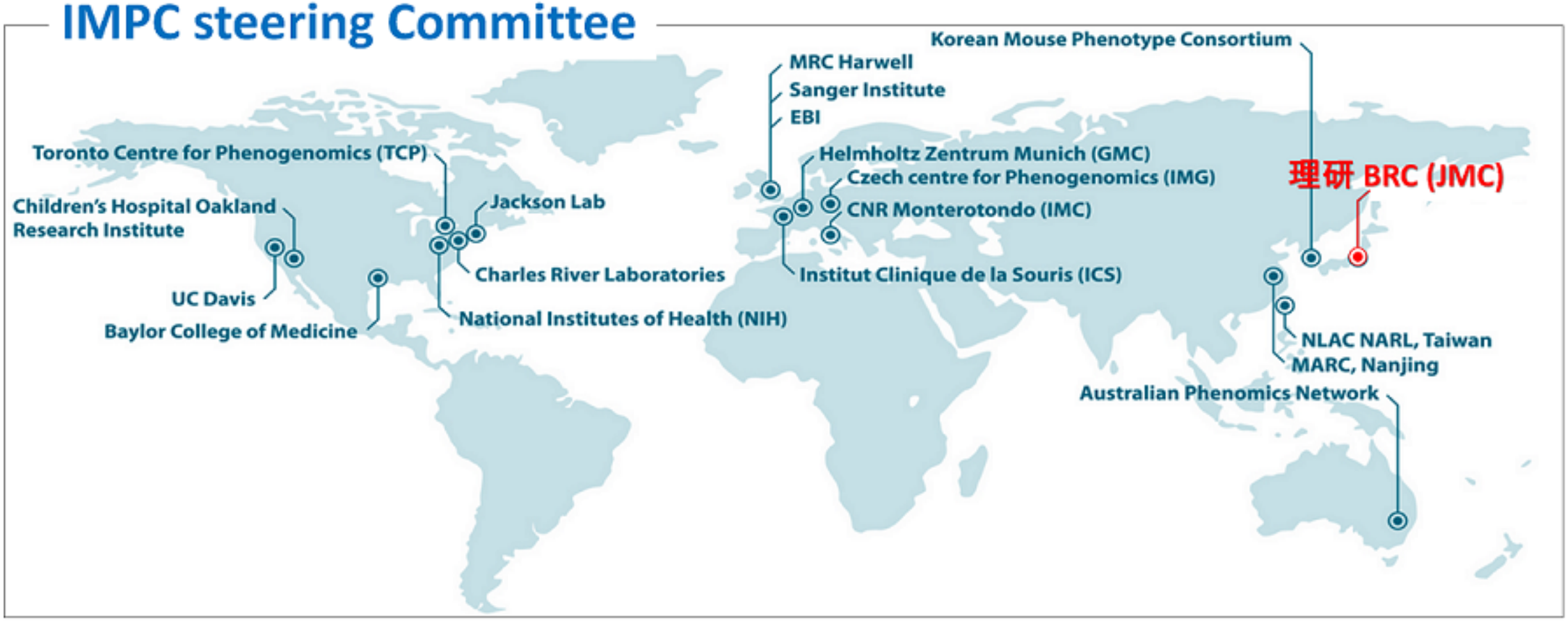
International Mouse Phenotyping Consortium

ゲノムプロジェクトによってヒトをはじめ多くの生物のすべてのゲノム配列が解読されました。しかし、ゲノム配列が解読されてもそのゲノム上にある遺伝子がどのような働きをしているのかはほとんど明らかになっていません。 そこで広くヒトの疾患モデル動物として広く用いられているマウスを使って、**個々の遺伝子がどのような働きをしているかを明らかにする 国際プロジェクトが始まりました。** それが国際マウス表現型解析コンソーシアム（IMPC）です。IMPCでは、国際ノックアウトマウスコンソーシアム（IKMC）で開発された各遺伝子について欠損させたES細胞からマウスを個体化して（現在ではCRISPR/Cas9法によるマウスの作製も行われています）、 2021年までにすべての遺伝子ノックアウトマウスについて**国際的標準プロトコールに基づいた網羅的な表現型解析検査を行うことで、 それぞれの遺伝子の役割を明らかにし、基礎医学や創薬の研究などに役立てる**ことを目的としています。さらに2016年からのPhase 2では、加齢性表現型に注目してパイプランを再構築しています。



