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EXTRACTS FROM THE FINAL REPORT OF
THE WORKSHOP ON INTELLECTUAL PROPERTY RIGHTS (IPR) ASPECTS
OF INTERNET COLLABORATIONS

European Commission, Research Directorate General, Directorate B,
European Research Area: Structural Aspects, Unit B.3,
Research and Innovation, Brussels

Working Paper

Extracts from
The Workshop Report on IPR (Intellectual Property Rights) Aspects
of Internet Collaborations
prepared by
the Rapporteur Ove Granstrand, in conjunction with
Workshop Co-Chairmen Dominique Foray and Paul David
and a group of independent experts attending the Workshop
organized by the
European Commission
Research Directorate General
Directorate B - European Research Area: Structural Aspects
and
based upon a Workshop of STRATA, Improving Human Potential Programme
held in Brussels, Belgium, on January 22-23, 2001

Final Report - March 2001

These extracts from the Workshop Report on IPR (Intellectual Property Rights) Aspects of Internet Collaborations, published as a working paper by the European Commission, have been added to the support documents for the International Conference on Intellectual property, the Internet, Electronic Commerce and Traditional Knowledge, to provide information on ongoing discussions in the scientific and business community of Europe concerning the impact of intellectual property rights (IPR) on R&D and transfer of knowledge and technology.

The aims of the workshop included identification of intellectual property rights (IPR) issues, problems and opportunities specific to intensive Internet collaborations.

The Final Report on the Workshop on IPR (Intellectual Property Rights) Aspects of Internet Collaborations was prepared by the Rapporteur Ove Granstrand in conjunction with workshop co-chairmen Dominique Foray and Paul David and a group of independent experts attending the workshop for the European Commission, Research Directorate General, Directorate B - European Research Area: Structural Aspects and is based upon a Workshop of STRATA, Improving Human Potential Programme, held in Brussels, Belgium on 22-23 January 2001.

In this extract we have included the following chapters:

- EXECUTIVE SUMMARY;
- RECOMMENDATIONS;
- WORKSHOP PARTICIPANTS;
- FOREWORD;
- TERMS OF REFERENCE;
- BACKGROUND;
- GENERAL PROBLEM AREAS;
- MAIN THEMES OF THE WORKSHOP DISCUSSIONS: ISSUES, PROBLEMS AND RECOMMENDATIONS;
- SUMMARY OF KEY POINTS OF CONTRIBUTED PAPERS;
- GLOSSARY AND ABBREVIATIONS.

The full text of the Final Report of the workshop on IPR Aspects of Internet Collaborations, organized by the European Commission, Research Directorate-General, has been published in March 2001 and is available from the IPR-Helpdesk website http://www.ipr-helpdesk.org
and can be can be downloaded (in pdf format) by following the link as follows:
ftp://ftp.ipr-helpdesk.org/ipr.pdf

The organizers of the International Conference on Intellectual Property, the Internet, Electronic Commerce and Traditional Knowledge should like to express their thanks to the European Commission, Research Directorate General, Directorate B – European Research Area, and in particular to Dr. Frederick Marcus, Research DG, EC and Mr. Alexander Weir, Communications Manager, IPR-Helpdesk, for providing access to this information for the benefit of the participants in the International Conference.

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EXECUTIVE SUMMARY

IPR Aspects of Internet Collaborations Problems

The subject matter of the workshop on the "IPR Aspects of Internet Collaborations" was acknowledged by its participants to be important in the process of forming and executing future research collaborations. Key features of IPR practices as well as of Internet communications are complex and will probably become more complex over time. Increasing costs, times and risks in complex RTDI investments will create a growing need for those organising collaborations to consider IPR issues.

The Internet speeds up communications and access to large sets of data, reduces transaction costs on average and facilitates interaction between researchers working remotely as a complement to traditional modes of interaction. One main new feature of these research partnerships is the use of large shared and interlinked databases and the software required to work with them. It is necessary for policy makers, executives and potential participants in collaborations to come to terms with the associated consequences and problems, as follows:

P1 The main IPR model used so far in publicly funded collaborative projects producing databases is the open science model, creating an "IPR-free" zone. This approach mostly relies on public funding. This "IPR-free" model is vulnerable to IPR usage in general, and can be threatened, e.g. when one or a few of the participants uses the collective information and converts it into private domain information, leading to a 'one way IPR route': Once IPR ownership and control are introduced, it is almost impossible to return to an open science model. The incentives to establish IPRs are strong, since perceptions are that a basic science discovery may have huge application value. Establishing IPRs for one, perhaps very specific, purpose may then "close" access to the knowledge base for other basic research or industrial advances. IPRs are established for several reasons in addition to the intention to commercialise an invention, including the need to defend against a rival’s patent positions and the need to have IPRs to trade in cross-licenses. Participants felt that the introduction of IPR without any care can be bad from a society point of view.

P2 IPRs introduce a variety of incentives into collaborative research that can create barriers or induce breakdowns in collaborations that, otherwise, would have produced social value. The standard of comparison for examining the benefits from IPRs should not be solely the private wealth creation process for IPR owners but rather the net benefits that are available to society. Assessing the latter involves taking account of the increasing costs of establishing IPRs and negotiating access to them once they have been established. As in applied science, companies and other research organisations often establish IPRs in basic science, sometimes supported by public funds (along with their own), which may introduce substantial social costs. These costs might not be offset by benefits, even those accruing directly to the IPR owners. Since most companies and an increasing number of universities have adopted explicit policies with regard to the securing of IPRs, European RTDI policies need to take these motives into account even when there is little or no evidence for their public or private benefit.

P3 In RDTI collaborations many IPR and other legal and economic instruments come into a complex interplay: patents, database rights, copyrights, trade secrets, software protection, contract law, tax law, trespass law, and competition law, for which

harmonisation is mostly lacking. Databases become a new and dynamic research tool that typically is of large potential research and commercial value. In contrast with the need to apply for a patent, a whole range of rights may be automatically generated when a database is created. The exercise of these rights depends on the actions of the owners of the database, its data and tools for its analysis. The rights proliferate, overlap and complicate interpretations and in the end the work of collaborating researchers. The linked genome sequence and protein databases are an example. Easy access to the databases is vital to their optimal utilisation. Case studies indicate that funding arrangements may influence the decision as to whether or not to use IPR to obtain revenue from the use of databases (or interlinked databases) or Internet sites. Some source of funds is needed for constant updating, verification and maintenance. Shortfalls force a search for commercial revenue e.g. by licensing, which may compromise database usage.

P4 A range of model contracts such as those of the EU Framework Programme, supplemented by consortium agreements are useful in forming collaborations. However, surveys from the USA and anecdotal evidence from Europe and Japan suggest that partners, especially from industry, are reluctant to contribute their best knowledge and researchers to a project. This reluctance arises from the differences in perceived exploitation goals and value of resources of the partners and will worsen from a common obligation to pool knowledge and rights, e.g. to contribute to central databases. Therefore, flexibility in the use of IPR protection may be essential in forming a wide range of collaborations, as well as for commercially exploiting the results. Sometimes, creating a strong IPR climate might damage benefits of openness.

P5 Certain IPR management tools and strategies developed by industry and by PROs (public research organisations) have been successful in facilitating collaborations. One method is forming 'clubs' or ‘co-ops’ or new organisations of similar interest groups. Participants are inventive in developing their own IP rights management systems and procedures to make collaborations work, provided they are given the necessary flexibility and legal support. Too narrowly standardised model contracts do not allow this flexibility.

P6 IPR management and protection technologies for Internet and database usage have been developed or are being developed, including a variety of encryption or electronic copyright management systems, but their use is controversial. Moreover, many tools are so far targeted at world-wide access and e-commerce, not at research. An IP rights management system would involve IPR labelling (tagging), applied to contributed or produced knowledge in databases. In the domain of predominantly publicly funded research, some participants felt that it would neither be effective nor desirable to invest in 'technological fixes' for IPR, since open access is essential for optimising investigations. For mixed academic-industrial collaborations with ultimate commercial applications, others felt that such tools would be important for successful partnership formation and exploitation, and that appropriate systems could be successfully constructed and adapted for conditions of restricted access.

P7 Traditional legal structures govern Internet collaborations in principle, but their current adaptations are not directly aimed at fostering research collaborations. For example, database protection laws are aimed at large data compilations, rather than at multiple integrated (and evolving) databases with variable formats. Moreover, the laws are significantly different in the rest of the world and the EU, and this may have the effect

of discouraging the formation or lead to the breakdown of collaborations with partners not governed by European database laws.

P8 Research policy should in principal be based on an "evidence based" approach, including evidence from “natural” experiments, but there is relatively little information available on private-public Internet collaborations so far. There is a need to collect systematic evidence about and evaluation of the benefits and costs of contractual requirements for the disposition of IPRs in European RTDI projects.

RECOMMENDATIONS

(Although the workshop participants agreed on the problems and most of the recommendations, some changes were proposed by some of the participants on R2, R4, R6.)

R1 Integrated Internet research collaborations need to be adaptive, continuously monitored, experimental and evaluated. The demonstrated ingenuity of research partners in forming associations should be given maximum scope to deal with the complexity and range of possible structures and IPR provisions in a decentralised mode. Regular and direct person-to-person contacts are encouraged. Attention should be paid to the negative and positive aspects of the models chosen.

