Chapter 12
Technology Transfer: The Change of European Governance of Research from a Private Law Perspective

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12.1 Introduction

From a private law's perspective, the most significant change in research governance structures stems from technology transfer based on patents and licensing. It was officially made the Third Mission of universities, beside research and teaching, in all European countries by the end of the 1990s. In Germany, it was enacted by way of abolishing the privilege of professors to file patents autonomously out of their own right in 1998 (§ 2 Abs. 7 German Federal Law on Higher Education "Hochschulrahmengesetz" (HRG), BGBl I of 20.8.1998, p. 2190). At its centre is the broad commodification of academic innovations via patenting, assigned as property to the institutions and administered by them. The law reversed the traditional assignment to professors. The idea is to improve the overall competitiveness of knowledge-based economies by a property-protected influx of innovations. The consequence are novel contractual arrangements between academia and industry, ranging from the single acquisition of knowledge to long-term collaborations.[1] In this regard, modern technology transfer differs from previous forms of institutional arrangements which relied on more personal forms of "spill overs", e.g. geographical clustering in technology parks, transfer of personnel/employees, and managerial communication policies. Whereas the term "spill over" is used for incidental forms of knowledge transfers, "technology transfer" is meant to be intentional, specific and proprietary. In this sense, old and new forms complement each other. However, universities continue to struggle with the Third Mission. Not only has the amount of necessary

[1] In Germany, the legal basis is the novel assignment of academic inventions to the University in 2002. Before this time, inventions were attributed to the individual professor, former § 42 German ArbNErfG).

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contractual coordination risen (see e.g. DESCA[2] [infra]), but also the open and contentious question of funding and organisation of technology transfer offices in Germany. Organisational structures have ranged from intra-university departments to outsourced entities, and man closed or merged their operations until then. More important, technology transfer has challenged academic values and the very self-understanding of academic institutions as "knowledge creating" entities (in contrast to "profit generating" centres). These tensions became crystalized in a conflict between the League of European Research Universities (LERU) and the European Commission. LERU criticised the Intellectual Property (IP) policy of the Innovative Medicines Initiative (IMI) and the access policy of the European Commission as depriving the universities of their property (IMI 2010; LERU 2010).[3]

This article explores the concept and the persistent tensions with regard to technology transfer as *the* most important private-law-related change in research governance. First, the article will briefly track the historic development of technology transfer. Second, it will explore current structures on the European and on the national level, which gave rise to subsequent conflicts like the LERU-Commission's dispute, and will shed some more light on the situation in Germany. Third, it will subsequently discuss legal problems with regard to technology transfer before developing a modern concept of the role of public research institutions in technology transfer in Sect. 12.4. Some conclusions finalise the exercise in Sect. 12.5.

12.2 History and Concept of Technology Transfer

Technology transfer, in its wider sense, has always been an issue of European R&D policy, not only since an explicit R&D chapter has been introduced into the European Treaty in 1986. In the early days, European policy, focused on fostering industrial collaborations, aimed at advantages in scale. Its paradigm was on access ("freedom of competition") and sharing knowledge ("dissemination of information"). Influenced by the US experiences with the "Bayh-Dole Act", policy makers shifted towards property-secured technology transfer. The transition from the fourth to the fifth Framework Programme (FP) marked the watershed in technology transfer. For the first time, the participation rules allowed to grant exclusive licenses for knowledge arising from research funded under the fifth FP (Art. 30 sec. 1, 2 sentence EC-Reg. No 996/1999, OJ *L 122 of 12.5.1999*, *pp. 9–23* (European Commission 1999; Godt 2007: 165, 215)).

[2] **DE**velopment of a **S**implified **C**onsortium **A**greement for FP7, developed by a group of stakeholders of the European Framework Programme, ANRT (www.anrt.asso.fr), the German CA-Team (represented by Helmholtz – www.helmholtz.de and KoWi – www.kowi.de), Fraunhofer (www.fraunhofer.de), EARTO (www.earto.eu), Eurochambres (www.eurochambres.be), and UNITE (www.unite.be). It aims at a "reliable frame of reference seeking to balance the interests of all of the main participant categories in FP research projects: large and small firms, universities, public research institutes and RTOs".

[3] http://www.leru.org/files/publications/LERU_Letter_on_IMI_2010_09_02.pdf.

