory research projects. Project management skills have been systematically improved.

Programme User Advisory Boards are in the process of being created. These are welcomed, as they will provide an ongoing external peer review that, together with the internal action of the Scientific Committee, should promote relevance in project missions, quality of work and improved transfer.

IV.4 Competition

Competition has clearly improved mission, transfer and quality, as indicated above. It also improves the morale and skills of the staff as they are seen to work at the cutting edge of science and technology.

The Visiting Group was impressed by the variety of external research and industrial bodies, from 15 Member and Associated States, that had been brought into contact with the Institute in the process of bidding for and operating Shared Cost Action projects.

However, extended competition is tending to move ISIS downstream towards practical applications, and away from basic research. Exploratory research therefore needs to be systematically stimulated, in order to refresh the Institute's intellectual competencies.

In consideration of the above, the Visiting Group considers that a balance between competitive and non-competitive activities should be maintained. In the opinion of the Group the competitive activities of the Institute could usefully grow to reach, asymptotically, 35% of the total.

Finally, the Group recognised that a potential conflict exists between the JRC's independence and its competitiveness. The independence of the JRC is a necessary requirement for its institutional activities, whereas competitive work may demand that specific interests be served. Careful management is required to minimise this conflict.

V. Executive Summary

The present evaluation of the Institute for Systems, Informatics and Safety (ISIS) of the Joint Research Centre follows the evaluation of the JRC Institutes performed by Visiting Groups in 1993 and 1994. ISIS was created at the beginning of 1996, basically merging two Institutes, the Institute for Systems Engineering and Informatics (ISEI) and the Institute for Safety Technology (IST).

This report has been requested by the Board of Governors of the JRC. Together with the 1993 reports for ISEI and IST, it covers a 5 year period and contributes to the periodical evaluation of the Community RTD activities.

ISIS executes work within the 4th Framework Programme as Institutional Research in the chapters: Measurement and Testing, Environment and Climate, Nuclear Safety and Safeguards, Controlled Thermonuclear Fusion. As Institutional Support in the chapters: Information Technologies, Environment and Climate, Agriculture and Fisheries, and Nuclear Safety and Safeguards.

ISIS also performs competitive work. It has won several contracts under Competitive Support and under Shared Cost Actions within the Framework Programme and executed work for third parties, outside the Framework Programme.

The Visiting Group reviewed the work performed at the Institute, which is structured in eight scientific/technical areas. The Group also considered the governance issues related to the scientific/technical work.

The activities were judged against three tests: Mission, Transfer, and Quality; the effect of Competition has been separately noted.

The mission of the Institute and of individual projects seems to be appropriate. Transfer, both laterally with other scientific bodies and downstream to industry has markedly improved since the previous Visiting Group reports of 1993. Quality is generally satisfactory and in some areas excellent.

The effect of competition seems to have been wholly beneficial, in sharpening mission, in testing quality and in promoting transfer. Improvement in staff morale is quite apparent.

The recommendations of the Visiting Group are presented in the following chapter VI.

VI. Recommendations

VI.1 S&T Activities

- Software Technologies and Automation

For a number of applications concerning Multimedia Networks, Dependable Software and Sensor Based Robotics - technologies for which research is widespread in many laboratories nowadays - it is recommended that the results, or elements of them, be tested soon against a competitive approach.

- Advanced Techniques for Information Analysis

The results obtained on 3-D holographic images, under High Performance Computing and Image Processing, should be evaluated by an industrial panel and be given the possibility of being confronted with the industrial market.

- Structural Mechanics Unit

  - The "auto diagnostic" optical fibres instrument and the optomechanical sensor show promise, and should be further tested in the unit.

  - The recent extension of research towards masonry structures is welcome. Masonry is a challenging material, difficult to model. So, although several research centres are concerned with the subject, ISIS, with its exceptional facilities, can make a valuable contribution. It should now develop an analytical package for the multiple social and engineering needs.

  - Collaboration with Japan in the field of seismic research and design should be encouraged. Although Japanese solutions are often specific to their culture, their wealth of experience and experimental data in the field are likely to be valuable in the European context.

  - Work on repair and strengthening structures by innovative means is still at an early stage at ISIS. Considerable additional effort is needed to achieve critical mass in this field.

VI.2 Infrastructure

Considering that a substantial part of the budget of the Institute is devoted to pay for the JRC Administration and Infrastructure (ADIN) and ISIS is substantially dependent on ADIN for its financial and management control systems, an external evaluation of this unit would be appropriate in parallel to the Visiting Groups for the JRC Institutes.

VI.3 Management

- The staff recruitment system has been recently made more flexible at the JRC with the introduction of non-renewable 3 year contracts which adds to the one year contracts for auxiliaries and to the renewable 5 year contracts for temporary agents. The Visiting Group is however concerned that rigidities still exist that can prevent the selection of appropriate staff, and impede initiation of projects won in competitive tender. It recommends that:

  * Temporary Agent staff, recruited under the new scheme of non-renewable 3 year contracts, should be permitted to apply for admission to the Reserve List of qualified candidates, and therefore allowed the opportunity to progress from an initial 3 year contract to more extended employment.

  * Similarly, Reserve List candidates should be free to apply for the aforementioned Temporary Agent status, under 3 year contract.

  * The Director should be enabled to carry a small reserve of staff - 1 to 3 persons - speculatively, so that competitive

projects can be manned promptly on award of contract. It was noted that delays of up to 6 months had occurred in starting work, due to the requirement that recruitment procedures may only begin after a contract has been awarded. The cost of this reserve would be classed as an overhead and discharged as a project cost.

- Responsibility for administering patents, which is now with DG XIII, should be moved to the level of the Institute. Revenues from licences net of patent costs, should go to the initiating Institute as additional funding at the Director's discretion.

- The Visiting Group encourages the establishment of Programme User Advisory Boards, which have been proposed for the Institute.

- The Visiting Group suggests that the possibility of establishing a commercial incubator facility at Ispra should be explored. Surplus accommodation is available, and the additional cost to ADIN might well be minor. Users could be JRC staff, external individuals with proposals for commercialising Ispra technology, and pilot teams from industrial companies.

- An active programme of exploratory research should continue to be encouraged: whereas the sharply increased competitive work has brought clear benefits in mission, quality and transfer, it is clearly desirable that the springs of creative science at ISIS be continually refreshed.

- ISIS should continue to develop and calibrate analytical tools, modelling techniques and system integration methods, as the essential infrastructure of its wider programmes.

- Technology transfer between ISIS and European Commission clients should be improved, by encouraging movement of some senior ISIS staff to established posts in the relevant Directorates General in Brussels.

- The benefits for ISIS of extended competition are quite evident. A number of observations and recommendations in this report are designed to promote further this encouraging progress.

Aveiro, 21 November, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S ENVIRONMENT INSTITUTE

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Environment Institute (EI) (Ispra, Italy)

I. Introduction

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 11 and 12 September, 1996 at the Environment Institute at Ispra in Italy, reviewing its work, meeting the staff and visiting the laboratories and other installations. A further visit was conducted on 17 and 18 October, 1996 to augment the impressions gained from the first visit in view of the multitude of activities performed at the Environment Institute and to finalise the report. One invited member could not be present at the visits due to other obligations, but has contributed to the present report.

The present exercise follows that performed by Visiting Groups in 1994 and the implementation of recommendations made at that time will be an important factor to be considered.

Since that time, certain changes have occurred and the JRC has become independent from Directorate General XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions.

The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI. The Visiting Group was informed that this action is managed by the Commission Secretariat General, together with the interested Commission Directorates General.

As stated in the Environment Institute's Annual Report for 1995, "the aims of the EI are to assess levels and fates of chemicals in the environment, the exposure of man and the environment to them, and their effects on both, as well as consumer protection.". Together,

these objectives encompass an amazing wealth of research and support activities at the EI. This prolificacy is a result of the Institute's mission: to be directly involved in research, in the strict sense of the word, and to provide support to several Directorates General of the European Commission.

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present, which requires assessments to be made covering the past five years, it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than by a programme oriented approach.

The presently applied system of visits by teams of independent experts covering the whole spectrum of activities of each individual Institute has been proven and widely accepted as the best practical method of assessing the JRC and indeed is that favoured for many other research organisations worldwide.

A Visiting Group evaluated the EI in April 1994, as reported in "*Evaluation of the Joint Research Centre and its Multiannual Research Programme 1992-1994*", Commission document COM(95)60 final, 8 March 1995". The Chairman of the present Visiting Group (and one member) took part in this exercise. Together, this aforesaid report and the present report will thus review the entire period in question and emphasise the progress and developments made over that period.

II. General Observations

The Environment Institute has its roots in the days, many years ago, when the Joint Research Centre activities were mainly centred on nuclear research and development, and when competences in chemistry and radiochemistry were needed and developed. The EI was formally created in 1988 when a large reorganisation of the JRC took place and the Institute grew from a former chemistry division. Targeted environmental research, however, was initiated within the JRC in the 1970's, as was work in support of other services of the Commission.

