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NATIONAL SYSTEM OF INNOVATION AND PUBLIC-PRIVATE SECTOR
PARTNERSHIP: CASE STUDY ON TRINIDAD AND TOBAGO*

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* The opinions expressed in this paper are those of the author and do not necessarily reflect the position of WIPO and/or ECLAC.

I. ABSTRACT

1. Caribbean countries with their limited resources continue to be net importers of technology. An adequate supply of appropriate technologies is essential to enable these countries to compete in the international market.
2. Capacity Building must therefore focus on technology forecasting, evaluation and acquisition. Most indigenous business enterprises in the region have tended to rely on brochures, their principals abroad and media reports on technological changes in order to update their production processes. Universities are not geared traditionally to provide technology packages which are designed for rapid implementation. The gap therefore continues to widen between universities and industrial research providers and the private sector.
3. The functions of diverse organizations are discussed together with the ways in which they can be optimally networked to best utilize the limited resources of the region.

II. INTRODUCTION

4. This century will be characterized by a globally competitive environment based on the creative use and application of resources resulting in innovations in all spheres of life, not only in the manufacturing and business sectors. The trend is for Governments, in both developed and developing countries, to sponsor programmes that encourage the generation of technological innovations by industry. Such programmes include establishment and promotion of a modern patent system, awards for innovations, the provision of various programmes to assist small entrepreneurs, funding for research and support for programmes that encourage commercialization of innovative research results.
5. Survival or growth may very well depend upon the capability and capacity of citizens to think creatively in as fast a time as possible in order to overcome challenges through knowledge-based innovations in products, processes and services. The rate at which such innovations are acquired and implemented in the community and the wider global marketplace will contribute significantly on the rate of national growth and the well being of the citizens.
6. A reality check reveals that while the developing are aspiring to become developed, the developed are progressing further. Each country, of necessity, must therefore establish its own benchmarks.
7. Technology is the key to opening new possibilities. Economic growth is primarily about the capacity and capability of a country to utilize this key to meet its objectives. This capability is dependent on investment in research to generate knowledge; in education and training to distribute, migrate and transmit knowledge and innovate to exploit knowledge.
8. The road from mind to market, from idea to realization, from challenge to solution is really about the quest for technology acquisition and its efficient and effective implementation or its application commercially or perhaps both.

9. National technological efforts in developing countries must be linked as closely as possible to overall economic and social objectives. The heterogeneous nature of developing countries is a fact which is self-evident but seemingly too often forgotten when models are developed with respect to the implementation of policies aimed at encouraging the localized or country-specific growth of technology.

10. Not only do their scientific and technical capabilities vary, but their social and economic structures, their basic infrastructure, population size, income and wealth. Perhaps one of the most common factors they face is the plethora of challenges in gaining access to markets including, in today's world of liberalized trade, their own. Planners in developing countries thus face a double challenge : to recognize the potential for new efforts to harness science and technology for their benefit and, by understanding the social, institutional and economic framework within which an innovation is to operate, to facilitate its use.

11. While it is recognized that some of the issues raised thus far are common to many developing countries, this paper focuses on the Caribbean region.

12. There are several approaches that a developing country can use to acquire technology, and in the Caribbean most, if not all, of these are in use at any point in time. These approaches fall into a range bounded at its extremities by two basic mechanisms. The first would be called the "inside-out" approach which describes the development of an indigenous capability for technology, and the subsequent "pushing" out or commercialization into the industrial sector of the economy. The second mechanism, which lies at the other end of the spectrum, can be described as the "outside-in" approach. Within this mechanism, all of the technology required for manufacturing of a particular product, or providing a service, is imported from external sources through technology transfer packages, use of foreign consultancies, government to government arrangements, or other such means.

13. By far, the greater portion of technology which is employed in the region is as a result of the latter approach with the foreign and local investors utilizing significant levels of imported technology. The several approaches in use for technology acquisition, are a reflection of the wide spectrum of industries operating in the region with their varying levels of sophistication, and hence differing technology requirements.

III. THE CARIBBEAN ECONOMIES

14. There has been some attempts to extend minimum standards for IP protection globally (TRIPS – Trade-related Aspects of Intellectual Property Rights). Is this sufficient for small island economies which at times face challenges from industrial giants that operate on budgets which are significantly larger than that of the entire country and which are not only mobile but are truly global in nature? Is there a case for special consideration? What type of IPRs should be developed to meet these specific needs?

15. According to the reports of the Joint Commission of the Commonwealth Secretariat and the World Bank, there are 49 independent countries in the world with a population below 1.5 million and this was the threshold also used to define small states. The table below provides ten such countries in one region. Small island states by and large refer to a category of state whose structural characteristics require international recognition of a special situation. Trade

negotiations tend to least favour the country that is less developed and smaller in size. This is because it has higher unit costs due to its market size, lower productivity levels, fewer opportunities to explore economies of scale, and fewer financial, technological and human resources at its disposal to close the technological gap.¹ Linkages between trade and the use of technology necessitate that programmes based on world use of technology should also be given special consideration.