R2 In formulating Framework model contract provisions for IPR disposition that are to be supplemented by optional consortium agreement provisions there should be three recommended types or families of contracts corresponding to: a 'closed' or 'strong' IP regime; an 'open' or 'weak' IP regime; a 'hybrid' regime with co-existing models. Concerning the second and third type of agreement: In the domain of publicly funded research, some participants felt that the contracts should clearly establish procedures for granting IPRs to the public domain. For mixed academic-industrial collaborations with ultimate commercial applications, others felt that ownership agreements should be much more flexible and adapted to commercial exploitation, depending on the goals of the collaboration.
(R2 Supplemental view - Model contracts or supplementary consortium agreements for *Framework research with provisions for the assignment of IPRs should provide additional options to: 1) freely disclose IPR to the public domain and 2) to assign IPR to a designated legal entity that will offer licences to all parties freely or for a small administrative fee. Selection of these options should not adversely effect the project's negotiation, funding, or evaluation and are therefore best implemented as supplementary consortium agreements to be concluded after the finalisation of the contract.)*

R3 Model consortium agreements for creating ‘clubs’ or ‘co-operatives’ of contributors and users (where access to the database is free within the collaboration but controlled for outside access) should be developed, preferably with the participation of researchers and organisations experienced with such arrangements.

R4 The problems associated with the 'open science model' and the 'one way IPR route' should be addressed by a pre-formulated clear and well defined IPR policy towards patent, secrecy, copyright and data management, supplemented by compulsory dispute mediation (if not arbitration).
(Alternative View - Recommendation R4 should be suppressed)

R5 In open science Internet collaborations, it should be recognised by funding agencies that database management is a major and continuing effort, often lasting beyond project lifetimes. The importance of maintaining open access to basic science should be emphasised. Public disclosure as practice in open science is complementary to the proprietary IPR regime of R&D in promoting high rates of innovation over the long run and thus in raising levels of productivity and product quality. Both parts of the system must be kept in balance in the interest of long-term economic growth and rising living standards.

R6 The promotion of IPR awareness, IPR education and referrals to networks of IPR professionals are necessary activities for supporting RTDI Framework research. They can be crucial in situation where contracting is decentralised, bargaining power is unequally distributed among the partners, and the commercial exploitation of knowledge can involve misappropriation. The implementation of these activities depends upon the goals of the research involved. Concerns were expressed by some that there is little evidence supporting the value of expanding the direct role of the Commission in these activities and that doing so might increase risks to the consortium formation process. Others felt that these activities could provide new means for developing and exploiting IPR legal and technical possibilities. There was broad agreement that access to extensive external consultation, a range of model agreements (see R2) and contractual language for resolving disagreements would aid in reducing and resolving conflicts over IPR issues.
(Alternative view - Some participants felt that the following sentence should be suppressed: For mixed academic-industrial collaborations with ultimate commercial applications, extensive consultation, helpdesk facilities and development work should be available, including in-house (Commission) aid, in order to best develop and exploit IPR legal and technical possibilities, especially if R2 is accepted.

R7 Less experienced and less powerful partners in negotiations do need co-ordination and support. The commission should promote the formation of networks (clubs, co-operatives) of universities and research institutes which can act as one party in negotiations with industry.

R8 Ways must be found to address challenges arising from the uneven distribution of Internet infrastructure throughout the EU and the heterogeneity of research skills and capabilities to access technical support among and within the Member States.

R9 Participants strongly proposed further workshops and expert group activities in the general area of the "Role and Strategic Use of IPR in the Research Process in the Digital Age". They are aware that this recommendation has been made elsewhere, but it nevertheless needs to be reiterated for an evidence-based approach to research policy.

R10 In the longer term, present IPR legislation, especially concerning databases and software tools, should be examined to see how well it is adapted to the needs of the research community.

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FOREWORD

♦ This workshop on "IPR Aspects of Internet Collaborations" was organised by Research DG of the European Commission, in the context of a series of workshops supporting the European Research Area (ERA) activities.

♦ A group of external experts were invited to meet and discuss this topic, and to provide a summary of the background, problem areas, current situation, and guidelines and options for action by the Commission and policy makers and organisations in member states.

♦ A workshop "Terms of Reference" and "information pack" consisting of documents and references was provided before the workshop.

♦ Attendees submitted short, highly condensed summary papers on their contributions, which are included here with the workshop summary, giving their points of view. Several of these were revised after the workshop to include detailed commentary and individual summaries.

♦ The workshop consisted of presentations by invited speakers. These presentations were followed by open discussion.

♦ The workshop was also attended by members of the Commission services, who provided background information on relevant activities.

♦ This workshop report was written and assembled by the Rapporteur with the aid of the Commission services and the officer responsible for the workshop, based on summaries of the workshop discussions, inputs from the chairmen and participants during and after the workshop, and the contents of the submitted papers.

♦ The executive summary represents a large convergence of views, but also significant differences, which are explicitly presented as such.

♦ This report is the property of the European Commission, and will be publicly available and disseminated in printed form and on the Internet. Reproduction is authorised provided the source is acknowledged.

TERMS OF REFERENCE FOR A WORKSHOP ON: IPR ASPECTS OF INTEGRATED INTERNET COLLABORATIONS

Prepared by Frederick Marcus, Philippe Martin, Isi Saragossi, Research DG,
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BACKGROUND

This workshop is planned within the institutional context provided by COM (2000)6: "Towards a European Research Area " and COM (2000)612: "Making a Reality of the European Research Area: Guidelines for EU Research Activities" in support of European Research Area (ERA) activities.

The workshop finds itself at the intersection of two important ERA themes, namely the "Development of effective tools for protection of intellectual property (IPR)", where it is one of a related series of workshops, and "networks of excellence", which should involve intensive use of computer tools and electronic networks, and development of interactive working methods.

The pervasive trend towards globalisation and the acutely felt problem of mobility in Europe give rise to a need to unite the widest range of resources possible for certain projects.

Changes in the international IPR system and the growing potential for the marketing of fundamental scientific discoveries are modifying the way research is done, and guidance is needed for researchers and research policy on how to manage their scientific activity under these new conditions. Clearly, existing and planned legislation, and public funding rules and policies, on patents, copyright, databases and software have an important impact on how integrated Internet collaborations within Europe can be carried out.

Communicating by e-mail and exchanging reports over the Internet are now standard practices. The intensive Internet collaborations envisioned here go beyond that. Indeed, they denote collaborations or "collaboratories", in which a large amount of data and expertise are shared, accessed and modified in common, involving both codified and tacit knowledge and physical resources. In summary, the characteristics of an "integrated" Internet collaboration (and relevant IPR) include:

- simultaneous working on a large shared database (database directive);
- transmitting data over the Internet (copyright, trade secrets, disclosures);
- developing and using software tools in common (software copyright, patenting);
- specific technological areas (biotechnology directive, circuit design layout protection, etc.)

Technological advances in the future in ICTs will additionally pose new challenges, so far unspecified, which calls for continuing efforts of this sort. There is a complicating diversity of changing behavioural patterns, which could be called IP cultures. Unproductive clashes of different IP cultures are not solely derivable from economic and legal differences and are moreover influenced by a transition to ICT-based communications. Also note that the underlying economic incentive problem, which IPRs are designed to cope with, is linked to the motivation structure of researchers, which is a complex issue.

From an IPR perspective, there are two extremes of Internet collaboration, plus an intermediate area which is the most challenging, and of most interest to this workshop. In one

system (universities) incentives are largely based on free and open disclosure because, in part, doing so is believed to lead to the most rapid rate of progress in scientific discovery and the elimination of wasteful duplication. In the other systems (companies) a principal aim in producing knowledge is to prevent its 'leakage' to rivals in order to appropriate the private returns from research investment. The types are:

- publicly-funded collaborations tend to occur in "basic science" projects, where data is instantly published and freely made available, and where IPR is sometimes considered as a threat to the project;
- privately-funded collaborations with a clear commercial goal, either internal to companies or external between companies, rely on the full range of IPR protection for all data and activities;
- publicly- or mixed-funded collaborations involving universities, public research organisations, small and medium and large enterprises, doing research in the "grey area" involving a mixture of basic and applied science in a pre-commercial or potentially commercial framework.

All types have their role to play. It is important to document and understand how extreme types operate, and to use this knowledge to understand the challenges and opportunities for policy makers and researchers in organising the "intermediate" type of collaboration.

Especially given the inherent "leakiness" of Internet-based systems, if projects are to be planned that either have IPR-protected input or possible commercial implications, then researchers clearly need guidance on how to use or collaborate to produce IPR protected results. Model contracts and optional guidelines will often discuss patent provisions, and in a highly prescriptive way, but pay little attention to other forms of IPR, trade secret protection, or specific technical fields.

There are challenges even in basic research projects. An international Workshop on "Digital collaboration technologies, the organisation of scientific work and the economics of knowledge access" in Laxenburg, Austria, on 3-5/12/99 recommended tackling "the policy challenges raised by the European legislative effort towards reinforcing IPR protection. It seems evident that few among the affected European research communities are paying close attention to these challenges and there is thus a pressing need to properly document some cases of adaptive innovations in intellectual property law, to diffuse policy recommendations to preserve the public knowledge base necessary for scientific research, and to design codes and mechanisms that would better protect the access of researchers to the tools, methods and results of basic scientific inquiry".

AIMS: The aims of the workshop are to:

- Identify the main IPR issues, problems and opportunities that are specific to intensive Internet collaborations. IPR issues may not be sufficiently appreciated by researchers and a broader effort may be needed to assure the valorisation of research conducted using public funds. IPRs may also be a significant barrier to research collaboration because they involve the collision between research systems.
- Discuss the ways that these IPR issues have impacted existing collaborative research programs, and extrapolate to the effects they would have in intensive Internet collaborations. Complexities in IPR issues, particularly the uncertainty of the ability to protect proprietary interests, may create a substantial disincentive for the formation of collaborative research activities and this might be mitigated by

better information such as 'model agreements'. Consider how IPRs affect the efficiency (productivity) and effectiveness of collaborative research with and without Internet and other ICTs.