At present, the EI which is headed by Professor Jean-Marie Martin and who took up his post as Director of the Institute on 1 September 1995, is organised into nine scientific-technical Units and a Unit for administration and technical services. The Deputy Director also heads one of the scientific Units.

The nine scientific-technical Units may be grouped into three major thematic working areas:

- Levels and Fates of Chemicals
  - Atmospheric Processes Unit
  - Environmental Monitoring Unit
  - Soil, Water, Waste Unit
- Exposure to Chemicals and their Effects
  - **E**uropean **C**hemicals **B**ureau (ECB) Unit
  - Life Sciences Unit
  - **E**uropean **C**entre for the **V**alidation of **A**lternative **M**ethods (ECVAM) Unit
  - Indoor Pollution Unit

- Consumer Protection

  - European Technical Office for MEdicinal Products (ETOMEP) Unit
  - Food and Drug Analysis; Consumer protection Unit

The above activities are performed and financed within the scientific and technical objectives, falling under Environment and Climate and Agriculture and Fisheries, specified in the Council Decision of 15 December 1994 and its annexes on the JRC specific programme (1995-1998) for the European Community, which contribute to the implementation of the 4th Framework Programme of Community RTD activities. This encompasses institutional research and institutional support, notably to the European Union's environmental policy (to the Commission Directorate General for Environment, Nuclear Safety and Civil Protection - DG XI), to the industrial policy (to the Directorate General for Industry - DG III), to the agricultural policy (to the Directorate General for Agriculture - DG VI) and to the consumer protection policy (to the Directorate General for Consumer Protection - DG XXIV).

Further work and finance is provided through participation in shared cost actions under specific programmes of the 4th Framework Programme, competitive support under the same and through work for outside third parties.

A particular characteristic of the EI is the high proportion of its activities which are devoted to scientific and technical support to the Union's policies, some 70% of the total of its institutional activities (60% of the staff, 80% of the financial resources), which is mainly organised through 'bureaux' or 'offices' set up through a Commission Communication to the Council and the European Parliament on a long-term basis, specifying the objectives and modes of operation of the work. The Visiting Group, in this connection, notes that the previous Visiting Group for the 1992-1994 evaluation suggested "*that a primary task of the Institute should be to provide the scientific support needed to underpin the preparation and implementation of EU policy in the field of protection of the environment*". A recommendation which has clearly been implemented.

In comparison with the 1992-1994 period, the JRC in general, and thus the EI in particular, are now permitted to compete in a wider spectrum of activities, mainly through the shared cost action programmes of the Framework Programme and the action on competitive support, as well as other Community programmes.

The Visiting Group notes that the EI has made good use of these opportunities, which were opened up to the JRC in 1995. The Visiting Group was informed that the EI is engaged in 22 shared cost action projects won in competition, with a success rate of 33% of the proposals submitted. In this way the EI is working with 120 outside partners.

The EI budget has grown from some 40 MECU in 1992 to 48 MECU in 1995, of which 2 MECU is derived from work for third parties. The 1996 budget is 51 MECU, of which 6 MECU stems from competitive activities (shared cost actions 35%, competitive support 46%, work for third parties 19%).

The statutory staff numbers 219, of which 88 are scientists. Scientific fellows (grantholders), scientific visitors and seconded national experts and 63 (unpaid) trainees bring the total human resources to more than 350. The non-permanent staff thus amounts to around one third of the total. The statutory staff has grown from 196 in 1992 when the total

human resources numbered 275. The EI has thus always followed a policy of having a substantial proportion of other human resources in addition to the statutory staff.

Presentations of activities were made to the Visiting Group and they had extensive discussion with the Director and the Unit Heads and visited the laboratories of each unit of the EI. Here the Visiting Group also met with several other staff members of the Institute. All the discussions were held in an open and most cooperative atmosphere and the Director and his staff did their utmost to present documentation and information to address the questions of the Visiting Group members, who express their thanks to everybody concerned. The Visiting Group furthermore acknowledges the testimonials it received from the customers of the EI and notably from the Commission Directorate General for Environment, Nuclear Safety and Civil Protection (DG XI).

Throughout the visit, the Group gained an impression of a very competent and highly motivated staff at the EI. During the visits to the laboratories the Visiting Group noted - as had the 1994 Visiting Group - the high degree of geographic dispersion of the EI throughout the Ispra site. There are historical reasons for this and while some regroupings have taken place, further efforts in this direction are recommended. Synergy and collaboration between the many Units of the Institute depends on many factors, but appears to be hampered by the present arrangements. The Visiting Group also noted that recently new buildings have been built for the EI, as part of an overall plan for the Ispra site which is now in progress. One new facility was not presently being used to its full capacity but in general the building and movement plans show promise for the scientific life of the EI.

The criteria used for the analysis of the EI activities were the standard terms of reference for all the Visiting Groups. The EI Visiting Group furthermore found it helpful to focus on four main points:

- Mission: Is it proper to the Institute and to the JRC? Is it useful? Is it well understood?

- Transfer: Are parallel and upstream ideas accepted and implemented? Is transfer out into the external world performed in an efficient way?

- Quality: Is the work rigorous, fresh and creative? Are the results of the work made available by publication?

- Competition: Has a good degree of success been achieved in competition, particularly in Shared Cost Actions? Has the competitive work been usefully integrated with institutional work?

III. Scientific and Technical Activities

III.1 Atmospheric Processes
(Statutory staff - 27; Non-permanent - 12; Trainees - 7)

This Unit is devoted to studies on the formation and impact of aerosols and photo-oxidants over Europe within the framework of the atmospheric global change issue. The research on complex physico-chemical studies for the proper understanding of these is rightly characterised as a key element in the development of environmental policies, both in the European Union and worldwide. In this respect, the Unit has a clear mission which also emphasises its role of coordination of European projects. These include the **B**iogenic **E**missions from the **M**editerranean **A**rea (BEMA) project and the Aerosols and Climate Project, (with up to 17 partners across the EU countries), complemented with photochemistry and chemical kinetics activities, with laboratory work and field modelling.

The work contributes to the **I**nternational **G**eosphere-**B**iosphere **P**rogramme (IGBP) for which the unit runs the European Project Office of the **I**nternational **G**lobal **A**tmospheric **C**hemistry (IGAC) project, and also to other international or European (EUREKA) programmes. The results are amply documented in peer refereed journals and through participation in, or initiatives on, seminars and congresses.

It is clearly an area of work where the new opportunity for the JRC to participate in Community shared cost action programmes has been beneficial. 8 projects have already been accepted, thus strengthening the collaboration with national research, as also witnessed by scientific fellows joining the work at the cost of their respective institutions.

The Visiting Group welcomed this collaboration with national research which could be further extended to encompass teams in other Member States and associated countries, in addition to those already involved.

III.2 Environmental Monitoring
(Statutory staff - 36; Non-permanent - 8; Trainees - 12)

In addition to the longstanding and highly recognised activity of the **E**uropean **R**eference **L**aboratory for **A**ir **P**ollution (ERLAP) in support to DG XI, the Visiting Group was also informed of the **R**adioactivity **E**nvironmental **M**onitoring (REM) project and the **E**uropean **T**racer **EX**periment (ETEX). This also supports DG XI, where follow up work is in progress after the large scale experiment which took place in the Autumn of 1994. Results are available, but the focus is now on work to reach a consensus on the models to be used for real-time forecasts.

All the work is clearly characterised by the ability of EI and the Unit to foster true collaboration through well defined networks and to obtain results for the benefit of the customer, DG XI (with whom a constructive dialogue is maintained). Here, as in other Units, the collaboration is also based on the fine scientific quality of the EI and the excellent instrumentation and facilities available in the Institute.

The Visiting Group noted not only the DG XI satisfaction with the work, but also their wish to see developments including further work on air quality and auto oil. The Visiting Group sees a clear need and scope for increased urban air quality studies in the future.

III.3 Soil, Water, Waste
(Statutory staff - 44; Non-permanent - 13; Trainees - 13)

The diverse work of this Unit ranges from support to DG XI (waste catalogue, classification of surface water) through institutional research (water, soil) to work for third parties on water management and recovery. The Visiting Group also inspected the Advanced Mobile Analytical Laboratories developed under a EUREKA project with industry and national laboratories. This is a good example of product and service development with industrial partners. Another promising activity is the project on Analytical Quality Control (AQUACON) which aims at the identification, quantification and reduction of sampling and measurement errors for selected environmental matrices and analyses. The work is based on extensive European collaboration coordinated by the EI including inter-laboratory exercises for rainwater analysis (186 laboratories from 22 countries) and should find further applications in the future. The Unit in general has a wide range of competences readily available to customer requests. Third party work, e.g. on the Venice lagoon, is an example of this, as is a series of projects on lake restoration and measurement and provision of tools for rational water management. It is recommended that even more focus be placed on the water related research in the future, in view of the EI involvement in the Task Force on Environment and Water, set up by the Commission and which, in the view of the Visiting Group, is responding positively to an overall EU concern. At the same time the Visiting Group recommend that adequate competences also be maintained in the other areas of the Unit - Waste and Soil - to cope with possible future demands by policy customers.