This philosophy was nourished by the modern "Mode 2"-paradigm, resp. the "Triple Helix" innovation theory. This theory suggests that property could help to transfer academic knowledge into the product development process. But unless academia transfers exclusive rights, industry will not invest in development. This idea demarks a departure from the linear innovation model which puts idle basic research at the beginning of the time line, applied research in the middle where practical applications are explored and industrial development at the other end of the time line when industry converts the idea into a product.

Since then, the impact of technology transfer has been much debated. At the core of discussions is the "entrepreneurial university"(Levie 1999; Gibb and Hannon 2006; Rothaermel et al. 2007). Whereas university managers and politicians have broadly embraced the idea as a means of defending the prosperity of the Western industrialised states against upcoming nations of the East (e.g. the Excellency Award of the German Research Foundation to the Technical University of Munich for its concept "TUM. The Entrepreneurial University" (TUM 2003–2011; Mogge-Stubbe 2006), sociologists like Richard Münch are much more skeptical (Münch 2007: 148). The latter fear that the specificities of public research will be lost. Universities could mutate to "workbenches" for industry and lose their independency. The "commercialisation" of research would lead to a neglect of research areas unappealing to industry (areas, where profits are not to be expected).

The European Commission seems to be aware of this policy conflict. In its Communication COM (2008) 1329 of 10.4.2008 (p. 6) it states as principle 9: "While proactive IP/KT policy may generate additional revenues for the public research organisation, this should not be considered the prime objective."(Commission of the European Communities 2008). In a very similar wording, the US National Research Council found in a study published in September 2010 that overall technology transfer might be beneficial; however, adjustments are due. Two conclusions stand out: Firstly, the idea that technology transfer offices (TTOs) have to finance themselves should be abandoned, and secondly, more governmental oversight is needed to secure public accountability (Merrill and Mazza 2010).[4]

Ultimately, the saldo of technology transfer seems to be mixed and differentiated (D'Este and Perkmann 2010). From a macro-economic point of view, it looks as if academic institutions contribute largely to an innovative technology development. Block and Keller find that two thirds of the top 100 innovations of the year have come from partnerships involving business and government, including federal labs and federally-funded university research (Block and Keller 2008). Young scientists profit from the development. They are being offered new opportunities to work in a research-close setting, and for some these activities serve as a spring board. Universities seem to profit since technology transfer offers new options for (long term) collaborations (D'Este and Perkmann 2010). On the other hand, academic institutions might to be deprived of steering their own research foci and sometimes put future options to pursue in-house research at risk. Whereas in the beginning the

[4] "[T]he likelihood of success is small, the probability of disappointed expectations high, and the risk of distorting and narrowing dissemination efforts is great" (InsideHigherEd 2010).

predominant concern was about delayed publications, skeptical considerations have shifted towards questions of access and the process of research as a whole. Researchers opt for research areas where they expect institutional support ("mainstream") and are discouraged from undertaking unconventional research. Contractual arrangements substitute what has been known as public domain. Proprietary arrangements require scientists to ask colleagues (and competitors) for permission to do research, and make newcomers hesitate to do research in fields which are perceived to be "taken" (or where patent thickets make research risky), thus thinning out competent colleagues who evaluate results.

12.3 Concepts of Technology Transfer

12.3.1 European Level

For European research policy, industrial politics have played a central role since the beginning. Art. 179 sec. 1. Treaty on the Functioning of the European Union (TFEU), states that "The Union shall have the objective of strengthening its scientific basis by achieving a European research area (…) and encouraging it to become more competitive, including its industry (…)".[5] In this regard, industrial applicability has been an integral objective of European research policy, requesting the participation of an industrial partner in most of the programmes. It has only become complemented by setting up the (basic-research oriented) European Research Council since 2006 (cf. Laredo, Groß and Karaalp in this volume). The following section focuses on the main instrument of European research funding, the Research Framework Programme (FP) (Sect. 12.3.1.1), collaborative attempts of European academic institutions to cope with the new task (Sect. 12.3.1.2), and novel collaborative instruments with shared funding between the European Union and industry, the Joint Technology Initiative (Sect. 12.3.1.3).