- Outline possible avenues to explore for making the best of the situation, to identify under what conditions intensive Internet collaborations are viable as far as concerns IPR, and provide guidelines for future action. Describe how IPR can be used as a tool to help design the collaborations. Alternatives (complements/substitutes) to IPRs (private property approach to the underlying incentive problem) like prizes and procurement contracts ought to be discussed as well.
- Discuss how the current structure of IPRs may be a barrier to collaborative research, because virtually all ideas and expressions are potentially subject to some form of IPR protection. The inability to define 'public domain' knowledge, to develop binding agreements that can effectively limit 'leakages' of potentially valuable proprietary knowledge in an ICT-rich context, and uncertainties about how to value or protect proprietary may be a substantial barrier to collaborative activity. If any or all of these factors are influential, policies to mitigate their influence may be worth considering.
- Identify, discuss and suggest problems and solutions regarding:

  a) Current/future ICT advances;

  b) Management of collaborative research.

SCOPE: Areas of IPR to address including, at least:

- the Database directive: Collaborations often construct databases containing common results;
- copyright legislation and problems of disclosure;
- software copyright and software patent legislation;
- patenting in general, and specific technological areas such as the biotechnology directive;
- managing trade secrets, tacit knowledge and know-how in collaborations;
- trademarks in a broad sense involving them as vehicles for recognition and reputation building for individuals and institutions. ICTs will enable more strategic use of trademarks and branding.
- alternatives to IPR (prizes, contracts).

Areas of scientific collaboration including:

- those presently using Internet collaborations: biotechnology, health;
- those, which will in the future: material sciences, geophysics;
- future collaboration in software R&D (new languages, operating systems etc.)

Methods of Internet collaboration including:

- shared databases, software, analysis methods;
- enhanced communication and remote working methods;
- future technology-based collaborative modes, i.e. Internet as we know it today is not a static, single given, thus a too narrow concept.

QUESTIONS TO DISCUSS:

a) Are existing public funding rules (e.g. model contracts) on collaborations suitable for encouraging integrated Internet collaborations? Are compulsory rules or suggested guidelines more appropriate? What role can be played by helpdesks and other support organisations?

b) What IPR issues should be considered (placed on a checklist) as advice to researchers, contract monitors, and policy makers, during the planning, operation, and exploitation of results of such collaborations? What should be put into consortium agreements?

c) Are collaborations restricted in scientific or commercial scope due to existing legal and funding rules frameworks? How does this affect public policy in establishing networks?

d) What are the identifiable future ERA research needs in the area of intensive Internet collaborations and IPR?

e) As a conclusion to the workshop, is IPR really a key and determining issue in forming integrated Internet collaborations, and in what ways? If so, how extensive is the problem, and how should it be assessed and dealt with?

f) How can the ownership of knowledge be determined, when it is diffused to other participants through the Internet or a database (who added what piece of information, when, ...)

g) Is existing IPR legislation in Europe encouraging the types of research collaborations envisaged?

h) What are key specific IPR problems. For example, what is the copyrightability of public databases that have been enhanced. Also, in consortium agreements, public funding organisations may put in clauses that could hinder licensing to commercial firms. There is concern of contributing information to databases that is confidential.

SUPPLEMENTARY QUESTIONS:

1) How will future ICT advances impact collaborative modes and IPR issues?

2) What role does different IP cultures and IP regimes (e.g. “open/closed”) play in collaborative research and how are they influenced by the use of Internet (e.g. regarding trust building and conflict resolution)?

3) What is the nature of the IP assembly problem and its possible remedies in collaborative research over the I-net (with its possibilities to register and recognise even “small” information and communication contributions). Should rights be regularly assigned to clearing houses or collecting bodies to reduce bargaining costs?

4) What types of internal and external disputes arise and how could they be resolved? Internet based bargaining and resolution (arbitration, mediation)? Special “research courts”? Special “internal IP rights”?

5) How could proper types or models of IP and licensing strategies be designed and matched to different types of collaborations (perhaps as umbrellas to model contracts, the latter then serving more as checklists and communication tools perhaps)? (Cf. the implicit licensing strategy in the open source movement).

6) What are the current and future “economies” of model contracts and compulsory clauses in an Internet environment?

7) What new business models for knowledge exploitation (involving Internet as a rule) are there for collaborative research to interface with?

8) How could “fair use”, “prophylax”, and conditional disclosure clauses be used in order to create necessary IP free zones, flexibility and action space?

1. BACKGROUND

The Changing Role of IPR

The main issue is whether collaborative research will be impeded or aided by IPR (Intellectual Property Rights) system, and in particular how this system (or rather unintegrated IPR systems) will affect Internet collaborations. The importance of IPR issues have rapidly grown since the advent of the pro-patent era in the USA in the early to mid-1980s. The emergence of this era was perhaps more a consequence than a cause of the technology-driven transition to a new type of economy with labels such as 'knowledge based economy', 'intellectual capitalism' and the like. The basic economic rationales and legal framework of the IPR systems around the world have not changed for centuries
however. During the 20th century the IPR field was dominated by lawyers; economists paid very little attention to it and so did industrial managers and policy makers in general, let alone the public at large. The rapid movement of IPR from backstage to the forefront of attention and strategic importance has therefore created a huge need for education as well as research on IPR issues, complex as they are from the outset.

New Technologies and the Changing Mode of R&D

The rapid emergence and deployment of new technologies further makes the instrumental use of the IPR system exceedingly complex, a trend that will continue in the foreseeable future. With this background it is naturally important to raise policy concerns about when, where and how the IPR system in its original form is still instrumental in the new economy. The trends stretching back into the 19th century towards professionalization of R&D (Research and Development); internalisation of R&D in industry; emergence of significant basic research in Humboldt-type universities; emergence of significant military R&D; globalisation and transition from individual centred to team centred R&D has largely left the basic legal and economic features of the IPR system unaffected. Rising investment costs and risks, premiums on speed to market and international competition have made all types of collaborative R&D more attractive. In-house R&D teams have become part of teams of collaborating companies, universities and other organisations. The advent of new ICTs (Information and Communication Technologies), the Internet in particular, has in addition lowered the cost of collaboration in certain respects (just as the fax and telephone once did) but is also limited when it comes to trust building and dispute resolution and fostering of a creative research climate. At the same time collaboration is complicated by the interdependence and dispersion of new technologies among actors requiring each collaboration to cope with mobilising and sustaining good efforts from good collaborators with smooth interfaces between background, foreground, sideground and postground knowledge, i.e. knowledge produced before, within, outside and after the collaboration, pertaining to each partner.

The Role of the Internet

The use of the Internet in collaborative research will have other, long-term and deep-running effects as well, e.g. creating entirely new modes of research collaboration and new types of products in a broad sense or results of research. Other ICTs will also have important impacts on the future of research collaborations, e.g. mobile access to the Internet, software intelligent agents (“humanoid” researchers), remote laboratory access, software robots “patrolling” the web for law enforcement purposes and artificial intelligence in general, including computer aided inventions.

A major issue now is whether the incentive effects of IPRs will be outweighed by increasing costs of using them, essentially through higher prices and transaction costs accruing in trading IPR related goods and services, IP processing, dispute resolution, R&D distortion, deterrence from litigation.

Preparing for the future through education and research is urgently needed, while short-term measures have to be taken to suitably adapt to the current situation.

Based on the workshop discussion, presentations and input papers, this report attempts to outline such measures as well as to suggest more long-run measures.

2. GENERAL PROBLEM AREAS

Matching Old IPR Systems to New Research Collaborations

The main problem of when, where and how the received old IPR systems fit and misfit the new economy with its new technologies has already been described above. More specifically in relation to intensive and integrated Internet research collaboration (Internet RCs), a main problem is that their potential has so far not been fully used in EC projects. Intensive use of the Internet will radically change both RC processes (modes of collaboration) and RC products (and results), in ways that are yet not fully known. The IPR system in order to be supportive thus has to be:

- adaptive;
- continually monitored;
- experimental;
- evaluated.

Proliferation and limitations of IPRs

The proliferation of IPRs both in terms of numbers and types through extensions, sui generis creations, lowering of standards and increased propensities to acquire IPRs are not necessarily conducive to more basic research as well as to some types of RCs. This creates a need for new and complementary IP approaches, e.g. creation of weak, open or free (in some sense) IPR regimes – with lower transaction costs but sustained incentive effects.

The difficulties to track and especially to value all recordable inputs in Internet RCs create a need for more accurate methods of valuation and remuneration, and the use of some complementary liability rules, and other incentive systems, e.g. prizes and recurrent contracting or recurrent grants.

Copyright laws were neither created nor are obviously suitable for Internet RCs. The same could be said about patents in relation to software and biotechnology.

Trade secret law is neither well adapted nor internationally harmonised and leaves many grey zones when applied to the Internet as well as to ICTs in general (e.g. faxing).

Trade mark laws and Internet domain names are also problematic in general but the problems are of less importance to Internet RCs.

Database rights are new and have not been sufficiently tried out yet, e.g. through evolving practices and litigation.

In addition, several IPRs may often overlap, international legal differences are palpable and jurisdictional problems accrue in cyberspace. This speaks as well for clearing away IPR issues by using decentralised and adaptive contracting as much as possible, everything else equal.