III.4 **E**uropean **C**hemicals **B**ureau (ECB)
(Statutory staff - 18; Non-permanent - 5; Trainees - 1)

Here, the Visiting Group found a one-to-one connection between an organisational unit and a specified activity, set up by a Commission Communication to the Council and the European Parliament in support of DG XI. The mission is clear and, as the previous Visiting Group found, there was continuing and good justification for the work being performed in a scientific environment.

The work responding to requirements of Community legislation is concerned with the classification and labelling of dangerous chemical substances, evaluation of existing substances, notification of new substances, carrying out risk assessments and a databank on import/export, all in close collaboration and contact with Member States' representatives and DG XI. Furthermore, there is work underway on the scientifically complex area of developing proper methods for testing, where 80 are already included in a Community directive and 40 are under development or revision.

DG XI see a clear need to continue this highly esteemed and necessary activity, and would like to see the remit widened to include pesticides and biocides. However, this is not possible within the present resource level.

III.5 Life Sciences *(Statutory staff - 11; Non-permanent - 6; Trainees - 6)*

This Unit encompasses institutional research supported by excellent laboratories on the exposure of trace metals in human tissues and fluids and on their toxicological significance to human beings. This work is in support of the Commission Directorate General for Employment, Industrial Relations and Social Affairs (DG V), and third parties (national authorities). The Unit has also won shared cost action projects in collaboration with national partners, as well as contributing to a EUREKA project.

The Visiting Group was pleased to note the positive developments since the last Visiting Group, the consolidation of the work and the willingness to share the laboratory facilities with other Units in the EI.

The value of exploratory research was emphasised and this may open up new areas for the Unit. The high specialisation on trace metals is of undoubted value, but there may, in the opinion of the Visiting Group, be a basis for further work for customers in the life sciences area, possibly by further strengthening the interaction with other Units of the EI.

III.6 European Centre for the Validation of Alternative Methods (ECVAM)
(Statutory Staff - 10; Non-permanent - 10; Trainees - 9)

This Unit is entirely dedicated to a single objective as defined by the Commission in a Communication to the Council and the European Parliament and work is conducted under a Memorandum of Understanding between DG XI and the JRC, and a further agreement DG XI/JRC from 1995. The validation of methods and strategies to reduce or replace live animals in laboratory studies is required in present and perhaps future Community legislation and highly feasible in view of the importance of the issue. The Visiting Group noted that the work is guided by a scientific committee which represents all vested interests. This stimulates indispensable collaboration with national and industrial bodies, combined with the experimental studies conducted in the ECVAM laboratories. The Unit has excellent facilities in a new building constructed for ECVAM, but not yet exploited fully. In the view of the Visiting Group this could also serve as a temporary working place for national teams or other needs of the EI.

The Visiting Group was concerned to learn, also from DG XI, that work has not progressed fully as foreseen. Information exchange and, in particular, the initiation of a broad dialogue with all interested parties has been fully developed, as witnessed by the many successful workshops organised. On the contrary, the requested database on alternative methods and services has not been initiated. Above all, the work of ECVAM to coordinate the validation of methods for alternative tests has not yet led to definitive results. Although the complexity should not be underestimated, as well as the fact that ECVAM is still building up with qualified staff, the priorities of the Unit with regard to work areas is questioned by both the customer DG and the Visiting Group. However, the Visiting Group is confident that the EI Director, being fully aware of the situation, will take actions to meet the customer requirements and to state priorities.

III.7 Indoor Pollution
(Statutory Staff - 10; Non-permanent - 1; Trainees - 2)

This is an important issue, on which the EI has been engaged for many years, coordinating a European wide collaborative action "Indoor Air Quality and its Impact on Man" which is a collaboration between scientists from 15 European countries, for which the Unit provides the secretariat. The main experimental facility, the INDOORTRON chamber, appears to be in good use and serves primarily for the experimental validation of volatile organic compound emission measurements. This institutional research is supplemented by a shared cost action on measurement methods. Results of the research have been of interest to DG III (Industry), but overall the Visiting Group regrets, as does the EI itself, that the work has not yet found a larger spectrum of users. Direct measurements in buildings have been made and the Visiting Group believes there is further room for work for third parties and Commission services, as was recommended by the previous Visiting Group.

On more scientific grounds, the Visiting Group recommends the work of the Unit be oriented more towards the effect of indoor pollution on man, perhaps in strong collaboration with other Units of the EI, thus linking with toxicology. This may lead to the further attractiveness of the work, whose future should be re-assessed in the light of its many potential applications.

III.8 European Technical Office for MEdicinal Products (ETOMEP)
(Statutory staff - 14; Non-permanent - 11; Trainees - 1)

This Unit, where some 55% of the work is devoted to the support of the European Medicine Evaluation Agency (EMEA) in London in informatics and telematics, is oriented to the pharmaceutical regulatory sector. This includes information systems such as the European Community PHarmaceutical Information Network (ECPHIN), and a series of telematics projects financed as institutional support and in addition through work won as competitive support and shared cost action programmes. Some 15% of the Unit's activities are concerned with environmental systems as third party work for regional authorities. The Unit has a role - for 30% of its work - in providing information technology support to the entire EI, both for scientific and administrative applications. Overall the Unit obtains half of its financial resources from institutional activities and the other half is won through competitive schemes, where this Unit has been particularly successful.

The Visiting Group was informed about databases and information systems such as ECPHIN and ECDIN (European Chemicals Data Information Network) developed and maintained by the Unit. The Visiting Group was pleased to learn of the utilisation of these systems by outside users. It agrees with the EI Director that this development, for the time being, should be maintained in the EI and not yet transferred to outside operators, as suggested by the previous Visiting Group. Overall, however, information technology activities of the Unit should have a clearer orientation towards the main environmental objectives of the EI.

III.9 Food and Drug Analysis
(Statutory staff - 24; Non-permanent - 5; Trainees - 11)

This Unit's main objectives are to provide scientific and technical support to various Directorates General of the Commission and to provide chemical analyses to other units of the EI, or Institutes within the JRC. It has a very long tradition of support work to the Commission services, going back to the early 1970's. One main activity is centred around the European Office for Wine, Alcohols and Spirit Drinks (BEVABS) organised at the request of the Commission in 1993 upon the initiative of DG VI (Agriculture). The purpose of the Unit is to combat fraud in wine production, notably the adulteration of wine by the addition of sugar and the watering of wine. The method applied is nuclear magnetic resonance (NMR) and the unit has established an EU wine data bank, using the results of NMR measurements and information on the origin of the wine from eight Member States, in collaboration with their national authorities and laboratories.

On the basis of its vested competences and excellent laboratory facilities the Unit furthermore, in response to requests from DG III (Industry), provides technical and advisory services related to chemicals in foodstuffs and food packaging materials. This work includes participation in collaborative trials for working groups of the CEN (European Committee for Standardisation). The varied work programme of this Unit includes analyses of contamination of animal feeds, of milk and milk products for DG VI (Agriculture and Fisheries) and cosmetics and water for human consumption for DG XXIV (Consumer Policy Service). These various work areas provide technical support to existing Community legislation or scientific-technical background for possible new legislation, The Unit therefore acts as the Commission's own laboratory and contributes to the arbitration when different measurement methods and results are to be compared and harmonised throughout the EU Member States.

Most of the work is classified as institutional support. However, the Unit has also won shared cost action projects with national partners in the field of food analysis and in addition some of the work for Directorates General III, VI and XXI (Customs and Indirect Taxation) is conducted under contracts won as competitive support. The confidence in the work of the Unit, as witnessed by the many requests to it over so many years from a variety of Commission services coupled with the growing importance of the subject area, could, in the opinion of the Visiting Group, lead the Commission to define a more targeted 'Office for Food and Drugs' within the EI, provided there is a clear scope and vested user need and that adequate resources are made available.

IV. Implementation of Research

IV.1 Mission

The published mission of the EI is in line with the overall mission of the JRC as described in documents made available to the Visiting Group and is amply reflected in the mission of its constituent scientific units.

The objectives of the institutional research and institutional support are described in *Annex I: Scientific and Technological Objectives and Content of the Council Decision of 15 December 1994 on the JRC Specific Programme 1995-1998*. This does not make any particular reference to either the EI or to the other JRC Institutes. The Visiting Group, however, on the basis of the workprogramme sheets for 1995 and an overview of the work distribution between the Institutes, judges that the EI institutional work is fully in line with the objectives as detailed in the programme decision, in particular for the Environment and Climate theme.

IV.2 Transfer

Since a large proportion of the work of the EI is devoted to institutional or partly competitive support to other services of the Commission, a major part of the transfer of its research results takes place within the frameworks established for its interaction with the customers. The Visiting Group, however, would encourage external publications whenever possible of scientific research results and studies of common interest in peer reviewed journals. In ongoing dialogue of new ideas and requests with the Commission customers the EI appears to be very receptive. This interaction and dialogue, however, is not solely restricted to the formal users, but is extended through the relevant national environments, as witnessed by the many network arrangements set up and the initiative of the Environment Institute to arrange seminars and symposia. The record of publications, as

illustrated by the EI Annual Report 1995 and the statistics was made available to the Visiting Group.