12.3.1.1 The Multiannual Research Framework

The most important instrument of the European research policy is the multiannual Framework Programme (FP), Art. 182 TFEU. It prescribes tenders to specific topics within specific programmes and allocates funds. In its various specific actions, it has always fostered collaborative research consortia. Not only did the European Union make the inclusion of industry a prerequisite for most of its

[5] The Wording of the Amsterdam Treaty (ECT, effective until 31. Dec. 2009) was more outspoken about its industrial objective: It read in its Art. 163 ECT: "The Community shall have the objective of strengthening the scientific *and technological bases of Community industry* and encouraging it to become more competitive at international level(…)" Italics, added by the author, indicate the differences between the versions of the Amsterdam Treaty and of the Lisbon Treaty).

actions, but it also shaped the proprietary set-up in these consortia by participation rules (issued as directly applicable regulation under Art. 183 TFEU (European Union 2008)). The rules of participation for the seventh Framework Programme (2007–2013) were issued as Reg. 1906/2006 (European Union 2006: 1), the rules of participation for the Programme "Horizon 2020" are about to be published[6] [Stand 30.1.2014].

As a default rule, intellectual property belongs to those participants who generate the invention (Art. 39 Reg. 1906/2006; Art. 41 Horizon2020-PR). Patenting is expected,[7] so is commercial use (covering exploitation via exclusive licensing and transfer).[8] One of the central objectives was the regulation of differences with regard to joint (resp. common) property of results developed under the project (and each co-owner's right to exploit the property share). Where no agreement was made, each joint owner is entitled to sub-license after prior notice, granting fair and reasonable compensation (Art. 40 sec. 2 Reg. 1906/2006; Art. 41 sec. 2 Horizon2020-PR).[9] In addition, access rights to project results and access to knowledge, which has been brought into the project, are stipulated (Art. 50 Reg. 1906/2006; more elaborated in Art. 45 ff Horizon2020-PR). Under FP7, project partners enjoyed the right to access either under fair and reasonable conditions or royalty free, Art. 50 sec. 1 Reg. 1906/2006. This right can be further qualified (e.g. "for research purposes/royalty free"). The right to use, as the standard FP7-rule, is limited to one year after the end of the project (Art. 50 sec. 4 Reg. 1906/2006). Horizon2020-PR differentiate more clearly between royalty-free access rights for implementation (Art. 47 Horizon2020-PR) and fair and reasonable conditions with regard to access rights for exploitation (Art. 48 sec. 2 Horizon2020-PR).

12.3.1.2 Model Contracts: EU Consortia Agreements (DESCA-Model[10])

The remaining flexibilities (esp. in the participation rules RF5-RF6) gave rise to a great variety of possibilities. Round about 57 varieties were counted, 17 different model contracts emerged until 2006 (all documented on IPR Helpdesk n.d.). This complexity was soon perceived too costly, too time-consuming, too complicated. Despite the sentiment that "one size does not fit all" the claim for one frame model

[6] http://ec.europa.eu/research/participants/portal/doc/call/h2020/common/1587751-h2020-rules-participation_en.pdf.

[7] Art. 44 sec. 1 Reg. 1906/2006: "Where foreground is capable of industrial or commercial application, its owner shall provide for its adequate and effective protection (…)".

[8] For the historic development with regard to commercial use forms see Godt 2006.

[9] Since 2005, this rule corresponds to German case law, at least with regard to common property (not joint property). The BGH clarified in *Gummielastische Masse II* (*BGHZ 162*, *342*) that partners have no financial claims to compensation when partners exploit common property unless they negotiated so. This legal situation corresponds to the one in common law countries (BGH 2005).

[10] DEvelopment of a Simplified Consortium Agreement for FP7.

contract became louder. The UK Lambert Tool Kit[11] (model for EU-CREST-Cross Border Decision Guide) took the lead claiming a "holistic approach", and voiced as a principle "at least a non-exclusive license".