Behavioural aspects

The trend towards explicit licensing approaches (generous or not) may create solutions to short term funding problems but may at the same time create long term effects on behaviour in Internet RCs, e.g. towards more strategic, short-run profit or utility seeking behaviour. People involved in R&D often display a number of problematic propensities, for example to overvalue their own contributions and undervalue those of others, to frame problems in a disproportional way, to be chronically overoptimistic about their own progress, time and money wise; to blame others; and to fear in absence of trust.

These problems will then become more palpable and prone to produce misperceptions, tensions and conflicts in the absence of direct human contacts. The use of the Internet may reinforce these tendencies, while at the same time offer limited possibilities to build trust and resolve conflicts. This in turn creates a need for direct human-human (H/H) communications, complementing rather than substituting for human-machine-human (H-M-H) communications.

The management of Internet RCs must therefore be skilful in managing conflicts and cultural clashes and stimulate multi-mode collaborations rather than using a single Internet mode. These behavioural considerations are important in handling IPR issues in traditional R&D collaborations, with emphasis perhaps only on patenting the final results, but will become more complicated in Internet RCs with a proliferation of less than perfectly fitting IPRs, and difficulties to sustain a productive and creative research climate.

3. MAIN THEMES OF THE WORKSHOP DISCUSSIONS: ISSUES, PROBLEMS AND RECOMMENDATIONS

The short papers that were contributed to the workshop and attached to this summary report carry a high density of information that collectively responds to all of the queries posed in the terms of reference, and from several points of view. In what follows, we attempt to summarise the arguments, but they are sufficiently broad that you are urged to read the papers, of typically four pages each. Most of the papers were updated immediately after the workshop to include personal views on the discussion. Where appropriate, a conference paper is referenced by [Author's last name]. Since intensive Internet collaborations share all the problems of using IPR in research collaborations in general, some of the discussion centred on this aspect.

3.1 FUNDING BASIC RESEARCH COLLABORATIONS

Background and Issues: Large basic science collaborations such as the human genome project [Cameron] have assembled over the Internet a large set of interlinking databases with strong interconnections and different functionalities from software search tools. The databases resulted from a world-wide collaboration, with major inputs from publicly funded institutions

in the EU, USA, and Japan. All information was contributed and labelled as freely available. The databases provided a valuable research tool for universities for broadening the science base. They will also be the basis for most future development of bio-related industries.

Problems: The issue is how to build the reserve of basic knowledge [David, Foray, Steinmueller] and at the same time ensure commercialisation at some point in the process. There are also limits to the public funds available for basic science, especially when it is evident that industry is receiving a hugely valuable resource for free with insufficient competition in its exploitation to benefit consumers in the end. When public funding does not cover all needs, for example adding new functionality to a database, a new revenue stream is required. In the genome project, all partners contributed in a reasonable proportion, based on national funding of basic science, and all had open access to the results.

Options: One method is to charge use and licensing fees for database access, but this interferes with the free ranging access to the database and its integration into the research system. Informal licensing has limits as well. Industry can be charged for access to the database, but this leads to problems of restrictions on less resourceful outside researchers. The best solution is a strong and enduring commitment of public funding authorities to basic research.

3.2 FUNDING UNIVERSITIES AND PUBLIC RESEARCH ORGANISATIONS (PROs) IN COLLABORATIONS

Background and Issues: Staying in the forefront of research is increasingly expensive. Universities and public research organisations such as national laboratories are using IPR strategies to form and facilitate collaborations. These strategies need to be adapted to the Internet.

Problems: Research funds from public funding are often insufficient to maintain top-class research.

Options: To solve this, one form of collaboration is where several universities have pooled their microelectronics research departments to form a PRO [Ryckaert], which gets 20% public money and 80% industry money. Developing an integrated IPR strategy at all stages of the research process is not an afterthought of research, but a key feature of fostering collaborations and generating a revenue stream. To form networks of research partners, they have evolved an IPR model where all IPR brought to and produced by a network of partners is labelled R0,1,2 for IMEC owned, partner owned and jointly owned. Careful labelling of all IP items facilitates collaborations, and can be applied in a network environment. This then raises the technical problems of how data can be labelled in a
shared database environment (see below).

3.3 FOSTERING INDUSTRY - UNIVERSITY COLLABORATIONS

Background and Issues: In surveys, USA industry participants ranked their reasons for participating in these alliances in the following order: Access to new research at the top; then Development of new products; Maintaining a relationship with the university; Obtaining new patents; Solving technical problems. [Hall] On the other hand, university participants placed a high priority on two things: obtaining funds for research assistance, lab equipment, and their own research agenda; and obtaining insights into their own research by being able to field test theory and empirical research. They viewed acquiring practical knowledge useful for

teaching, student internships and job placement and obtaining patentable inventions and business opportunities as less important motivations for entering into research alliances with industry. Thus although neither group rated obtaining patents very highly, the university partners thought they were even less
important than the industry partners did. Taken at face value, the replies to the survey indicate that these transactions are driven by simple supply and demand: the university partners are selling the output of their research and development in return for the funds to do it. The transaction is structured as an alliance because of uncertainty and the need of industrial firms to monitor the progress of the research.

Problems: Because this kind of system for securing rewards to investments in research is so different from that to which most industrial firms operate, it is not surprising that tensions arise in settings where the conventions of one world (private industry) come up against the conventions of another (public R&D and university science). Restrictions in EU and national model contracts often prevent the best IPR being brought to projects. The attitude of many companies is that they "believe we own the IP developed for us under sponsored research. This view is often not shared by potential university partners." and that "many universities want to publish results prior to IP protection, and sometimes will not grant exclusivity." [Hall]. These problems are exacerbated in a shared database environment, where information from all parties is easily accessible and less secure.

Options: Large European industries, for example in telecommunications, have found that the EU Framework programme has been instrumental in fostering collaborations outside of their home country. Sample consortium agreements are essential, and they have found it helpful to label their IPR in a systematic manner, as owned by the contractor or by the University. [de Moor]. Still the model contracts do not allow industry to overcome its problems, and the problems listed by [Hall] are important. One solution would be to put fewer obligatory clauses in the model contract and leave more to model consortium agreements. Another would be to develop creative ownership schemes or use schemes for collective databases (see below).

3.4 GENERAL BARRIERS TO FORMING COLLABORATIONS

Background and Issues: In forming collaborative structures, including those involving the Internet, individuals and organisations have been highly creative in finding solutions allowing the collaborations to happen. However, given the complexity of collaborations, many partners, especially industry, would like more freedom to define the IPR arrangements, in order to fully use this creativity.

Problems: At the moment, there are inhibitions against putting strategically important IPR into collaborations, often imposed by public funding rules.

Options: A solution would be to put minimal IPR requirements into compulsory model contracts, and leave more freedom to adjust the IPR provisions in the consortium agreements. For this, the Commission could provide a set of voluntary provisions.

3.5 USING OPEN SOURCE COLLABORATIONS

Background and Issues: Open Source is another model for knowledge production, in which all products must be kept freely available. This must be symbiotic with other activities. Like open science, it relies on public funding to support those doing the work, or on charitable donations, including individual donations of free time and knowledge [David].

Problems: The problem is that most of the work is done by a few people. This small core needs to be supported by some means to do this. There is also the problem that enforced open licensing means that companies are unable to patent derived items that make use of the open source information, hence acting against the use of such systems. Said initiatives, although constructed with the best intentions and being motivated with great principles of IP sharing and the assumed benefits for society, are aiming at avoiding IP barriers. They do however neglect the economically necessary revenues for investing in the development. [Hall]

Options: Discussions tended to integrate open source with open science considerations.

3.6 INSTABILITY OF THE OPEN SCIENCE MODEL

Background and Issues: From a research and basic science point of view, the open science model has highly desirable features.

Problems: It was observed that the open science model functions very well until there is a "defector" from the system, who takes the data and then commercialises it, and starts to exclude others except on a commercial basis. Systems where the data are freely available to the public, but potentially has a very high commercial value, are especially susceptible to this. The telecommunications industry is a prime example of this [Granstrand]. This phenomenon has been observed in several areas where co-operation in sharing of information resources is voluntary and participants are free to withdraw in order to claim private property rights; it may be described as an equilibrium situation that is desirable, but very unstable. Once IPR is injected into a system, it is very hard to return to an IPR free regime.

Options: The options for avoiding this problem are both legal and technical. Legally, once the creators of a database are fully aware of their rights and able to assert them, they have a better ability to maintain the database in the desired access conditions. The database may also be protected through limiting the ability of people to copy it, but, inasmuch as some usage modes require extracting virtually the entire contents of the database for manipulation, this kind of protection may destroy its value as a research tool. If there are recurrent contributions over time among members in the open community plus means to exclude any defectors, the risk of defection is lower.

3.7 CHOICES BETWEEN OPEN SCIENCE AND COMMERCIAL MODELS

Background and Issues: A research group’s choice between an open science model and a proprietary model of information management is driven by several factors. One key factor for public funded organisations is the level and duration of public funding. An insufficiency of this may lead to attempting to generate a revenue stream [Cameron] e.g. by restricting access in order to raise the value of licenses permitting “outsiders” to access the data, or specialised software tools developed to process it. A purely commercial firm naturally wants to make profits from use of the database, and competition among licensees has to be ensured. Of

course, licensing may not be the most profitable way for firms to exploit the knowledge gained through their research, and even in a regime of licensing it may be more advantageous to permit free sharing of information-goods among certain categories of users. [David]

Problems: Attempts to charge licensing fees will divert some people from using the database, and harm the advantages of free access for everyone.