IV.3 Quality

The above mentioned statistics on publications as illustrated in the EI Annual Report demonstrates a clear drive to publish the Institute's research results across most aspects of its activities, in peer refereed journals, which gives the Visiting Group confidence in the quality of the work performed. Throughout its visits the Group also recognised the European added value of most of the ongoing work, but would recommend maximum efforts to include all Member States and associated countries in the research programmes.

IV.4 Competitive Activities

The Visiting Group found that the EI has responded in a dynamic way to the new challenges set out for the JRC, with participation in a wider spectrum of competitive activities than was possible in the past and was encouraged that so far the EI has achieved good success in competition. In particular, the participation in shared cost action programmes was considered to have brought value, because these open up a new dimension to the collaboration with national organisations. The EI also participates in competitive support, but the borderline between this type of action and institutional support is not distinct. The Visiting Group was also informed of some administrative problems in relation to the new competitive support action introduced in the 4th Framework Programme.

Finally the EI continues to participate in work for third parties, which accounted for some 4% of its income in 1995. Present projections indicate at least a 15% income from the competitive activities, heading towards the targeted ratio of 80/20 between institutional and competitive activities. This is seen as a good opportunity for the EI at this level.

IV.5 Management Issues in General

The Visiting Group reviewed with the Director the methods of internal management of the Institute and was pleased to find that improved procedures appear to have been set up, not only to ensure proper management control of the work progress, but also to create a stimulating atmosphere for the generation of new ideas. In this respect the Visiting Group was also pleased to learn of the outcome of a recently held 3-day internal seminar on the future strategy for the EI and of the clear intention of the Institute to become, in its specialist areas, the leading Institute in Europe in its field.

The Visiting Group felt, as emphasised above, that a greater degree of cooperation between the Units would strengthen the Institute and was pleased to learn of the plans to set up inter-Unit projects, with two or more units participating in each project. In the view of the Visiting Group exploratory research may be a further vehicle for fostering this necessary and welcome trend.

The Visiting Group recognised the highly competent and motivated staff of the Institute. It examined in detail the age structure. For the scientists there is a clear peak in the 31-40 year age bracket and another in the 61-65 age bracket. Thus, several of the staff are approaching the statutory retirement age. In the immediate future the challenge for management will be to preserve and maintain the accumulated competences in order to equip the Institute for the medium and long term future.

V. Executive Summary

The Visiting Group concludes that the work undertaken by the EI is of high quality and meets the objectives set out in the Council Decisions on the JRC specific research programmes 1995-1998, and the intentions in the Council Conclusions of April, 1994 on the Role of the JRC, including competitive activities. The Visiting Group judged that the recommendations from the previous Visiting Group covering the 1992-1994 period, have largely been implemented, as far as possible. For an Institute with a large proportion of its work devoted to scientific-technical support to the Union's policies the customer/user requirement that objectives be met is very important.

With one exception, the Visiting Group is convinced this is fulfilled and the Group welcomes the fine performance of the EI in the competitive arena.

Future prospects are good, provided the EI smoothly transfers knowledge and expertise across the generation shift for an important proportion of its staff, including some in senior managerial positions.

VI. Recommendations

VI.1 S&T Activities

- Maintain the primary task of providing the scientific support necessary to underpin the EU policies for environmental and consumer protection;
- Further extend outside scientific collaboration to encompass all EU Member States and associated countries;
- Increase the multi-disciplinary approach, notably with regard to improved interaction with life sciences in further activities of the EI (as an example, on indoor pollution);
- Pay particular attention to the promising developments in the area of food and drugs, where the EI may gain an even more prominent role;
- Similarly in the area of water research and the management of water resources, where the EI has, as yet untapped, further potential.

VI.2 Infrastructure

- Continue plans to concentrate and better distribute the Institute premises and laboratory facilities, as this will contribute to improved interaction between the Units of the Institutes;

- Foster further collaboration between the Units of the EI, including the institution of inter-Unit projects.

VI.3 Managerial

- Provide early plans for the necessary succession planning in relation to the forthcoming retirements to ensure that developed competences are safeguarded for the future of the EI;

- Related to the above, recruit new staff into the work at the necessary time to develop and extend flexibility to respond to customer needs;

- Maintain the recorded level of customer satisfaction, check customer opinions at regular intervals and implement the steps necessary to restore adherence to objectives agreed with the user, in cases of variance;

- Strive for a proper balance between institutional (i.e. EU funded) activities and competitive activities in the context of the overall JRC policy. Competitive activities may increase in proportion towards the 20% goal for the present programme period.

- Encourage whenever possible that the outputs of the EI's research and services should be published in peer reviewed journals to extend the already promising position.

Metsähovintie, 11 October, 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S SPACE APPLICATIONS INSTITUTE

CONTENTS

Report of the Visiting Group for the Evaluation of the Joint Research Centre's Space Applications Institute (Ispra, Italy)

I. INTRODUCTION

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 9th and 10th September 1996 at the Space Applications Institute (SAI) at Ispra, reviewing its work, meeting the staff and visiting the laboratories and other installations.

The present exercise follows that performed by Visiting Groups in 1993 and 1994 when the name of the Institute was the Institute for Remote Sensing Applications (IRSA) and the implementation of recommendations made at that time will be an important factor to be considered.

Since that time certain changes have occurred and the JRC has become independent from DG XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions. The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI. These activities are managed by the Commission Secretariat General and the relevant Directorates General.

The particular objective of the Space Applications Institute is the generation of relevant, timely and accurate information from remote sensing and space systems.

This involves:

- work supporting the sectorial policies of the European Union concerning agriculture, forestry, environment, aid to development and regional aid.

- work to promote, disseminate and support remote sensing applications and services in the Earth Observation industry, value

added companies, research institutions and government organisations.

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present (which requires assessments to be made covering the past five years) it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than with a programme oriented approach.

The present system of visits by teams of independent experts covering the whole spectrum of activities of each individual institute has been widely accepted as the best practical method of assessing the JRC, and indeed is that favoured for many other research organisations worldwide.

The present evaluation will therefore cover the period from Summer 1994, when the last visits took place, up to the present time, and together the two reports will review the whole period in question.

II. GENERAL OBSERVATIONS

The observations of the Visiting Group are based on the presentations of the Units of SAI by the Unit Heads, on the discussions with the Director of the Institute, on visits to some laboratories, and on printed material delivered before and during the visit. The presentations and subsequent discussions gave information to the Visiting Group about the objectives and main results of the Units. The discussions with the Unit Heads clearly brought out the most important results and the direction of future activities. The presentations reflected the often high scientific and technical quality of the Units and professional approach towards development and use of applications of remote sensing. The discussions showed a sharpened awareness of the mission of the Institute on the part of the management.

The Visiting Group also reviewed with the Director and Unit Heads the recommendations of the previous Visiting Group and actions taken to follow the recommendations. The Visiting Group noted with satisfaction that the previous recommendations have been taken into account, were implemented or were not relevant any more.

SAI plays, and should continue to play, an important role in the development of European Earth Observation, and its activities have become crucial to the exploitation of the investments made by Member States, particularly in the European Space Agency. To this end it must continually disseminate the results of its work, even to potential competitors, and be ready and eager to transfer activities to operational entities, particularly in the private sector. This implies a willingness in due course to close down activities which have proved either to lack promise or have found new sponsors, thereby making resources available for new activities - always, of course, within the agreed mandate of the SAI.

III. SCIENTIFIC AND TECHNICAL OBJECTIVES

III.1 Agricultural Information Systems (AIS)

The presentation and discussions confirmed the impression of the previous visiting group, that this Unit has a high level of professional competence and an excellent understanding of the SAI mission in this important field. Visible progress has been made in the past two years,

not only in techniques (for example, the introduction of radar into the methodologies), but also in the transfer to operational entities and the extension of the SAI work to Eastern Europe and North Africa. The progress made is perhaps best illustrated by the setting up of a so-called "super control" to monitor quality in the service industry now working in this area.

The Unit is well qualified to work in the future in the important field of major hazards and risks, but it is not a simple extension of present work. Accordingly, it is essential to recognise, firstly, that new links must be forged with other entities already working in this field, and secondly, that the activity will almost certainly require the addition of some new expertise.

III.2 Environmental **MAP**ping and Modelling (EMAP)

The research and development in EMAP are concentrated on the applications of remote sensing methods for environmental purposes. Typical projects are mapping and monitoring of European forests, natural grasslands, Mediterranean land degradation and urban land use. The Unit uses advanced methods such as fuzzy logic, fractal techniques and neural networks.

The main projects of the Unit are Forest Ecosystem (FIRS) and Mediterranean Environments. The Visiting Group noted clear progress in these important projects.

EMAP has not been able to attract DG VI (Agriculture) for competitive projects as much as the Unit had anticipated. The Visiting Group notes that it is a responsibility of the Unit to develop applications in prospect to some minimum level where benefits can be foreseen or are likely to be achieved. After that projects can be "sold" to customers for competitive actions.

The Visiting Group also noted that EMAP is lacking a clear strategy and commonly accepted goals for the future. The mission of the Unit should be clarified with the personnel of the Unit and the Director of the SAI.