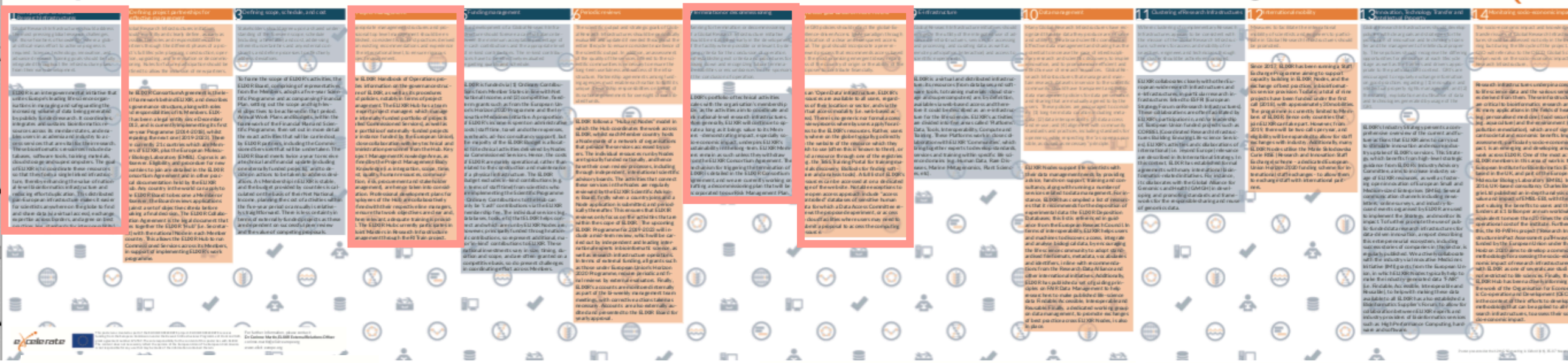
理研 IMPCホームページ

GSOの現状

- GSO work plan - October 2017 through 2019 springを策定
- 以下の５つのRIに関して2016年10月から2017年6月にかけてケーススタディを実行
    - **Underground Laboratories（素粒子原子核実験用地下実験施設）**
    - **International Mouse Phenotyping Consortium（国際マウス表現型解析コンソーシアム）**
    - European Separation Source（中性子施設）
    - Canadian High Arctic Research Station（高緯度北極圏研究所）
    - High Altitude Water Cherenkov Observatory（高高度水チェレンコフ光観測所）
- 上記ケーススタディに加えてGRI であるかどうかのSelf-Assessmentを４つの研究機関に提案（次項）
    - MagLab / NEON / SKA / ELXIR

Group of Senior Officials Framework for Global Research Infrastructures and how ELIXIR aligns

www.elixir-europe.org



1 Core purpose of Global Research Infrastructures

Global Research Infrastructures should address the most pressing global research challenges, i.e. those frontiers of knowledge where a global-critical-mass effort to achieve progress is required. Science, technology, innovation, and advanced research training goals should be fully integrated throughout the infrastructure plans from their early development.

ELIXIR is an intergovernmental initiative that unites Europe's leading life science organisations in managing and safeguarding the increasing volume of data being generated by publicly funded research. It coordinates, integrates and sustains bioinformatics resources across its member states, and enables users in academia and industry to access services that are vital for their research. These bioinformatics resources include databases, software tools, training materials, cloud storage and supercomputers. The goal of ELIXIR is to coordinate these resources so that they form a single linked infrastructure, thereby enhancing the value of national-level bioinformatics infrastructure and reducing effort duplication. This distributed pan-European infrastructure makes it easier for scientists anywhere on the globe to find and share data (via virtual access), exchange expertise across borders, and agree on best practices (e.g. standards for interoperability).

4 Project management

Appropriate management structures and professional top level management should be established, consistent with best practices derived from existing recommendations and experience at the international level, to ensure rigorous project management.

The ELIXIR Handbook of Operations provides information on the governance structure of ELIXIR, as well as its procedures and policies, notably in terms of project management. The ELIXIR Hub has a team of expert project managers which manage the internally-funded portfolio of projects (called Commissioned Services), as well as the portfolio of externally-funded projects (for instance funded by the European Union), in close collaboration with key technical and administration personnel from the Hub. Key Project Management Knowledge Areas, as defined by the Project Management Body of Knowledge (i.e. integration, scope, time, cost, quality, human resources, communication, risk, procurement and stakeholder management), are hence taken into consideration. Professional development plans for employees of the Hub are collaboratively defined with their respective line managers, to ensure that work objectives are clear and, where relevant, adequate training is provided. The ELIXIR Hub currently participates in a Joint Masters in Research Infrastructure management through the RITrain project.

7 Termination or decommissioning

Planning for termination or decommissioning of a Global Research Infrastructure initiative should be established early in the development of the facility where possible or relevant, by defining criteria for the conclusion of operation, and establishing exit criteria and procedures for closing down and recognizing future termination liabilities or encumbrances on the sponsors at the conclusion of operation.