Options: Form clubs with full data access, or obtain improved public funding, or equity partnerships, or develop more differentiated licensing schemes. Licensing contracts are in fact flexible enough to accommodate a large variety of situations and interests.

3.8 THE IPR ASSEMBLY PROBLEM

Background and Issues: Modern technology in certain fields such as biotechnology and microelectronics involve a huge and growing IPR assembly problem, in that increasingly many pieces of IPR need to be assembled to produce modern "products" such as medicines or telephones, media programs or databases themselves.

Problems: IPR assembly create large transaction costs and even hold-up situations where key IPR holders block further progress

Options: There are several options for coping with the IPR assembly problem, such as improving technology market mechanisms, IP pooling, schemes for collecting and clearing IPRs, licensing incentives (e.g. through tax deductions), reducing the proliferation of IPRs (without essentially reducing incentives), and improving dispute resolution.

3.9 IPR AT DIFFERENT COLLABORATION STAGES

Background and Issues: The choice of when to inject IPR into research collaborations depends crucially on the stage of research and incentives of the partners [Foray, Hall]. The stages to be considered include the background to the collaboration, forming the collaboration, obtaining funding from different sources, exploiting the results, commercialising, and ultimately providing products and benefits to society.

Problems: Many researchers feel that IPR is an issue separate from the scientific process, or one that interferes with it, and that when it must be addressed, it is a subject entirely for lawyers at the end of the project, where it interferes with journal publication.

Options: Awareness, education, training and helpdesk activities need to concentrate on the strategic use of IPR at all stages of the research process, and at the same time as simple approaches to integrating IPR into the process need to be attempted (e.g. simple schemes for IPR labelling) [Ryckaert]

3.10 DATABASES AS NEW RESEARCH PRODUCTS

Background and Issues: It was agreed at the meeting that integrated Internet research collaborations are like other collaborations in many respects. The Internet tends to provide a means of increasing speed of communications and a reduction of transaction costs. However, a key distinguishing feature tends to be the existence of one or more, linked, large databases and software tools to analyse them. These databases have become both a new research object [Cameron, Steinmeuller] and a highly valuable resource in both knowledge and commercial

terms, and the use of these databases is now a major research activity as well. There is a whole “database industry” emerging. The optimal use of this resource is to allow free and open access to the database. [What is the reason?]

Problems: Creating and maintaining access to and the integrity of these databases and their supporting software is a long term and costly activity, and funding this is often complex and difficult in the public sector.

Options: One option is to arrange for long term public funding of a database or collection of databases of continuing public and private utility. The alternative is to generate a funding stream by restricting or otherwise aggravating access to all or part of the database, and to prevent copying of the database. The cost of this is that research will often be of poorer quality, and that less resourceful researchers are unable to use the full functionality of the databases.

3.11 INCENTIVES TO CONTRIBUTE TO A DATABASE

Background and Issues: The whole questions of incentives to contribute data to a database was recognised to be crucial. The question is inextricably tied to the question of quality of material that is put into a database in a collaboration, and to whether the collaboration will form at all.

Problems: In the case of data generated by for-profit institutions, they need to see a way of getting a financial return. For publicly funded organisations, they may feel it sufficient to contribute to the science knowledge base, but it may also be necessary to feel that they are achieving local (even EU level) policy goals, and that others who have access are contributing. Even in purely academic collaborations, there is a real problem of recognition and reward to those who contribute, financial or otherwise. Studies have shown that different parties bring very different motives to collaborations. The priority for academic institutions is often to produce journal publications, whereas producing IPRs and generating profit is key for industrial establishments. [Hall]

Options: One approach is to convince everyone that they will get at least as much out of a collaboration as they put into it. However, as soon as one partner becomes either untrusting or untrustworthy, the collaboration starts to fall apart. The other approach is to carefully define rights and obligations before the collaboration begins. In the case of Internet collaborations and large databases, the problem of avoiding such conflicts is crucial. Schemes for licensing in to and out from the database could be developed therefore.

3.12 DATABASE IPR MANAGEMENT

Background and Issues: The utility of using these databases often depends on free and open access to all the data [Cameron]. The efficient creation of these databases depends on freely available contributions, with a balance between the resources contributed and the degree of use.

Problems: However, this usually occurs only in the public funded regime, and if this tool is to be extended to regimes with a commercial content, new solutions need to be found.

Options: Several options were discussed, in addition to the existing open science model. These include user clubs, or consortia with specific rules for specific partners. The individual

labelling of ownership of each piece of data is conceivable, but involves transaction and access costs.

3.13 TECHNICAL PROTECTION OF DATA

Background and Issues: The Internet was not designed to promote protection of data, whereas databases in commercial collaborations have to be prevented from unauthorised use.

Problems: More sophisticated tools are being designed by users of databases generated by others to extract as much data as possible and at minimum cost from available databases, and attempts are often made to commercialise the data from someone else's databases.

Options: As a result, a whole range of defences are being developed, both technical and legal, including encryption, monitoring programs, watermarking, fair use limitations, counter-piracy measures etc. These need to be considered for use, for which awareness and education is needed.

3.14 TECHNICAL SOLUTIONS TO DATABASE IPR MANAGEMENT

Background and Issues: In the commercial world of entertainment such as music or films, there is typically one main producer and distributor of content, and a large number of customers who will attempt to copy such information for free. As a result, tools are being developed [Gonthier, Granstrand] for commercial use in protecting copyrighted material, such as books or music, that could in principle be extended to database management in a research regime. Such tools attempt to provide the means to label the IPR status of each piece of information, to protect it against unauthorised use, to track and meter its use, to authorise use and to provide a charging mechanism. Such IP rights management tools are embeddable in the content and could be made un-erasable by technical or legal means. To apply a surcharge on hardware to cover up for piracy is a blunt tool.

Problems: Strong reservations about the use and technical possibilities of such a system were expressed, including: the research utility of the database would be strongly reduced, since the ability to access all data easily would be inhibited; the technical difficulties put the enterprise in doubt in the research context; the difficulty of determining whether the data was used for commercial or research purposes, etc.

Options: However, such tools, combined with various IPR labelling schemes discussed above, could provide a way of getting commercial material into a database. Besides, several developments take place in this area, some of which could be adapted to a research context. A key technical problem, still to be solved, is to track and meter uses of various kind, and then to use the legal option of “fair use”, which ought to be extended in the public research domain.

3.15 LEGAL SOLUTIONS TO DATABASE MANAGEMENT - THE CLUB APPROACH

Background and Issues: The key issue is how to maintain the advantages of the approach of open science and free access to the full database in a commercial environment, in which control of the use of the database is desirable.

Problems: It is still difficult to control the IPR within a database, and especially one with Internet access.

Options: One approach is to form a database "club" on a contractual basis, where several groups form a contract which describes what will be contributed to the database, what access will be allowed, and how benefits and ownership are to be distributed and how disputes are to be resolved. Access to members outside the club would have to be regulated.

3.16 DATABASE LAW - THE DATABASE DIRECTIVE AND COPYRIGHT LAW

Background and Issues: The creation of shared databases and their manipulation is considered to be the key novel feature to Internet collaborations. Databases and their contents are automatically covered by database law and copyright law, and unlike patents where filing is a legal necessity, the very act of their creation generates certain property rights. To anyone contributing to, creating, maintaining, using, copying, verifying or interpreting the contents of such a database, it is essential to be aware of the extent of these rights. Otherwise, the risks of misuse of the database, from the point of view of the right holders, is very great. The Celera example, from the point of view of the Human Genome Project, is a case in point [Cameron].

Problems: The extent of rights, the overlap of database and copyright law, the ownership and enforcement of these rights is complicated. [Sanders] Moreover, the laws are significantly different in the USA and the EU, and this can have a significant impact and even an exclusion effect on EU-USA collaboration. A new database can be created, and new rights generated, by taking available data and databases and forming them into new ones. The law may not even be fully compatible with existing scientific databases. A complex database assembly such as the genome database has many external views, many different interconnections, and is not necessarily well covered by database law. A further complication can arise, as in the USA with satellite photos, where freely available data is put into a database with a government monopoly. Access then becomes more expensive, excluding less resourceful researchers. Such laws can also create adverse effects [David, Steinmueller], where the research process is severely impeded.

Options: A key first step is awareness, so that researchers are fully aware of the rights they have to what they create. Many other laws and rights can also be used to control access and ownership, including contracts, the law of trespass for excessive data mining, etc. Any collaboration must start with a clear image of how to manage these rights, especially to decide on the ownership, access and exploitation rights to the databases.

3.17 RESEARCH STRUCTURES

Background and Issues: Long term thinking about how to structure and incentivize projects is needed in conducting R&D and IPR work. Once a university signs e.g. an exclusive licensing contract, it is a long-term commitment.

Problems: Integrated Internet collaborations will pose a whole new range of unknown problems. It is inappropriate to impose fixed structures early in the process in a centralised way.

Options: We need an experimental approach to project management. We know little about Internet collaborations. Regarding the incentive function of IPR, maybe some prize system would be an alternative to an IPR in certain situations. A prize system can induce people into various collaborative behaviours. How you set up an incentive system is important since there

are various motivation structures among researchers. We need to find new ways of creating open and motivated, creative research spaces.

3.18 LEGAL STRUCTURES

Background and Issues: The legal structures controlling databases, software patenting, and associated laws provide powerful opportunities and constraints, but are largely untried in a research context [Sanders, Marinos].