III.3 Marine Environment (ME)

The objectives of this Unit are to develop and validate methodologies for the use of space observations in both operational applications and scientific investigations related to the marine environment. Basically remote sensing of ocean colour and sea surface temperature have been studied and applied, e.g. in coastal areas. In order to validate the derived parameter distributions the Unit has carried out an experimental activity successfully. More recently, the goals were extended in the direction to promote an integrated approach combining the use of remote sensing data, *in-situ* measurements and numeric modelling.

The processing of satellite data in order to generate distributions of ocean colour and sea surface temperature has been improved substantially towards operational use for e.g. coastal management and the field of fisheries. The Unit was also successful in getting support in the area of competitive activities.

The Visiting Group acknowledges the research concept of an integrated approach by combining remote sensing data, *in-situ* measurements and modelling in principle, but it strongly recommends not putting manpower into the development or use of 3-D models, but rather to cooperate closely with correspondingly experienced groups, and to define carefully the interface for fruitful work between them and the Institute. The efforts of SAI/ME should be mainly concentrated on

the remote sensing part including calibration/validation and the understanding of processes in coastal areas in order to be a competent partner in the cooperation.

III.4 Monitoring Tropical Vegetation (MTV)

The objectives of the MTV Unit are the characterisation of vegetation canopies and eco-systems in tropical regions. Data sets of different satellite sensors have been used to derive large-scale information in order to support the study of global change issues. These activities include the human impact upon land resources like deforestation and biomass burning.

The presentation of the Unit was clear and gave a very good insight into the work of the last years. Major results, like the first global tropical rainforest map as derived from AVHRR (**A**dvanced **V**ery **H**igh **R**esolution **R**adiometer) data, and the large scale ERS-1 (**E**uropean **R**emote **S**ensing satellite number 1) radar mosaic of Central Africa, were impressive. The monitoring of biomass burning within the FIRE (**Fi**re **I**n global **R**esource and **E**nvironmental monitoring) project yielded the first global fire distribution map, which should be very useful for investigations of tropical atmospheric chemistry.

The laboratory visit included the interesting presentation of the TREES (**TR**opical **E**cosystem **E**nvironment observations by **S**atellites) CD-ROM containing a wide range of TREES products.

It has been recognised by the Visiting Group that there is some overlap with other Units, in particular with respect to remote sensing of forests. As a consequence, it seems to be necessary to reinforce the cooperation between the relevant Units.

The MTV Unit has been very successful in acquiring funds in the competitive activities area.

The Visiting Group encourages the Unit, that the main activities will be pursued in the same direction in the years to come. Attempts to interface remote sensing measurements and biosphere modelling are supported, but the latter activity should be kept small.

III.5 Advanced Techniques (AT)

The Advanced Techniques Unit is investigating both theoretical and applications-oriented principles of remote sensing measurements in different spectral bands. The Unit is also developing advanced data analysis tools and information extraction methods.

The presentations of the Unit and a visit to the laboratories were well organised and very informative.

The major measurement facilities operated by the AT are the **E**uropean **M**icrowave **S**ignature **L**aboratory (EMSL) and the **E**uropean **GO**niometer (EGO). These quite new facilities have already produced significant results e.g. data base of signatures of remotely sensed targets.

New projects such as detection and identification of anti-personnel land mines and **RO**ad **CO**ndition and **CO**ntrol (RoCoCo) are well suited to the role of AT and will without doubt proceed towards useful applications. However, the Visiting Group notes that, if accepted, the proposed anti-personnel mine project, due to its public nature, may require different management efforts compared with those normally used at the Unit.

The Visiting Group noted that the management of the Unit is satisfied with the functioning of the EMSL Advisory Committee. The Visiting Group proposes similar advisory committees also for other Units of the SAI, if applicable to the benefit of Units.

The Visiting Group encourages more extended use of facilities of AT for third party contractual work (now 7% in the case of EMSL).

III.6 Centre for Earth Observation (CEO)

The Visiting Group received a very competent description of the status of the Centre for Earth Observation, and noted with satisfaction that the Pathfinder Phase had been successfully concluded at the end of 1995. The Design and Implementation Phase has now started, and the Group was satisfied that the CEO management was being responsive to the directions being given by the Steering Committee and sensitive to feedback from cooperating entities.

The project thus appears to be developing satisfactorily.

In reviewing the CEO work area, the group would wish to make just two observations:

- The amount of data already being handled is impressive, but the avalanche has yet to come. Problems with such large quantities of data - not to speak of the difficulty of controlling the content of the databases - will multiply in the coming years. Planning the future of the CEO function after 1998 already needs high-level attention.

- New fields of activity, telecommunications and navigation have been added to the work schedule of the unit responsible for the CEO. It is important, both in the CEO and in other SAI units, that these understandable extensions should initially be restricted to areas wholly connected with satellite remote sensing.

The Visiting Group supports the proposed new activity in atmospheric research, in principle. On the other hand, it is not clear if the CEO Unit has enough specialist experience in this research area to develop the UV radiation project. Therefore, it is recommended that it be carefully examined if SAI/CEO has to recruit one or two experts from experienced European laboratories in order for the Institute to be in a position to undertake recognised work in this field.

IV. IMPLEMENTATION OF RESEARCH

IV.1 Mission

The mission of the SAI, its place within the JRC and relevance of its work to the Framework Programme, all appear to the Visiting Group to be adequately defined and documented. The objectives and the methods to be followed in the SAI have been promulgated and seem to be widely understood and respected by staff.

IV.2 Transfer

There was a good appreciation of the need for ideas, information and results to be continuously diffused, not only within the SAI, but also between sister Institutes within the JRC and in the outside world. But continued vigilance is necessary on the part of the Director and senior staff to ensure that this openness continues to be encouraged by the Institute.

The Visiting Group took note that the number of publications produced by the Institute is quite high. On the other hand, it is recommended that the Institute should make more frequent use of the respected refereed journals as publishing channels. Publishing in refereed scientific journals represents a good continuous evaluation process of the work and results of the Institute.

IV.3 Quality

The Visiting Group had specific evidence of a striving for quality and excellence, but here again this report can be little more than a snapshot and continued effort is required in this area.

It is somewhat difficult for the group to offer a thorough opinion as to whether results are commensurate with the resources deployed, but there was certainly an air of targeted activity, and a realisation that quality needs to be maintained.

It is suggested that the multi-annual work schedules for the various research areas should attempt to include more specific milestones whereby progress could be more effectively measured - by the Director as well as by governing bodies or visiting groups.

IV.4 Staff Management

A new Director for SAI was appointed about a year ago. The new Director with his Deputy, the Scientific Assistant and Administrative Assistant, has built a management group which makes a very competent impression and gives the feeling of a well directed and motivated Institute.

Recent administrative decisions appear to have gone a long way towards solving the recruitment problems to which the previous visiting group drew attention in its report. This is very gratifying, because the dynamic nature of SAI's workload requires a continued measure of flexibility if appropriately qualified key staff are to be recruited in time.

Some of SAI's future projects will involve complicated partnership arrangements and may have a high political profile. Consideration should be given to recruiting, training or acquiring in some other way, the services of experienced project managers capable of undertaking such activities, as well as recruitment of the more conventional disciplines of the Institute.

The Visiting Group has also discussed the role of the Units and the interaction with the Director. Even though the Units have the scientific responsibility for the performance of established research programmes, future proposals have to be developed in close cooperation with the Director. The responsibility of the Director includes the preparation of an integrated scientific programme and the proposal of new research areas.

V. EXECUTIVE SUMMARY

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 9th and 10th September 1996 at the Space Applications Institute (SAI) at Ispra, reviewing its work, meeting the staff and visiting the laboratories and other installations. The present exercise follows that performed by a Visiting Group in 1994. The name of the Institute was at that time the Institute for Remote Sensing Applications (IRSA).

The Visiting Group reviewed the present situation, development since previous Visiting Groups, and took note of actions taken to fulfil the recommendations from 1994.

The Visiting Group noted with satisfaction that in general terms the management of the Institute is running well and high quality scientific and technical results have been achieved in all six Units of SAI. Nevertheless, the Visiting Group noted that some further improvement could be made in certain aspects of management and strategy, and in scientific and technical work done in some of the Units of SAI. The recommendations of the Visiting Group are presented in Chapter VI of this report and those which are related to only one of the Units are also repeated in Chapter III in connection with the Unit concerned.

VI. RECOMMENDATIONS

VI.1 Scientific and Technical Activities

The Visiting Group has noted that in different SAI Units there is a growing requirement for radiative transfer (RT) modelling. In order to avoid unnecessary duplication in this field it is recommended that only one small group of RT experts for the Institute as a whole be established and to have just one, or a very restricted number of RT specialists per Unit, for applying the specialised RT models.

Several Units of SAI are involved in remote sensing of forests. Whilst accepting that different problems exist in the various projects, it nevertheless seems to be necessary to establish a regular cooperation between the relevant Units, in order to further the study of the basic procedures in remote sensing of forests.