Its Consortium 1-Model Treaty granted: (1) each of the others a non-exclusive royalty-free license to use its results for the project, (2) each of the others a non-exclusive royalty-free license to use its results for any other purpose, (3) it stipulates that any member of the Consortium may exploit any of the results. The models 2 and 3 gave more rights to industry.[12]

The Lambert Kit became the model of the European consolidation which is now known as the "DESCA-Model". It was made to become the single reference for FP 7 DESCA is a partnership of then five associations representing European universities, public and private research organisations, and industry.[13] The DESCA-Model is used by ca. 80 % of all FP7-Consortia. E.g. at the German Helmholtz-Institutes, it is used as the default contract for further negotiations.[14] Its goal is to find common ground which respects the interests of academia and industry alike. It cooperates with an initiative called "Responsible Partnering" (2005). Three elements qualify the DESCA-Model: (1) With regard to joint ownership, partners have the right to license (unless otherwise convened) after prior notice of 45 days and subject to fair and reasonable compensation. An alternative option is to grant the right to use, however *without* prior informed consent (PIC), information, compensation (No. 8.1 DESCA-Model, option 1 and 2). (2) Partners are allowed to transfer foreground, with (or without) PIC to a limited list of affiliated third parties (No. 8.2. DESCA-Model). (3) Beneficiaries have a right to veto publication under legitimate reasons which are (a) legitimate commercial or academic interests, (b) that the protection of the objecting party's foreground/background is affected (No. 8.3.1.2 DESCA-Model).

12.3.1.3 Joint Technology Initiative

A novel instrument, set up as "joint undertakings" under Art. 187 TFEU, are public-private partnerships (PPP) with shared funding between the European Union and industry. Until October 2010, five joint undertakings have grown out of the Joint

[11] Developed under the auspices of the UK-Intellectual Property Office and published on its webpage: see www.ipo.gov.uk/lambert, providing model contracts for (one to one) collaboration treaties, and for (multi-party) consortia (Intellectual Property Office n.d.).

[12] The "three model-version" (1–3) became substituted by a "four-model-version" (A–D) which is now found on the IPO-webpage (ibid). The open access strategy (Model 1) became refined and split into two versions (Model A or D). Model A grants partners non-exclusive licences to use results for the purposes of the project and for any other purpose. Model D grants non-exclusive rights to partners as well, however restricts to purposes of the Project only.

[13] European Universities: http://www.eua.be/; Research and Technology Organisations: http://www.earto.org/; 150 major companies: http://www.eirma.org/f3/cmps_index.php?page=home; public research organisations: http://www.protoneurope.org/.

[14] G. Bornemann on 11 March 2010, personal communication.

Technology Initiative. All of them were established in May 2008: the Innovative Medicines Initiative[15]), Advanced Research & Technology for EMbedded Intelligence and Systems (ARTEMIS),[16] Clean Sky,[17] the European Nanoelectronics Advisory Council (ENIAC),[18] and Fuel Cells and Hydrogen (FCH).[19] Each initiative has its own IP policy.

Most recently, the League of European Research Universities (LERU) raised concerns about the IP policy of the Innovative Medicine Initiative (IMI). It voiced objections against three rules which put academic institutions at a disadvantage in relation to industrial partners, compared to participation rules under FP7: (1) Ownership rules would anticipate, although not explicitly, that academic partners assign ownership to research results to industrial partners (here EFPIA). (2) Broad "research use" clauses for industry (including indirect exploitation, "royalty-free-option") deprive academic institutions of their royalties. (3) Access rights are unlimited in time, thus impede exclusive licensing at the end of the project (LERU 2010).

This initiative is interesting because it claims the same rights for academia which, up to now, industry has claimed for itself. Differing from earlier discussions, LERU is concerned about the universities' ownership position, not about academic values which might be affected by patenting (publication, research freedom, communication), nor about the issue of too much patenting or licensing ("royalty staking") (Godt 2008). Universities are concerned that they will be degraded to serve as the workbench of industry without due pay.

12.3.2 National Level

On the national level, the situation is quite similar. After the European Union shifted towards the concept of technology transfer, the member states followed at the beginning of the century – as many countries did worldwide (So et al. 2008).[20] Germany instigated the so-called "Valorization Initiative" ("Verwertungsinitiative") in 2002 when it shifted the patent ownership of academic inventions from individual professors to their universities. Since then, technology-transfer offices have been set up at almost every German public research organisation, including universities. While

[15] http://imi.europa.eu/.

[16] https://www.artemis-ju.eu/.

[17] http://www.cleansky.eu/index.php?arbo_id=83&set_language=en.

[18] European Commission 2010, Press release IP/10/542 of 6. May 2010,

[19] http://ec.europa.eu/research/fch/index_en.cfm.