Problems: There are important questions about which legal regime applies. There are significant legal risks putting data on the Internet. There are also significant problems of rights on collaborations that extend beyond the EU, because of different database regimes. The EU may be hurt by being excluded from collaborations with non-EU countries. The IPR system thus can create perverse effects.

Options: Suggestions for model contracts include providing options for how you can deal with the difficulties imposed by the database directive in international collaborations. We should improve patent search facilities and new search engines should also be developed adapted to research contexts. (Note that the EPO has ownership of this database, so it cannot be downloaded as a whole!)

3.19 EVIDENCE BASED APPROACH TO RESEARCH POLICY

Background and Issues: There is a need for information on existing collaborations in order to have an "evidence" approach to forming policies [Steinmueller]:

Problems: The role of IPR in forming, funding, and conducting collaborations is unclear and few systematic evaluations exist. If we are looking at contractual arrangements, we need to find out experience and best practice, and to find what motivates individual partners. It is also necessary to find if institutional management of IPR is cumbersome and e.g. the nature of any problems in getting the licenses that are needed, say in mixed ventures.

Options: The Commission needs to look at proposals that failed, and the nature of collaborations that actually form to identify any barriers to collaborations. The Commission also needs to see what are the industries, where collaborations and the Internet are most important. Case studies show biotech and databases are very important, as are microelectronics. If there is an attempt to commercialise universities, one has to view universities as an economic institution, being part of a higher education and research industry (in which the US is most competitive).

3.20 A RECOMMENDATIONS FOR MODEL CONTRACTS

Background and Issues: IPR provisions for existing EU model contract structures for collaborations are based on:

a) the fraction of EU funding provided;
b) prescribed conditions on access and ownership, and
c) the assumption that particular research parts can be associated with particular partners.

Problems: These model contract types do not seem to be well adaptable to desirable structures for Internet collaborations with large shared databases. In the domain of predominantly publicly funded research, some participants felt that the contracts should clearly establish procedures for granting IPRs to the public domain and/or explicitly renouncing an intent to claim or enforce specific IPRs produced as the result of the research. For mixed academic-industrial collaborations with ultimate commercial applications, others felt that ownership agreements should be much more flexible and
adapted to commercial exploitation, depending on the goals of the collaboration.

Options: Design three types of model contracts (with possible sub-contract types and optional clauses), corresponding to:

1. One closed or strong IP regime, with no open access, with controlled and strong IP orientation and enforcement, and with regulated entries and exits on a default basis; typically deployable in bi- or multi- company RCs or mainly private RCs.

2. One open or weak IP regime, with basically open access, with weak or absent (by waiving) IP orientation and collective community-type of IP enforcement by agreement and pre-agreed arbitration, and with open entries and exits by design; typically deployable in bi- or multi-university RCs or mainly public RCs (although universities may be private sometimes).

3. One hybrid (or intermediate) regime, with coexisting open/weak and closed/strong IP orientation depending on type of research results, being specified in advance; typically deployable in private/public RCs. Basically the IMEC model is representative for this regime. The labelling of RC components could be in line with IMEC's labelling and the ideas (if not solutions) of an Electronic Copyright Management Systems could be used. Schemes for licensing in and out (back and forth) should be worked out in advance for interfacing the open and closed parts of the hybrid IP regime. Since collaboration proceeds in stages, a stage-specific mix of open/closed regimes should be envisaged with controlled stage shifts. At a late stage a model contract for equity partnership should also be made available.

These three optional model contracts should be left to parties to choose from in a decentralised manner. Annual reviews should be undertaken with renegotiation points and options to switch models, according to progress and stage-shifts in the collaboration.

3.20B RECOMMENDATIONS FOR TRAINING AND SUPPORT

Background and Issues: The generally growing importance of IPR issues will be felt even more strongly in temporary inter-organisational R&D collaborations and especially Internet-supported collaborations. Training and support will then become more of a key feature also in the short run, while evaluation research on the issues is a key feature in the long run.

Problems: IPR awareness among researchers is indeed poor, the capabilities of strategic use are rare, and the appreciation of e.g. database protection is almost non-existent.

Options: The nature of the implementation of IPR awareness also depends on the goals of the research involved. Concerns were expressed by some that a strong emphasis on IPR in the domain of predominantly publicly funded research could result in extending the scope of IPR claims and management beyond that sought by participants in research projects.

For mixed academic-industrial collaborations with ultimate commercial applications, others felt that extensive consultation, helpdesk facilities and development work should be available, in order to best develop and exploit IPR legal and technical possibilities. Optional guidelines for consortium agreements [De Moor] should be furnished to give a starting point to negotiations.

In order to support a flexible model contract approach, the general training of researchers in IP should be undertaken (just as companies do), supplemented with extensive training of Research Collaborations (RC) managers in strategic IP management.

A reasonably strong in-house IP capability should be built up in the Commission, not only for helpdesk support but also for pro-active IP management support, plus for monitoring, adaptation and development of IP models, as well as for qualified procurement of IP tools and services, e.g. for patent clearance or infringement detection, e.g. by procuring software agents.

The Commission's IP unit for RCs should also be capable of building up and interfacing with a network of IP centres for teaching and research in Europe, the latter usable also as an IP help-network. In the long run, considerable teaching/education and research on the IPR system is needed.

The Commission should also consider forming clubs or co-operatives so that they can negotiate more efficiently with industry. Such organisations would also need support for sustaining collaborations and to negotiate their own IPR policies.

The costs for in-house as well as outsourced IPR-related operations in large industrial corporations typically fall in the range of 2-3% of total R&D expenditures (higher for small technology-based firms, especially start-ups). The corresponding figure for EC-commissioned R&D in the European Research Area is most likely much lower, despite the probably higher complexity and importance of IPR issues in this context.

SUMMARY OF KEY POINTS OF CONTRIBUTED PAPERS

SUMMARY: Dominique Foray - A preliminary note on the IPR aspects of integrated Internet collaboration: be prepared to cope with a large variety of problematics

Dominique Foray, Principal Administrator, OECD/CERI, France

The problematic of IPR and Internet collaboration is complex and includes many different cases. Groups have very different interests in the enforcement of IPR and different strategies of knowledge dissemination. The modes of expression of and access to knowledge can strongly vary on the web. For most of these cases, the uncertainty about the "right" IPR regime (if any exists) or the right pricing system is still very high.

There is thus a danger of over-generalisation from both sides: on the one hand, in pursuing the public good analysis and deliberating on its welfare economic aspect we are in danger to over generalise a problem which is limited to scientific and technological knowledge (and even to a part of that domain). On the other hand, in seeking for the best methods to support e-business of – say – the entertainment sector, we are in danger of over-generalising methods (such as ECMS methods) that could generate huge social losses if applied to the part of scientific and technological domain in which knowledge is highly cumulative. We must be prepared to cope with a great variety of situations – all captured by the expression "integrated Internet collaboration".

The Colline project as well as the Alcatel and IMEC cases developed respectively by Anne de Moor and Vincent Ryckaert during the workshop show that formal collaborations are areas of high levels of institutional creativity where the actors devise rules for sharing and appropriating knowledge.

These rules express a tendency towards the decentralisation of economic regulation. There is here, however, a risk of mismatch between this highly decentralised creativity which should be used by policy makers as a providential opportunity for policy experiments and evaluations, and the centralised effort aiming at the creation of a legal environment at the European level (database and copyright directives); an effort which makes very little use of the innovations generated at the local level. There is, for instance, a need to transform some of these local solutions and rules into "intermediate entities" that could connect local practices to more general institutions such as ordinary contract provision or other legal arrangements.

SUMMARY: Graham Cameron - Scientific Data, The Electronic Era, Intellectual Property

Graham Cameron, Joint-Head, European Bioinformatics Institute Wellcome Trust Genome Campus, UK: The International Nucleotide Sequence Database as a model collaboration; SWISS-PROT - moving from public domain to a licensing model; the scientific record in the electronic era.

In 1980 EMBL decided to establish a public DNA sequence database on public funds; No restrictions at all were imposed on the use or reuse of the data; A collaboration was established whereby each group collects data locally and all of the information is shared over the Internet; The patent data enters the shared collection via computer networks. We are

custodians of the data, not owners; We keep each other honest: no-one can restrict access to the data, because there three public sources; The database flourishes;

SWISS-PROT: A more difficult case, which struggles for funding. Everyone could do what they liked with SWISS-PROT; APART FROM CREATE A COMPETITOR; NO Policing at all. Wherever you got SWISS-PROT, if you were commercial you were obliged to pay a license fee; It worked - we raise enough money to a good job. So, what is the problem? Our collaborators have qualms about the licensing implications of including SWISS-PROT; This diminishes the motivation to ensure that all the cross-links are maintained; ISOLATION of islands of information serves no-one well. The value of the information is more than the sum of its parts; Creative discovery comes from unlikely journeys through the information space; No go zones restrict the right to roam.

Public databases are now as crucial to the scientific record as journals; Researchers spend as much time scanning databases as they do reading journals; Major high-throughput science projects are often designed to populate public databases; The scientific record should be: High quality; Permanent; Citable; Widely accessible.

SUMMARY: Anne De Moor - Participation of industry in the framework programme and contracts with universities on a bilateral basis

Anne De Moor, Legal counsel, Alcatel, and EITIRT, France

One of the achievements of Framework Programmes is that industry has now become "used" to co-operate in research with partners that might not have been their "natural" partners. This effect will be increased in the "Internet-age". Access to information / selection of partners will become easier.