ELIXIR's portfolio of technical activities scales with the organisation's membership size, as the activities aim to coordinate and link national-level research infrastructures. More generally, ELIXIR will continue to operate a long as it brings value to its Members - demonstrating impact, especially socio-economic impact, underpins ELIXIR's sustainability in the long-term. ELIXIR Members remain as such unless they withdraw from the ELIXIR Consortium Agreement. The mechanism for triggering the termination of ELIXIR is detailed in the ELIXIR Consortium Agreement, and we are currently working on drafting a decommissioning plan that will be incorporated to our Risk Management Plan.

8 Access goal based on merit review

The GRI policies should reflect the global-Excellence-driven Access (gEA) paradigm through publication of a clear and transparent access goal. The goal should incorporate a peer-reviewed process that recommends access based on the most promising emergent ideas, regardless of the country of origin or the ability of the proposer to contribute financially.

As an 'Open Data' infrastructure, ELIXIR's resources are available to all users, regardless of their location or sector, and via the virtual access modality (i.e. web-based access). There is no generic nor formal access review process whereby users apply for access to the ELIXIR's resources. Rather, users anywhere on the globe typically go directly to the website of the resource which they wish to use (often this is known to them), or find a resource through one of the registries (e.g. the TeSS Training Portal for training materials discovery; BioTools for finding software and analysis tools). A full list of ELIXIR's resources can be accessed at on a dedicated page of the web site. Notable exceptions to the open access approach include "access controlled" databases of sensitive human data for which a Data Access Committee reviews the proposed experiment, or access to cloud facilities where users may need to submit a proposal to access the computing resource.

GSOの現状

- 第12回会合を2018年11月にOxfordで開催
    - これまでは年間２回の開催を行ってきたが、評価基準の議論が一段落し固まってきたため年１回の開催に変更することを検討中。
- 第13回は2019年6月にFrance Roscoffにて開催
    - 議論の焦点
        - 評価基準を確定させる
            - Soft monitoringからのフィードバック
- 第14回の主催を中国が提案中
- 定期的にG7科学技術大臣会合で進捗の報告や提言を行っている
    - Advanced GRI Projectへの支援を要請
        - Underground Laboratories GRI
        - International Mouse Phenotyping Consortium GRI
        - 2019年の科学技術大臣会合ではこれらのGRIからの報告を予定

まとめ

- 2008年沖縄G8科学技術大臣会合にてGroup of Senior Officialの設立を議論
- 2011年より実活動に入り、
  - Global Research Infrastructure (GRI)としての判断基準であるFramework Criteriaの策定
  - GRIの利用促進に向けたプロモーション・イノベーション創出の分析
  - GRIの国際化の推進、等を行っている
- 現在Framework Criteriaの策定がほぼ最終段階にある
  - 定期的に会合をひらいてCriteriaの見直しは行う
  - 第13回　2019年6月フランス・ロスコフにて開催
- G7/G8 科学技術大臣会合への提言とGRI現状の報告を行っている

GSOは各国が有する大型研究施設の国際利用を推進することにより優れた研究を実現しようというものであり、個々の研究機関のアウトプットを最大化しようとするものではない。GSOで議論する研究施設は、「国際協力による建設・運営」が前提にあり（NASAのような）ナショナルプロジェクトは議論の対象ではない。

補足資料

G8科学技術大臣会合　議長総括より抜粋

Cooperation in Research and Development Resources

16.We acknowledged the necessity of promoting international cooperation in large-scale research facilities through the exchange of relevant information, by allowing other countries access to such facilities in a proper way including wider access by industry, and by sharing information on plans to construct new large-scale research facilities in order to promote mutual international use by international groups or individuals to avoid international investment duplications and to facilitate cost sharing where appropriate.

17.In strengthening such international cooperation in large-scale research facilities available for international use, we reached a consensus to exchange information, such as accessibility, on existing large-scale research facilities and basic information, such as the scale, priority and schedule for future facilities in each country. In order to continue the dialogue for international cooperation on large-scale research facilities in the future, including discussion of different models for their operation and their use, we reached a consensus to set up an ad-hoc group of senior officials, composed of representatives of G8 members as well as other invited countries. We recognized that the work of this group should take account of the output of existing fora such as the OECD Global Science Forum. We welcomed the US invitation for a first meeting in Washington DC in September or October this year.

18.18. We also emphasized the importance of promoting the international mobility of human resources in science and technology to further the development of science and technology on a global scale. In this respect, we stressed that the international use of large-scale research facilities could contribute to facilitating the international mobility and capacity building of human resources in science and technology. We also recognized the importance of further discussions on the promotion of “brain circulation” in which G8 countries not only accept human resources from but also provide them to developing countries.

1. Core purpose of Global Research Infrastructures.

Global Research Infrastructures should address the most pressing global research challenges, i.e. those frontiers of knowledge where a global-critical-mass effort to achieve progress is required. Science, technology, innovation, and advanced research training goals should be fully integrated throughout the infrastructure plans from their early development.