The Visiting Group acknowledges the research concept of an integrated approach by combining remote sensing data, *in-situ* measurements and modelling in principle, but it strongly recommends not putting manpower into the development or use of 3-D models, but rather to cooperate closely with correspondingly experienced groups, and to define carefully the interface for fruitful work between them and the Institute. The efforts of SAI/ME should be mainly concentrated on the remote sensing part including calibration/validation and the understanding of processes in coastal areas in order to be a competent partner in the cooperation.

The Visiting Group supports the proposed new activity in atmospheric research, in principle. On the other hand, it is not clear if the CEO Unit has enough specialist experience in this research area to develop the UV radiation project. Therefore, it is recommended that it be carefully examined if SAI/CEO has to recruit one or two experts from experienced European laboratories in order for the Institute to be in a position to undertake recognised work in this field.

VI.2 Infrastructure

The Institute and its Director can benefit from advice and criticism from outside the normal hierarchical chain. This could be provided either by an SAI advisory group (to be established, meeting about once per year) or by ensuring that a visiting group is regularly convened every two years, approximately. Given the workload already created by existing committees and the like, the second method would probably be preferable. However, in this case the visiting group should consist of 4 or 5 members, rather than the present 3, in order to provide a better coverage of the disciplines.

VI.3 Management

Many of the problems which SAI is tackling are inter-disciplinary and it is obviously important for the Institute to have good and continuous collaboration with the other JRC Institutes and to take the maximum advantage of their existing capabilities. There is ample evidence of good relations at a working level between Institutes and the regular meeting of Institute Directors provides a basis for cooperation at senior level. Given the increasing breadth of SAI activities, however, this is a subject which requires regular attention.

Because of the increasing relevance of its work to industry it is recommended that appropriately qualified representatives from industry should be included in SAI's committees, working groups, etc., along with those from academia and elsewhere. The group would not, however, suggest creating a separate industrial consultative body. Industry's intellectual contribution will be most effective if it is injected into the system at varying points, rather than being in a single - ghetto-like - body.

Cambridge, 21 October 1996

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES

CONTENTS

REPORT OF THE VISITING GROUP FOR THE EVALUATION OF THE JOINT RESEARCH CENTRE'S INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES (IPTS) AT SEVILLE IN SPAIN

I. Introduction

At the invitation of the Board of Governors of the Joint Research Centre (JRC), a Visiting Group of independent experts (see Annex I) spent the 12 and 13 September 1996 at the Institute for Prospective Technological Studies at Seville, Spain reviewing its work, meeting the staff and visiting the facilities.

The present exercise follows that performed by Visiting Groups in 1993 and the implementation of recommendations made at that time was an important factor to be considered.

Since that time, certain changes have occurred and the JRC has become independent from DG XII and is now an autonomous Directorate General of the Commission (Commission Decision of 10 April 1996 on the Reorganisation of the JRC). Furthermore, the Council has further clarified the JRC's role by clearly distinguishing between institutional and competitive activities (Council Conclusions of 26 April 1994 on the Role of the JRC) and in Council Decisions of 15 December 1994, adopting the present "specific programme for research and technological development, including demonstration, to be carried out for the European Community....." by the JRC under the Community Framework Programme. This requires that an evaluation is carried out by external experts on work performed during the preceding five years.

The above changes, together with efforts intended to increase efficiency and reduce costs, have led to some internal reorganisation of the JRC structure. This in its turn has resulted in a reduction of the number of Institutes from eight to seven and in consequence, a redistribution of certain tasks and projects.

The general scientific and technological objectives and content for the Joint Research Centre's specific programme are set out in Annex I of the Council Decisions of 15 December 1994. Institutional research activities are included in this annex which also includes Institutional scientific and technical support. Together, these two areas comprise the JRC Direct Action and specific rules for its implementation are given in Annex III of the Decisions. The scientific and technological objectives and contents of the competitive support activities are to be found in Annex IV and the specific rules for their implementation in Annex VI.

The mission of the Institute for Prospective Technological Studies as defined by the Commissioner for Science, Research and Development, Mrs. Edith Cresson, "is to collect information about technological development and its application in Europe and the world, to analyse it and to transmit it in processed form to the European decision makers". Its particular objectives are defined as follows:

- to perform technology watch (TW), particularly in the areas of energy, environment, transport, information technology and biotechnology;
- to carry out studies on matters relating to technology, employment, competitiveness (TEC);
- to undertake work on request (WOR).

The Visiting Group has applied the Terms of Reference given in Annex II of this report on the understanding that although the present evaluation will contribute to the general evaluation of the Framework Programme being performed at present, which requires assessments to be made covering the past five years, it is nevertheless based on a somewhat different premise. The JRC by its nature and by its assigned tasks is evaluated Institute by Institute rather than by a programme oriented approach.

The presently applied system of visits by teams of independent experts covering the whole spectrum of activities of each individual Institute has been proven and widely accepted as the best practical method of assessing the JRC and indeed is that favoured for many other research organisations worldwide.

The present evaluation will therefore cover the period from Autumn 1993, when the last visits took place, up to the present time, and together the two reports will review the whole period in question.

II. General Observations

In evaluating the Institute, the Visiting Group was particularly interested to explore changes that had taken place since the last visit in 1993, when the IPTS had been situated in Ispra. Recommendations made at the time were examined in the light of a follow-up action carried out mid-1995, at which time five out of the nine recommendations had been accepted and implemented.

Regarding the other four, the early strengthening of the Brussels unit to the recommended 6 staff was not possible during the initial period and considered to be undesirable before a reputation had been gained with customer services there. Recently, however, the Brussels contingent has been enlarged with an additional person and successful contacts are developing.

The recommendation to recruit staff from outside Ispra has occurred in practice because of the nature of the experience required. New staff have largely been selected from outside the JRC.

The recommendation that 50% of the scientific manpower should be non-JRC staff has also occurred naturally and there is at present an almost equal ratio.

Finally, the recommendation that annual reports should contain a special section on recommendations with a further evaluation in 1997 has been pre-empted by strong follow-up campaigns launched by the JRC Board of Governors and by the present evaluation.

In the 3rd Framework Programme the Institute had no budget from programme activities and relied entirely on contracts with other Commission services and work for third parties for its income. This situation has changed with the 4th Framework Programme Decision.

Since 1993, the Institute has been rehoused in the World Trade Centre in Seville, where an existing technical infrastructure is ensuring good communications with Brussels, the rest of the JRC and with members of its various networks, while its position nearby but not inside the science park provides excellent opportunities for contacts, without danger to the Institute's European Union image.

Since the International Exhibition of 1992, Seville has enjoyed improved rail and air communications with most European capitals.

III. Scientific and Technical Areas

III.1 European Science and Technology Observatory (ESTO)

Since the debut of ESTO in October 1995, under the 4th Framework Programme, this activity, in many ways the core of the Institute's activities, has made rapid progress. The concept has been defined, founded on a network of European nationally-based institutions. At the time of the visit, the final agreements with core members had not yet been signed, but preparatory work was already well advanced and some activities were operational. The Visiting Group feel confident that preliminary milestones are largely being met.

We consider ESTO to be the Institute's salient activity and as such, the data base should have the widest possible accessibility. Similarly, the ESTO network should have an open membership within the European Union, whilst recognising the special position and responsibilities of the core members in its management.

To ensure its credibility, strong quality control measures are essential and this feature will enhance the Institute's reputation and help to create added value in all its operations.

With the achievement of a reputation for quality, it is foreseen that ESTO outputs could increasingly form the trigger for in-depth studies both in IPTS and elsewhere in other network members. We see ESTO as an enabling facility for an expanding field of European programmes. Finally, ESTO should be exploited to bring up-to-date information on best practice in prospective technological studies to the Institute.

Since December 1995 IPTS has been publishing "The IPTS Report" at the request of Commissioner Cresson. The report, issued in 10 numbers per year, is addressed to decision makers involved in "managing change" and selectively presents condensed articles on technoeconomic issues which need wider debate. Topic preparation is carried out collaboratively by the Institute with a small group of ESTO core members interactively using the Internet for speedy communication. At the time of the visit, 8 issues were available and circulation had reached some 4,000 copies and was still growing.

The Visiting Group applauds these first efforts and expects to see ESTO develop into a service with significant European added value as experience is gained.

III.2 Technology - Employment - Competitiveness (TEC)

Work on TEC began in September 1995 and is largely programme oriented. In the first year some 18 man months have been devoted to three major topics:

- the Competitiveness Programme;
- the Employment and Technology Programme;
- the Regional Aspects and Resources Programme.

The first two topics are the subject of considerable activity with scientists and organisations throughout the world. The OECD is particularly active. The IPTS is still a newcomer. It is important that IPTS identifies projects of special competitive advantage to the Community as early as possible. The present concentration on "economic webs" and competitiveness seems to be a reasonable but ambitious approach. To ensure a high quality in this area, extensive contacts with the OECD regarding their work on national innovation systems could be rewarding. In addition, a clear focus on the European policy dimension could bring greater pertinence to the issue.

In the Employment and Technology Programme we agree with IPTS that although various aspects have already been examined by others, conclusions do not exist in an explicit form. However, thinking through the combination of competitiveness and employment to its conclusion requires great experience and this should be recognised. The proposed plan to focus on a European model that promotes and reinforces competitiveness and employment is supported by the Group and should be developed with other Institutes.