Take scheme of FP5: The principle established in the applicable legislation that IPRs are owned by the party generating the result is acceptable - but by enhanced collaboration through Internet, partners might more come into situations, whereby results are co-owned. This is not preferred. It has the implication that an additional set of rules relating to the co-ownership has to be agreed upon.

Working together in basic research activities: We think it is good practice that partners come together and are satisfied with the mutual exchange of experience - which is an ongoing process during the project - and with the result. We think it is not good practice that partners are entitled to obtain a share of the results / benefits of other partners' exploitation.

We have good experience with establishing a "model consortium agreement", the so-called "unified consortium agreement (UCA)" for FP5-projects. This model has been elaborated by a group representing industry, universities, and research institutes. Alcatel works on the basis of bilateral contracts with research institutes / universities. For a long, lasting relationship, framework agreements are established. Distribution is made between two types of results:

Type A - owned by company solely;
Type B - jointly owned with research institute. Alcatel has successfully applied this scheme.

We recommend contracts to be known on beforehand, which means working on the basis of "model contracts". This means also that "special conditions" deviating from standard contract conditions should be avoided.

SUMMARY: Ulf Petrusson - Structural transformation towards license-based

Ulf Petrusson, Centre for Intellectual Property Studies, Department of Industrial Management and Economics, Chalmers U of Technology, Sweden: Structural transformation towards license-based R&D-structures – A structural pressure to “commodify” knowledge and establish knowledge-based markets?

R&D-structures

Is publicly organised and funded research in Europe going to be transformed into license-based structures? And is it so that in the process it has become important to transform knowledge, not only into assets, but also into commodities? The impact of information and communication technologies is especially interesting. Today the usage of databases in research is so extensive in certain fields that one could talk about the emergence of ”virtual laboratories”. Use of ICT’s makes it possible to govern information in a more organised way.

Commodification requires awareness of the creative origin and contractual claims
Commodification requires contractual control and license structures
Commodification requires a multilayered program for governance of knowledge
Commodification requires a knowledge and information-oriented infrastructure
Privatisation of knowledge - a commercial ethos in the research field?
The necessity of strength/market power to establish structures for cross-licensing?
Centralisation and specialisation of public research?
R&D-networks based on multi-layered governance structures - small actors are captured as knowledge providers without control?
Policy making in structural captivity – a legal theoretical approach
Policymakers structurally captured to control intangibles – result of global competition & IPR’s?
Importance of a communicative and pluralistic understanding of IPR.
Awareness of property claims / intellectual property law as a façade for self assertive interests
Policy-makers as a cog in a communicative machinery that structurally transforms societies
Designing IP & IPR´s concepts as structural tools – the regulation level
Designing and using IP & IPR´s concepts as structural tools – the contractual levels

SUMMARY: Dominique Gonthier - Digital World and Intellectual Property

Dominique Gonthier, DG INFSO, EC: Copyright Protection & Privacy with ECMS: Electronic Copyright Management Systems

We do need to think about intellectual property in a new way. We need to think differently about how we define these properties, how we value them and how we protect an exploit them. Protection should not aim to restrict access to the information but rather to open it up by defining simple, easy to use controls. Potential solutions to this problem are multi-faceted, they will emerge from an appropriate mix of legal, technical and political responses. The

application field of existing copyright laws and regulations urgently need to be extended in order to cope with the digital information environment and harmonise the various European legal contexts related to Intellectual Property.

Technical - Encouraged by the potential economic importance of the new so-called multimedia applications, technical solutions are beginning to emerge which aim to manage the rights attached to digital information transmitted over any kind of distribution networks, on or off-line. Further work is being planned to develop and implement "Electronic Copyright Management Systems -ECMS" for various application fields. Such systems are likely to include "Automatic Licensing Systems" as well as the means to identify protected information and their usage rights & conditions. Electronic means for payment of usage rights (including copyright) should also be included. New standards will have to be established to support these developments: data format to identify copyright material with standardised usage conditions, definition of standardised fees structure(s) related to standardised usage acts, specification of "black boxes" preventing unauthorised use, etc. While basic technologies are available, though needing improvements, their integration in comprehensive working systems as well as the supporting standards have still to be developed.

SUMMARY: Edward Steinmueller - Problems and Challenges of Integrated Internet Collaborations in the Area where both Commercial and Open Science Issues are Operative

Edward Steinmueller, SPRU-Science and Technology Policy Research, University of Sussex, UK: Problems and Challenges of Integrated Internet Collaborations in the Intermediate Area where both Commercial and Open Science Issues are Operative, or Honey, help, I shrank the science knowledge base!

There is a growing conviction that a central feature of the 'new economy' is the creation, ownership, and commercial exchange of knowledge. A central feature of these developments is a new trajectory of institutional and organisational change, the commodification of knowledge. Is this new trajectory consistent with economic reasoning and social reality? This question is rapidly becoming of paramount importance for the institutions and practices of the scientific community. The 'old view' that science was a public undertaking and that scientific knowledge was a bequest to all of humanity funded by those best in a position to pay for its creation is increasingly seen as obsolete. The 'new view' that science is an investment in intangible capital, from which there should be direct and identifiable beneficiaries as well as tangible 'wealth creation,' is on the rise. The structure of assumptions, from which this conclusion follows, requires careful scrutiny.

Ways must be found to address challenges arising from the uneven distribution of Internet infrastructure throughout the EU and the heterogeneity of research skills and capabilities. New means must be devices for establishing and validating the roles of individuals responsible for developing Internet resources, particularly when this is done in a 'not for profit' context.

New understanding of what constitutes a 'research output' and new standards for assessing and evaluating the relative quality of these outputs need to be devised to create a virtuous circle of

improvement in the creation of artefacts like virtual laboratory benches, information resources, interactive web sites, and so forth. We risk remaining stuck in an endless pattern of creating 'demonstrations' long past the point when such exercises are productive.

SUMMARY: Vincent Ryckaert - The Need for a Unified IP Terminology

Vincent Ryckaert, Patent Officer, Business Development, IMEC, Belgium

Integrated Collaborations, with or without use of Internet, between companies, universities and research institutes is often hampered due to a inadequate matching between the technical and legal aspects, that must be addressed while setting up and maintaining such collaborations. An alternative IP active approach for accelerating contract discussions is based on the use of an appropriate interface between the technical side and legal side of a contract.

As a case study the IMEC (http://www.imec.be) IPR model is presented. The Industrial Affiliation Programs (IIAP's) IPR model essentially defines three labels: co-ownership; owned by the related company; IMEC ownership. The increasing complexity of the 5-th framework type contracts necessitated the internal use of a labelling approach. Apparently a slightly modified IP model was sufficient to cope with the main IP issues within such contracts. Concerning the extension of a IP labelling approach in a network context, IMEC can announce that within the Hermes Partnership (http://www.hermes-europe.org), being a network of leading independent telecom research centres, the proposed approach is in principle accepted. As a conclusion one can state that the set-up of Integrated Collaborations requires a flexible unified scheme for fast but also accurate encoding IP agreements. As shown in the case study, such IP schemes can however also incorporate the open source basic IP sharing principle. Creation of an easy to deal with IP scheme can result in less averse IP aspects and enable an active but economically feasible IP approach rather than ignoring it.

Although open and private science has often been put against each other during the workshop, one must recognise all types of intermediate of mixed forms. One should take into account that:

(i) often the technological requirements (at least if one wants to performance top-class research) require input of industry (funding and expertise), and hence IP rights, and

(ii) often the path to exploitation later is blocked if the IP becomes too diluted due to project requirements.

As IP models often have options, one must make sure that the parties are of a sort of equal strength, otherwise the weak partners have no actual fair choice. The commission could (if not done yet) for instance promote the formation of networks (clubs).

SUMMARY: Ove Granstrand - The Role of Infocom Technologies in the New Economy

Ove Granstrand, Centre for Intellectual Property Studies, Department of Industrial Management and Economics, Chalmers U of Technology, Sweden

In summary, new technologies play two major roles for the emergence of intellectual capitalism. First, new technologies constitute a major factor in the generation of intellectual capital and new products in general and second, and more specifically for ICTs, new technologies facilitate the appropriation of benefits from intellectual capital and new products by raising excludability and lowering average transaction costs. Note that total transaction costs under intellectual capitalism may increase due to a larger total volume of transactions. This in turn may or may not imply that there is a way to organise the same set of economic activities with lower total governance costs.

The Internet with its web sites is a very important illustration of how ICTs play both these roles and thereby foster intellectual capitalism in two ways. Intellectual capitalism is enabled and fostered by a number of key functionalities offered by ICTs in particular, such as collectability, codifiability and processability of information and interactivity, selectivity, controllability and connectivity in communications. These functionalities enhance the possibilities of economic agents to profit from production and distribution of information, e.g. by raising excludability by building electronic locks and fences around information assets. The possibilities to combine both technological and legal means for protection may then lead to overprotection in certain areas.

SUMMARY: Michail Marinos - Basic features of Internet collaboration

Michail Marinos, Professor, University of Thrace, Greece: Basic features of Internet collaboration and Sides of collaboration

The activities which fit into the term of “collaboration via Internet” should be translated in legal categories, bearing in mind that these features imply a “joint” collaboration with the aim of common development and common exploitation of the output by using pre-existing material protected or not by IPR-Rights and accessing via Internet this material. The common goal, to achieve it through collaboration is what is matters. Behind it lies the idea of partnership to achieve with joint efforts the common goal, to create a “new output” using its own joint or third party resources. The members of a team form a partnership, which legally speaking is company law.