[20] Interestingly, the same goal of fostering technology transfer was pursued with inverse instruments. In Italy, patent ownership was shifted back to professors in order to liberate their negotiation capacities with industry.

federal funding was cut back in 2011,[21] a consolidation process fostered centralisation either geographically or on the line of technology sectors.

Very similar to the concerns raised by LERU, a 2010-study (focusing on German TTOs) manifested that inventions made inside universities rarely become property of the academic institution (Godt and Marschall 2010: 8 ff.), irrespective of the reform of the Employees' Invention Act (German: Arbeitnehmererfindergesetz) of 2002. Three mechanisms stand out: (1) Ownership rights to inventions might be promised (resp. rights transferred) either to industrial partners or to independent organisations early in the process. In this case the university will not acquire property. (2) The situation is similar in so-called "trust situations". The university will only be the trustee of the patent claim. In terms of the common law, the university holds the "legal title" to claim the patent; the industrial partner is the beneficiary (and will hold its patent ownership as soon as the international patent is issued). Contractual arrangements vary. Sometimes, the transfer is finalised after 18 months when the file has been published by the agency which includes the university's name. The institution can then be researched in data banks and can be credited for the patent in the respective performance indices. Other contracts stipulate that the transfer of property will be executed when the procedure will be shifted from the national to the international phase of the application procedure under the Patent Cooperation Treaty (PCT). In any case, the patent will finally be issued to the industrial partner. (3) The "Fifty-fifty-rule" in Sect. 6.1.3 of the second edition of the Model Contract "Berliner Vertrag" (Goddar and Mohnkopf 2007, 2008; Goddar et al. 2009)[22] stipulates that in the cases of an industrial contribution to an invention above 50 % the whole property title will be assigned to the industrial partner. The rule defines "university results" as being either exclusively or above 50 % assigned to the university (ibid.: 43). It has a double consequence. First, the academic contributions below 49 % will altogether be automatically lost in terms of a proprietary title. Second, an uninformed, consensus-driven "fifty-fifty" formulation in contract negotiations can lead to a loss of (common or joint) property.

12.4 Re-thinking the Role of Universities

These discussions cause unease. Universities are in the process of a profound transformation; however, the direction is fundamentally controversial. There is a broad consent only to one thing: the vision of practical applicability of academic inventions. This expectation was formerly confined to "applied research" (distinguishing

[21] Bundesministerium für Wirtschaft und Technologie (2011) Richtlinie zur Förderung von Hochschulen und Unternehmen bei der rechtlichen Sicherung und wirtschaftlichen Verwertung ihrer innovativen Ideen (SIGNO), 13. Sept. 2011, Bundesanzeiger 147, 3364–3369.

[22] Goddar and Mohnkopf 2007: http://www.ipal.de/fileadmin/user_upload/downloads_wissenswertes/downloads/BerlinerVertrag_Vorwort_TN_Fibel_101007.pdf (accessed 21 September 09); Goddar and Mohnkopf 2008: 142–143; Goddar et al. 2009.

it from basic research). Today, basic research has to equally justify itself with "usefulness" – be it vague or just long term.

What has become unclear is the mission, the goal, the self-understanding of universities. The revenue measure, which seems to dominate today's day-to-day performance in TTOs,[23] is rather an expression of the change than the end in itself. The financial income measure only corresponds to the idea that universities have to stock up the basic public funding which tax-payers provide. In this regard, the leading idea is supplementation, not substitution. Public quests are melded with private yardsticks. The requirement of third-stream money instead reflects the shifts in concepts. The old concept of public finance for public institutions, the safeguarding CUDOS ideal of Robert Merton,[24] has given way to an idea of matching funds – without turning universities into private entities. The vision is "something in between": neither a "splendid isolation, financed by the taxpayer", nor (short term) "profitable knowledge production". The speech about "the entrepreneurial university" describes the direction without precisely defining the status quo. This situation has become intensified with the re-interpretation of the term by concepts of the "Intellectual Entrepreneurship" (Cherwitz and Sullivan 2002; Cherwitz 2005; Gibb and Hannon 2006) which emphasise the intellectual and practical (problem solving) impact of universities on society.