2. Defining project partnerships for effective management.

Global Research Infrastructures initiatives should explicitly and clearly define, as early as possible, the roles and responsibilities of the partners through the different phases of a project's full lifecycle: planning, construction, operation, upgrading, and termination or decommissioning. Rules for future participation should be defined to allow the inclusion of new partners.

3. Defining scope, schedule, and cost.

Stakeholders should agree upon a shared understanding of the foreseen scope, schedule (including a timetable) and cost, addressing inherent uncertainties and any external constraints, and define processes to effectively address deviations.

4. Project management.

Appropriate management structures and professional top level management should be established, consistent with best practices derived from existing recommendations and experience at the international level, to ensure rigorous project management.

5. Funding management.

The development of a Global Research Infrastructure should foresee a careful balance between the minimum acceptable percentage of in-cash contributions and the appropriate level of in-kind contributions. The in-kind contributions have to be effectively evaluated regarding quality and schedule.

6. Periodic reviews.

The scientific output and strategic goals of Global Research Infrastructures should be periodically evaluated and updated if needed throughout the entire lifecycle to ensure consistent excellence of the scientific output. In addition, an assessment of the quality of the services offered to the scientific communities is necessary to ensure the long-term usefulness and success of the infrastructure. Partnership agreements among funding agencies must enable each nation to fulfil its unique stewardship responsibilities on behalf of its national government for oversight of contributed funds.

7. Termination or decommissioning.

Planning for termination or decommissioning of a Global Research Infrastructure initiative should be established early in the development of the facility where possible or relevant, by defining criteria for the conclusion of operation, and establishing exit criteria and procedures for closing down and recognizing future termination liabilities or encumbrances on the sponsors at the conclusion of operation

8. Access goal based on merit review.

The GRI policies should reflect the global-Excellence-driven Access (gEA) paradigm through publication of a clear and transparent access goal. The goal should incorporate a peer-reviewed process that recommends access based on the most promising emergent ideas, regardless of the country of origin or the ability of the proposer to contribute financially.

9. e-infrastructure.

Global Research Infrastructure initiatives should recognize the utility of the integrated use of advanced e-infrastructure services for accessing, processing and curating data, as well as for remote participation (interaction) and access to scientific experiments.

10. Data management.

Many GRI have recognized that the data they produce are of value and utility to a broad scientific community. Effective data management and sharing has the potential to increase the pace of interdisciplinary research and scientific discovery, to inspire innovation, and to promote more efficient and effective use of research resources. Global Research Infrastructures that manage and maintain research datasets in service to the scientific community should have transparent and public data management policies for data preservation and sharing that are mutually agreed to by the users. These policies are encouraged to consider: (1) long-term data curation including metadata; (2) data interoperability; (3) data access and re-use; and (4) alignment with community standards and practices, including standards for openness, while respecting the "as open as possible, as closed as necessary" principle.

11. Clustering of Research Infrastructures.

Where clustering of complementary Research Infrastructures appears to be consistent with the mission of the Global Research Infrastructure, schemes for access and mobility of researchers, engineers and technicians through the cluster should be actively encouraged.

12. International mobility.

Measures to facilitate the international mobility of scientists and engineers to participate in Global Research Infrastructures should be promoted.

13. Innovation, Technology Transfer and Intellectual Property.

Global Research Infrastructures should develop policies with clear goals and strategies for the promotion of innovation and technology transfer and the management of intellectual property. These policies should recognise the differing opportunities for innovation at each lifecycle stage as well as the barriers and drivers appropriate to the particular GRI context. GRI's are encouraged to regularly exchange information on good practices regarding: (1) innovation and intellectual property rights management; and (2) the sharing, exploitation and utilisation of data and technologies generated by usage of the GRI.

14. Monitoring socio-economic impact.

The socio-economic impact and knowledge transfer issues of Global Research Infrastructures should be assessed not only in the beginning but during the lifecycle of the project. The GSO will refer also to the OECD Global Science Forum work on the socio-economic impact of Research Infrastructure

- 参考資料
  - GSO Work Plan : https://ec.europa.eu/info/sites/info/files/research_and_innovation/research_by_area/documents/gso_work_plan-102218us_to_uk.pdf
  - GSO Progress Report 2017: https://ec.europa.eu/info/sites/info/files/research_and_innovation/gso_progress_report_2017.pdf
  - GSO Case Study Report 2107: https://ec.europa.eu/info/sites/info/files/research_and_innovation/gso_case-studies_reports.pdf
  - GRI Self-Assessmentの例: https://ec.europa.eu/info/research-and-innovation/strategy/european-research-infrastructures/group-senior-officials-gso/gso-toolkit_en
  - Global Excellence-driven Access (gEA)に関しては2015年G7科学技術大臣会合に提出されたGSO Progress Reportを参照: https://www.bmbf.de/files/151109_G7_Broschere.pdf