The Regional Aspects and Resources Programme reasonably focuses on the Mediterranean region. Should this work increase significantly, a special programme outside the TEC should be considered.

The TEC has a broad field of interest and greater emphasis needs to be placed on project selection and project management to generate significant added value. Research elsewhere has created a huge literature bank and the application of advanced literature survey methods could bring considerable returns to the IPTS and save time and resources.

Lastly, TEC is a client oriented area, especially in the third topic. It would be very advantageous to train staff in interpersonal communication skills. IPTS needs to recognise that its customers will also need help to exploit IPTS findings.

III.3 Institutional Support Agreements and Projects

Included under these agreements* is work undertaken for the following Commission units and Directorates General:

- Forward Studies Unit
- DG III, Industry
- DG XI, Environment, Nuclear Safety and Civil Protection
- DG XII, Science, Research and Development
- DG XIII, Telecommunications, Information Market and Exploitation of Research.

* *Formal agreements which are signed between the JRC and the Directors General of the services concerned.*

In addition, projects are being or have been undertaken for other Institutions as follows:

- European Parliament (including STOA)
- Council of Europe.

Projects cover topics such as:

- Environment
- Pharmaceutical industry
- Transport
- etc.

The Visiting Group considered that in these cases, the IPTS will need to identify the particular aspect of value to these organisations. After debating the subject, the Group concluded that IPTS activities, to be of greatest value, should be situated near but upstream of the decision-making process. As a young organisation, to obtain maximum effectiveness, IPTS will have to pay particular attention to the interactions it will have with its customers. The Visiting Group felt that with its growing experience, considerable progress was being made in the area.

III.4 Customer Review

The Visiting Group contacted a number of customers in the above organisations to gain their views. These are summarised here.

III.4.1 - Project Management

IPTS projects generally adhere to the brief but customers feel the need to have a much stronger interactive process in their projects. This is considered helpful for better management but most importantly to facilitate transfer of results. The Seville location does not help this. IPTS might consider lending or exchanging staff with customers to facilitate this interaction. There is a need to recruit staff who can work directly with customers in the policy making process.

IPTS controls timescales well except in the area of staff management. A project defined in November 1995 was delayed for more than 6 months by lengthy procedures in staff recruitment.

III.4.2 - Quality

Although customers thought it a little early for full evaluation of quality they were positive so far. In comparison with consultants, "quality management" is reasonable.

III.4.3 - Value

There does seem definite evidence that IPTS advice has been used to formulate policy. But IPTS need to follow up projects more strongly on this aspect. This will further improve their projects as experience builds up.

IPTS is seen as particularly valuable as it could work in sensitive areas, gain access to privileged information and interpret it for the European perspective. IPTS is expected to digest research results and interpret them into the policy dimension, which will include communication.

One very positive feature of IPTS is that customers know that they will take an in depth look at global scale in each project area, consultants generally don't have the brief or time to do this.

For IPTS work to have the highest value, the closer it can work with its customers the better.

III.4.4 - Future issues

(1) IPTS and the JRC need to build stronger working links. The JRC can use IPTS for JRC planning, strategy and prospective or foresight activities. IPTS could exploit JRC resources and scientific knowledge more effectively.

(2) IPTS should play a greater role in animating European foresight as this topic will become a priority and some organisation has to be in charge. More generally IPTS should become a pro-active organisation, a full part of the policy making process.

(3) IPTS must further strengthen links with the national policy institutes, who are doing the same sort of job and encourage company/academic/ government collaboration.

(4) IPTS should be assessing Europe's capability to meet the international challenge. The US/Japan have their own groups to do this, IPTS should do this for the EU.

IV. Implementation of Research

IV.1 Mission

As mentioned in the introduction, the mission of the Institute defined by the Commissioner, Mrs. E. Cresson "is to collect information about technological developments and its application in Europe and the world, to analyse it and to transmit it in processed form to the European decision makers".

The Visiting Group considers that the Institute is starting to establish a sound reputation with its customers and set up an infrastructure to meet their future demands. The IPTS' capability includes both modern information systems and a skilled staff able to exploit them efficiently.

The IPTS mission was well understood by staff encountered by members of the Visiting Group and its terms are being met in most respects.

IV.2 Transfer

Considerable efforts have been committed to establishing and maintaining efficient dialogue with major customers. The **E**uropean **S**cience and **T**echnological **O**bservatory (ESTO) network provides an alternative means of customer contact and also adds an extension to the Institute's own resources.

The scientific, technical and intellectual assets of other JRC Institutes, however, seem to be largely untapped and could provide the IPTS with specialist advice and studies on a larger scale than at present. This possibility should be examined.

The openness and availability of IPTS' output is considered to be a positive and very welcome advance on the situation encountered during the last evaluation. Information of all kinds was made available

to the Visiting Group and the concern and flexible means employed to inform and engage the customer was felt to be a most satisfactory evolution. However, on examining some of the printed output it was felt that a more uniform house-style would help to enhance the Institute's image and should be implemented for all reports.

IV.3 Quality

The perceived quality of output is consistent with a relatively youthful organisation and in general of good calibre. In future, however, formal quality control procedures must be adopted if the Institute's work is to be universally acknowledged; this being present practice in comparable institutes elsewhere.

The management has set high standards for its staff, but recruitment of experienced "permanent" staff of the required level of excellence is still being hampered by lengthy EU procedures. Furthermore, staff additions are required, particularly at the more senior levels, if the necessarily high customer expectations are to be fully satisfied.

On the other hand, the flow of short-term staff now appears to be highly satisfactory both in quality and in numbers consistent with the recommendations of the previous Visiting Group. Intelligent use of this resource enhances the Institute's vitality, flexibility and enthusiasm. Besides introducing the latest skills the benefits greatly outweigh the extra supervisory effort required by "permanent" staff.

IV.4 Areas of concern

The Visiting Group is particularly concerned that IPTS may be pressured to attack an unreasonably wide range of issues, thereby diluting its effectiveness. Consideration should therefore be given to identifying those future and new European priority areas. Rather than limiting its vision to traditional themes, much under study in Member States and elsewhere. Policies relating to food, demographics, socio/economic stability, regional influences are likely to emerge and should provide sufficient new challenges.

A transparent and formal project management system has not yet been fully developed in the Institute, in part due to other priorities during its early years. A suitable system should now be installed with some urgency. For example, for each project, a clear and unequivocal definition of operational goals is needed and the project leader must have clearly defined responsibilities. Project resources, both internal and external, required to meet customer requirements should be predetermined and realistic milestones set. These will enable management to assess continuously performance and take action where required, stimulate a methodical approach and enhance customer confidence.

In line with the above, sensitive qualitative indicators should be identified appropriate to the types of work carried on by the IPTS, serving to monitor the use and value customers obtain from the Institute. Emphasis must be placed on tangible action (new Community programmes, changes in policy direction, improved legislation, etc....) following input from Institute actions rather than numerical evidence obtained from citation rates, numbers of publications, etc., indicators impressive in themselves for demonstrating output but failing to demonstrate success. It is essential in that respect that project leaders can and do track the practical use made of their project results.

V. Executive Summary

Overall considerable progress has been made since the last visit. In particular IPTS now has a much clearer brief, formal budgets, a defined set of customers, a skilled and enthusiastic staff and has delivered valuable results. This is very encouraging. After the management changes which have taken place a period of continuity is now necessary to allow the full potential of IPTS to be realised.

For an organisation of its age project management and quality are typical, but more needs to be done.

A clearer view of the ways IPTS needs to work with its customers is now emerging. Customers are seeking greater interaction with and participation of experienced IPTS staff in the policy formulation process. We consider this a most healthy development but it will need more experienced staff to work with the researchers and much closer working relationships with customers most of whom are based in Brussels. This is still in their eyes, a long way from Seville. Use of advanced communication technology and the Internet and World Wide Web need to be extended to key customers.

The formation of the ESTO network brings a number of benefits. Apart from its main function as a science and technology observatory and reporting network, it starts to bring together many of the leading science policy institutes in a formal long range project rather than the short projects which had previously been a feature of the Institute's work. ESTO should also provide much more flexibility to IPTS in meeting short term requests from its own customers. It provides an alternative channel to policy makers through national institutes.

Specifically IPTS, where relevant, needs to make more use of the scientific specialists in the other parts of the JRC. This might be facilitated by strengthening the contacts with the rest of the JRC and the expertise in the various Institutes: the JRC itself being able to use the IPTS to help set strategy as well as an indicator of scientific and technological trends.

As a source of scientific knowledge and a member of scientific networks, the other JRC Institutes need to be part of the ESTO network too.

The portfolio of projects at IPTS needs to be carefully managed. There may be pressure to try to cover too much.

VI. Recommendations

VI.1 S&T Activities

1. Activate ESTO network but make the project as open as possible and widen project teams to include academics, policy makers and industrialists.

2. Where relevant, make more use of JRC specialists.

3. In all projects relationships should be formed with the best research groups so that IPTS does not 'reinvent the wheel'.