The underlying basis of the overall re-orientation of research institutions (including universities) is more profound. It is rooted in socio-economic changes towards the so-called knowledge and information society. As Münch (2009: 106) noted, technology transfer cannot be foregone since it is not technology transfer which is transforming public research organisations but the overall global developments broadly labelled as information society and globalisation. The emergence of technology transfer seems to be a parallel phenomenon to the lost ability to distinguish basic and applied research. It is a consequence of the acknowledgement that basic research is equal and that it is pursued in industrial research labs to a large extent. Vice versa, industry is interested in collaborations since universities nurture a research spirit, host young minds and provide an environment which industry cannot copy. These descriptions do not deliver the new positioning of public research: Is economic growth better served when universities are turned into entrepreneurial knowledge-producing profit centres, or should public institutions remedy market failures? What about "public responsibility" for invested public money? It should be considered that public research not only plays a central role in cases where private incentives evidently fail (orphan diseases, tropical diseases). Public institutions also play a pivotal role in specific areas, e.g. in diagnostics: Public hospitals and universities account for 76 % of genetic testing laboratory affiliations (Matthijs and Hodgson 2008).

Positions in social science literature are split. Some argue that universities have transformed into entrepreneurial entities (Etzkowitz and Leytesdorff 1997; Acs

[23] Boehmert and Boehmert & Prognos AG 2010.

[24] For an in-depth analysis see Godt 2007: 156; for an early criticism of the implied ideals see Kuhn 1997.

et al. 1992), others argue that different norms in academia and industry subsist and might assume even a greater significance in the face of closer links (David et al. 1998; Mowery and Sampat 2005).

From a regulatory perspective, the new behavioural incentives for attracting third-stream money can be read as instruments which enable new "points of communication" in terms of system theory. As Freitas and Verspagen (2009) pointed out, the motivations of universities and industry to participate in collaborative projects are quite different. The trade-off is **not** characterised by a *do-ut-des* situation which is characterised by the fact that one has something which the other one wants. Freitas and Verspagen speak about the "trade-off in motivational space". They find that the interest in filing applications seldom occurs within each partner for the same reason. Instead, whereas industry is interested in product development, academic researchers are interested in long-term collaborations. This reflects different rationalities in each system. However, what commodification achieves is creating a "common language". It is far from clear whether a commodified technology transfer makes the transfer to industry more likely, or at least not one-dimensional. The process "translates" knowledge into market categories. But IP are only essential for a successful collaboration in a number of exceptional cases (Freitas and Verspagen 2009).

These findings support that the old categorisation does no longer meet the current processes prompted by the "Third Mission". What it does, however, is positioning technology-transfer entities of public research institutions as intermediaries between "idle research" and industry. The proper metaphor is a "hinge-joint", which enables the flow of knowledge and inspiration in both directions.[25] Universities will (and are well advised to) safeguard segments in which behavioural norms are maintained which cushion "idle curiosity" (Merton 1942, 1973: 267). In other parts, they will develop entrepreneurial policies both on faculty level and on the level of each individual scientist. The reconception of public research institutions as intermediaries is by far not trivial. The idea opposes the analysis that universities "turn into" an entrepreneurial entity or that the university has to "defend" itself against this transformation. The concept of an intermediary implies the need to decide by the institution (not only by the policy makers who steer the change). The necessity of a decision in each single situation requires a policy regarding how to execute the room of discretion. What is needed is an enhanced reflection (and at the end criteria) about when and why (which) research institution pursues which way.

[25] The core of the new philosophy is "communication" in "network structures"(e.g. Commission of the European Communities 2007: 6, 13), not generating additional funds.

12.5 Conclusion

From a private lawyer's perspective, the Valorization Initiative has granted universities "more rights" which they can use according to their preferences. Those preferences are not fixed, neither confined to profit maximisation nor to "giving away knowledge assets". From a functional point of view, it seems important to translate the novel function of universities as "intermediaries" into policy concepts and legal terms. At the end, the position of universities will be strengthened because they are different from industry. Their self esteem should be enhanced because they bring about a different type of knowledge. In addition, it has to be acknowledged that most research institutions are financed by public money. Public money comes with public policies which change over time, may be multiple and not always consistent. In addition, public research institutions are entrusted with a public mission which they have to acknowledge. In the long run, universities have to devise policies which ensure that continuous conflicting goals are served on a transparent basis.

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