Before information (content, protected or not by IPR- Rights) is offered for commercialisation/exploitation, there must be legal certainty about the “ownership” on this content. The ownership can be understood as an direct output result of IR-Rights (ownership as an absolute and exclusive right) or in case of non protected information as direct attribution through the act of generation it or through contract. The crucial question is “who owns the “new” produced knowledge or information, which is created through collaboration. As far as a public funded database is concerned, the commercialisation of its contents it is free, since its content is non protected by any IPR rights. That means that its content falls under the public domain (=non protected by intellectual property rights+free accessible by any third party on equal conditions). In this case of the exploitation of the content parts of such databases the questions arises, whether its owner can prohibit the further commercialisation of the licensed content through contact (content licensing).

SUMMARY: Paul A. David - Digital Technologies, Research Collaborations and the Extension of Protection for Intellectual Property in Science

Paul A. David, Professor, University of Oxford and Senior Research Fellow, All Souls College, UK: IPR, the Knowledge "Commons" and Virtual Laboratories: Do 'Good Fences Make Good Neighbours' in Science?

Information is not like forage, depleted by use for consumption; data-sets are not subject to being "over-grazed" but, instead, are likely to be enriched and rendered more accurate, and more fully documented the more that researchers are allowed to comb through them. It is by means of wide and complete disclosure, and the sceptical efforts to replicate novel research findings, that scientific communities collectively build bodies of "reliable knowledge." There is good reason for caution in extending a system of resource allocation that can work well in the domain of conventional commodities, which are exhausted in the process of use and cannot be simultaneously enjoyed by many, into the realm of knowledge, information and scientific data. An overly literal application of the metaphor of "property" to knowledge, one that emphasises the desirability of socially enforced rights to exclude trespassers and to alienate "commodities" by means of exchange, may lead towards perverse economic policies in the field of scientific and technological research.

Noting that opportunities for formally and informally organised research collaborations are being greatly widened by the spectacular advances in digital technologies (including computer-mediated telecommunications), there are reasons for concern about the impact upon open science of the environment of intensifying international competition for markets in R&D-intensive products. Several passages in the Laxenburg Statement elaborate this tension.

"...Widespread patenting of research materials and computational algorithms, and copyrighting of scientific databases without due provisions for "fair use," are instances of recent legal innovations that have the potential to create crippling barriers to the free exchange of new scientific findings and to impede ready access by the world's research communities to the archives of scientific knowledge upon which the cumulative advance of scientific discovery and invention necessarily relies."

A research group's choice between an open science model and a proprietary model of information management is driven by several factors. One key factor for public funded organisations is the level and duration of public funding. A purely commercial firm naturally wants to make profits from use of the database, and competition among licensees has to be ensured. Even in a regime of licensing it may be more advantageous to permit free sharing of information among certain categories of users.

SUMMARY: A. Kamperman Sanders - Databases – Some Considerations

Anselm Kamperman Sanders, Senior lecturer in Trade and Intellectual Property Law at Universiteit Maastricht, The Netherlands

Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases provides copyright for databases which, by reason of the selection or arrangement of their contents, constitute the author's own intellectual creation, irrespective of the content of the database. The Directive also provides a sui generis database right, which enables the maker of a database to prevent extraction and/or re-utilisation of the

whole or of a substantial part, evaluated qualitatively and/or quantitatively, of the contents of that database, provided he can show substantial investment has taken place in the creation of the database.

When research institutions engage in the creation of collaborative online databases with non-EU partners, the subsistence, assignment and licensing of the sui generis right needs to be addressed.

In order to benefit from exceptions to the sui generis right, one has to be a legitimate user of the database. Whereas it is laudatory that the maker of the database can control access to the database, single and trusted source issues, as well as refusals to license may present a problem. The single source issue therefore needs further attention.

The digital environment presents unprecedented possibilities for controlling access and use of information through technological protection measures, conditional access and on-line contracts.

If it is true that normal use of large scientific databases, such as the human genome database, require large-scale extraction and re-utilisation of its contents, it should fall within the scope of the legitimate user rights of Art. 8 and 9 of Directive 96/9/EC. Even for the purpose of scientific research, however, it remains necessary to 'become' a legitimate user of the database, before such use may take place. It is submitted that rightholders to such databases compiled by the public sector should provide open and unrestricted access to the information held in the database.

SUMMARY: Bronwyn H. Hall - University-Industry Research Partnerships and Intellectual Property – A View from the US

Bronwyn H. Hall, Professor, Department of Economics, UC Berkeley, USA

The primary effect of the advent of the Internet on research collaboration is that it has lowered the cost of reproduction and transmission of information, which both facilitates collaboration over distance and reduces the cost of unintended spillovers from such research. Although the Internet has made the problem of appropriating the returns to research and development more difficult, it has not otherwise changed what was already an important tension between the goals of industry and university partners in collaborative research of appropriating and diffusing knowledge. Recent developments in the protection of Intellectual Property, especially in the U.S. and Europe, together with the increasing closeness of public and university research to commercialisation have heightened this tension, causing concern in the academic community and elsewhere: in the race to ensure that the incentives to create new forms of information such as databases and software are in place, we may have also slowed their diffusion in ways that will harm the very enterprise that was responsible for generating the IT revolution to begin with (the "digital boomerang," in Paul David's (1999) phrase).

1. The simple "economist's" solution to these problems are to grant IP rights, allow the market to ensure data provision and to subsidise scientists and researchers who need access to these resources for research purposes. However, there are many problems with the simple solution:

1) the politics of government granting organisations usually exhibit considerable reluctance to finance the acquisition of easily reproducible software and/or databases;

2) the transactions' costs of charging for data access can be substantial;

3) perhaps most importantly, imposing administrative and pecuniary costs on researchers who wish to use others' research tools as inputs, even if reimbursement is theoretically possible, tends to discriminate against new and young scientists without grants and also against "outsiders" with radical ideas.

SUMMARY: B. de Laat - IPR Aspects of Integrated Internet Collaborations – Some observations

Bas De Laat, Technopolis France SARL, France

This document contains some brief reflections following a seminar on IPR in Integrated Internet Collaborations. What exactly do we understand by Integrated Internet Collaborations? Four examples are considered: a research platform on multi-modal passenger information in France; A series of currently on-going projects (co-)funded by the European Commission; the construction of large databases; All researchers and engineers make use of internet. The extent to which IPR is currently addressed in connection with internet collaborations is variable.

The workshop allowed us to identify some critical issues. The most important ones in my view are: Collaboration versus IPR; Changes in IPR behaviour; Databases; Experimenting; Awareness. The question is to analyse what the difference between normal and Internet collaborations consists of. Therefore, one should focus on the issues that indeed make the difference, since they did not exist in their present form before, especially: Shared databases; Electronic data transmission; Commonly developed software tools; Specific technological areas (ICT and biotech, which, having research priority in more than one member state today, are good opportunities for the European Commission. One must than also ask what the difference is between Internet research collaborations and 'normal' Internet traffic. One could think of making a more anthropological study and even produce a 'Collaboratory Life'.

SUMMARY: Robin Cowan, Elad Harison - The EU Database Directive: Did Europe Adopt an Over-Protective Regime?

Elad Harison, MERIT (Maastricht Economic Research Institute on Innovation and Technology), Universiteit Maastricht, The Netherlands

The Bern Convention defines the legal provisions for protection of database contents that are copy-protected as artistic and literal works, whereas facts do not enjoy copyrights as no intellectual or creative effort is involved in their collection. Moreover, collections and anthologies of works are not copyrightable, as their contents are copyrighted by themselves.

The US statutes for protection of database contents are based on the case of Feist (1991), by which databases are copyrighted only if "a minimal degree of creativity" is involved in their production. Since then, although duplication of factual databases was permitted in the US and European producers appeared to gain a competitive advantage, the US information industry holds the lion's share of the global market.

The EU Database Directive, approved in 1996, intended to create intellectual property provisions for the uncopyrighted contents in the form of a sui-generis law.

Critiques of the EU Directive mention that it grants legal protection only in countries that apply a similar regime and therefore US databases are excluded from protection in Europe. Moreover, the Directive was approved in contradiction to WIPO's guidelines of harmonised IPR regimes and avoidance of international variations.

Finally, as scientific research relies on data processing to test and to generate new hypotheses, we evaluate the effects of information ownership granted by the EU Directive on science and technology. Most concerns relate to the influence of the Directive on accessibility of online databases and of the contents of digitised libraries.

GLOSSARY AND ABBREVIATIONS

EC	European Commission
ERA	European Research Area
EU	European Union
ex post valuations	Valuations in retrospect, after the fact
H-H	Human to human (communications)
H-M-H	Human to machine to human
Humboldt-type Universities	Universities with integrated teaching and research
ICTs	Information and Communication Technologies
Internet	A set of interconnected networks, appearing to the user as a single network
Internet	(with capital I) is an Internet using a specific Internet protocol (specification of bit order in data packages for data transmission)
IP	Intellectual Property (also used as an abbreviation for Internet protocol)
IPR	Intellectual Property Rights
licensing	Selling the right to use IPRs.
R&D	Research and development
RTDI	Research and Technological Development and Innovation
RC	Research collaborations
STRATA EC	programme for STRATegic Analysis of policy issues
sui generis	of its own kind, unique
www, Web or World Wide Web	System to link servers together to process control language data
Background knowledge	Knowledge relevant to but produced before a collaborative venture
Foreground knowledge	Knowledge relevant to but produced within a collaborative venture
Sideground knowledge*)	Knowledge relevant to but produced simultaneously but outside a collaborative venture
Postground knowledge*)	Knowledge relevant to but produced after a collaborative venture

*) Not commonly accepted terms but suggested here.

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