4. Help with the animation of discussions on European foresight actions (see Section III.4.4(2)).

5. Form working relationships with the ETAN programme.

VI.2 Infrastructure

1. Continue to develop IT and communication systems to be of highest quality but focus on their effective utilisation by customers. Training will be needed.

VI.3 Management

1. Introduce formal Project Management and Quality procedures.

2. Build up more experienced Brussels team, investigate staff exchanges with customers.

3. Change project organisation to increase customer interaction and measure performance on outcomes. Develop indicators of project value to aid management and staff assessment.

4. Identify major European issues and take a leading, proactive stance.

ANNEX II

JOINT RESEARCH CENTRE
JRC

CONDENSED LIST OF RECOMMENDATIONS FROM THE REPORTS OF THE VISITING GROUPS TO THE JRC INSTITUTES 1996

EVALUATION OF THE INSTITUTE FOR REFERENCE MATERIALS AND MEASUREMENTS (IRMM)

RECOMMENDATIONS FROM THE REPORT OF DR. DEL MONTE CHAIRWOMAN OF THE VISITING GROUP

No.	Recommendations
1	Maintain suitable level of resources in core activity
2	Avoid advantages to nuclear enterprises in certain countries
3	More effort on chemical metrology
4	Restructure IRMM to become EU centre of excellence in biological and environmental RMs
5	Broader market for Institute
6	Use "head hunting" agencies to target specific scientists and then employ them on competitive terms
7	Attract staff on worldwide basis with more flexibility for Director, progress review oriented to Institute needs
8	Business like approach needed under new JRC role
9	Overhaul Institute accounting (using consultants), delegate operational decisions to Unit heads
10	Include equipment depreciation in accounting procedures; define project objectives and milestones
11	Provide marketing courses for selected staff from each Unit

EVALUATION OF THE INSTITUTE FOR TRANSURANIUM ELEMENTS (ITE)

RECOMMENDATIONS FROM THE REPORT OF DR. HANSEN CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Maintain excellence of staff - transfer knowledge at retirement by early use of pensioners
2	Maintain reputation in actinide research - facilitate access to laboratory
3	Strengthen safety research - develop / improve analytical methods for safeguards
4	Set up interdisciplinary teams for projects - extend project management - promote cost accounting transparency
5	Establish early planning of activities for 3 year contracts; 3 year contracts may not be appropriate in highly specialised areas; continue hosting young scientific fellows
6	Apply adequate resources to maintain present nuclear authorizations
7	Employ stepwise approach to certification and accreditation

EVALUATION OF THE INSTITUTE FOR ADVANCED MATERIALS (IAM)

RECOMMENDATIONS FROM THE REPORT OF PROF. BATHIAS CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Site work near, upstream of Industrial Research
2	Work in coatings area to be generic or precompetitive
3	Open access databases encouraged but maximum outsourcing of routine tasks
4	Avoid duplication of activities or important equipment between Units
5	Characterisation is an important core competence for the Institute
6	Encourage shared cost actions
7	More inter-Institute collaboration in JRC
8	Complete project management and total quality management introduction
9	Examine recruitment procedures for scientific staff
10	Enhance educational role, enhance number of doctoral and post-doctoral fellowships
11	Increase mobility with short term attachments
12	New mechanisms to start industrial third party work more quickly
13	Contact European experts when establishing new activity fields

EVALUATION OF THE INSTITUTE FOR SYSTEMS, INFORMATICS AND SAFETY (ISIS)

RECOMMENDATIONS FROM THE REPORT OF MR. BENTON CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Test results against competitive approach where technology is widespread in many laboratories
2	Evaluate 3-D holographic image processing by industrial panel and confront industrial market
3	Opto-instrumentation for ELSA application should be further tested
4	Develop analytical package for masonry structures
5	Encourage collaboration with Japan in seismic research
6	Critical mass not yet achieved in repair and strengthening structures
7	Suggest external evaluation of ADIN
8	3 year staff should be allowed to apply for admission to Reserve List
9	Reserve List laureates should be free to apply for 3 year contracts
10	Director should carry reserve of 1 to 3 persons
11	Patent administration should be moved to Institutes - with revenues to initiating Institutes
12	Encourage Programme User Advisory Boards
13	Explore establishment of commercial incubator facility
14	Encourage exploratory research
15	Develop and calibrate analytical tools, modelling techniques, system integration methods
16	Encourage mobility of some senior ISIS staff to relevant Directorates General to improve technology transfer
17	Extended competition is encouraged

EVALUATION OF THE ENVIRONMENT INSTITUTE (EI)

RECOMMENDATIONS FROM THE REPORT OF PROF. BORREGO CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Maintain scientific support to environmental and consumer protection policies
2	Extend collaboration to all EU Member States and Associated countries
3	Increase multi-disciplinary approach - particularly including Life Sciences
4	Follow developments in food and drugs area for possible future actions
5	Follow developments in water research and resource management as potential development area
6	Continue concentration of laboratories and facilities
7	Foster internal collaboration with inter-Unit projects
8	Plan early for coming retirements to safeguard competences
9	Seek means of inserting new staff at the necessary time
10	Maintain user satisfaction, regularly check opinions, follow-up discrepancies
11	Be prepared to increase competitive activities to 20%
12	Encourage documentation of output, preferably in peer reviewed journals

EVALUATION OF THE SPACE APPLICATIONS INSTITUTE (SAI)

RECOMMENDATIONS FROM THE REPORT OF PROF. URPO CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Avoid unnecessary duplication of radiation transfer modelling (one small group for the Institute)
2	Establish regular cooperation between units concerned with remote sensing of forests
3	Don't develop 3-D models, cooperate with experienced groups - concentrate on remote sensing part
4	Explore recruitment of experienced staff in UV radiation for atmospheric research
5	Appoint advisory group or convene Visiting Group every two years
6	Maximise collaboration with other JRC institutes
7	Include industry representatives in working groups and Committees

EVALUATION OF THE INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES (IPTS)

RECOMMENDATIONS FROM THE REPORT OF DR. WHELAN CHAIRMAN OF THE VISITING GROUP

No.	Recommendations
1	Widen project teams via ESTO with policy makers, academics, industrialists
2	Make more use of JRC specialists
3	Form projects' relationships with best research groups
4	Help to animate discussions on European foresight actions
5	Form working relationships with ETAN programme
6	Continue developing IT and communication utilisation
7	Introduce formal Project Management and Quality procedures
8	Build more experienced Brussels team, exchanges with customers
9	Increase customer interaction and measure project outcome - develop value indicators
10	Take leading proactive stance in identified major European issues

ANNEX III

JOINT RESEARCH CENTRE
JRC

COMPOSITION OF THE VISITING GROUPS TO THE JRC INSTITUTES 1996

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ANNEX IV

JOINT RESEARCH CENTRE
JRC

TERMS OF REFERENCE OF THE VISITING GROUPS TO THE JRC INSTITUTES 1996

A-98

TERMS OF REFERENCE
FOR THE VISITING GROUPS FOR THE EVALUATION OF THE
JOINT RESEARCH CENTRE'S INSTITUTES

1. To evaluate progress in performing work in accordance with the objectives set out in Council Decisions 94/918/EC and 94/919/Euratom, documents addressed to the Board of Governors, the JRC's Annual Workschedules, budget etc., taking into account the results of the last JRC evaluation performed in 1993-94.

2. To ensure that the Institute has effective mechanisms to set its local scientific objectives, monitor progress towards those objectives and evaluate outputs.

3. To review the various research activities to assess:

   a) the relevance of the work with respect to Community needs, including the relevance of work performed for external customers, when applicable. In particular whether the objectives initially set for the Institute are still valid against evolving S&T, industrial and socio-economic conditions;

   b) the scientific quality and productivity of the Institute;

   c) whether full advantage is being taken of scientific opportunities in the light of funding and other constraints.

4. To assess the effectiveness of the scientific management leadership within the Institute.

5. To advise on whether the Institute has been making efficient, effective and economical use of resources in carrying out its programmes and management functions. Resources include manpower, money, services, facilities, data and equipment.

6. To review the extent and effectiveness of the Institute's external scientific links, including cooperation with research organisations, the higher education sector, industry and government departments in the Member States.

7. To examine the relationship of the Institute's work in general, to the mission of the Joint Research Centre and to its forward strategic planning as well as to the overall objectives of the Framework Programme. Therefore assessing:

   - the contribution towards the improvement of the competitiveness of European industry and the economic impact (both direct and indirect) that has already been, plus that which is expected to be achieved;

   - the contributions to strengthening the scientific and technological bases;

   - the contributions to relevant Community policies such as environment, industry, agriculture, transport, employment, cohesion, etc.

   To assess the European added value of the Institute's activities on the basis of the subsidiarity principle.

8. To make recommendations and report to the Board of Governors of the Joint Research Centre.

ISSN 0254-1513

COM(97) 164 def.

DOCUMENTEN

NL **15 01**

Catalogusnummer : CB-CO-97-152-NL-C

ISBN 92-78-18377-6

Bureau voor officiële publikaties der Europese Gemeenschappen

L-2985 Luxemburg

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