16. Table 1, which follows summaries some basic data on several countries within the Caribbean area.

Table 1
Basic Economic Data on Select Caribbean Countries²

Country	Population	GDP / Capita \$	GDP Growth %	Inflation %
Antigua/Barbuda	67,000	9,230	2.4	3.0
Barbados	268,000	9,290	3.0	1.6
Belize	238,500	2,825	6.1	- 1.2
Dominica	76,000	2,930	0.9	1.2
Dominican Republic	8.23 mil	2,110	8.3	0.5
Grenada	100,700	3,066	8.2	1.0
Guyana	850,000	798	1.8	7.5
Haiti	7.95 mil	532	2.2	8.1
Jamaica	2.54 mil	2,790	- 0.4	6.0
St Kitts/Nevis	42,000	4,640	2.0	- 0.9
St Lucia	151,900	4,390	4.9	3.5
St Vincent	114,000	2,420	4.0	2.0
Trinidad & Tobago	1.29 mil	6,545	10.7	3.4

¹ Small Economies, vulnerability and trade negotiations : A topic of debate. An interview with Professor Miguel Ccara-Hilton, ex Director, Centro de Investigacion Economica para el Caribe

² Association of Caribbean States line of Cooperation, 6th Ministerial Meeting December 2000. Published by International Systems Limited in conjunction with the Association of American States

17. Overall, there has been sustained pressure on developing countries to increase the levels of IP protection based on standards in developed countries and in many instances in areas that are mainly of specific interest to such countries.

18. For example, counterfeiting of pharmaceuticals may be more of interest to developed countries than the protection of plant genetic material or copyrights of music in developing countries.

19. IPRs should attempt to have some element of reciprocity that could be beneficial to both developing and developed country. In other words, can the more established channels and assistance schemes in developed countries be made available to assist the developed countries in special situations?

IV. INSTITUTIONAL CAPACITY

A. Industry

20. The manufacturing and services industries which operate in the region may be conveniently divided into the following classifications:

- petroleum and natural gas;
- minerals (metals, ceramics, etc);
- agro-industrial;
- plastics;
- assembly industries;
- entertainment;
- information technology; and
- other (glue, cosmetics, insecticides, franchises, utilities, etc).

21. Group (i) technologies are almost all imported and IP activities are mainly with respect to the registration of trademarks. Having regard to the survival and development of the individual sectors (the priority of which varies from country to country) in considering the current range of products, it is first necessary to build a pool of expertise to:

- Maintain and improve the quality of current products;
- Reduce production costs;
- Develop, where possible, downstream products/industries;

- Increase throughput to meet market demands;
- Optimize basic raw materials utilization; and
- Pay special regard to allied aspects of production, e.g. pollution, energy utilization, international trade requirements, HACCP, biodegradable packaging, etc).

22. IP policies and challenges involve copyright, trademarks and patents due to the diversified nature of the industries which exist.

23. In many instances throughout the region, individuals in corporations, learning institutions, NGOs and communities have acted upon their creative ideas and developed new and improved techniques as solutions to obstacles on the factory floor, on the construction site, in the office environment and in the community. Very few of these have been carried to the point of obtaining a patent.

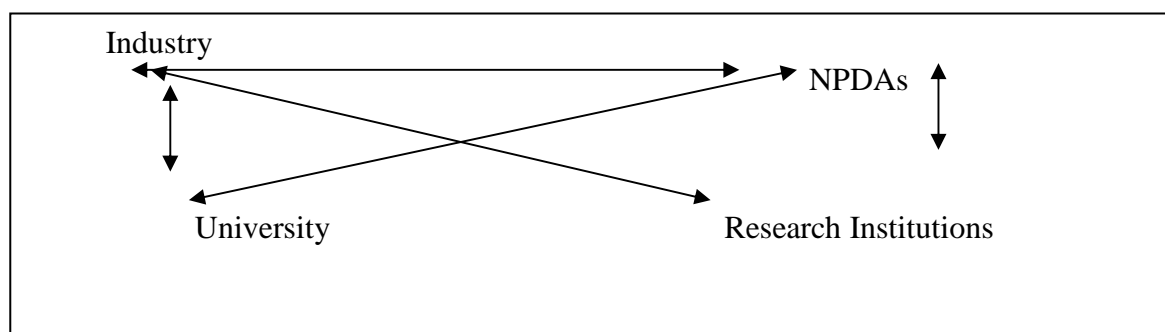
24. Innovations that have been implemented within the folds of industry have remained within the specific industry as there is no mechanism for bringing the innovation to the attention of other or as in many instances there is no motivation in bringing forward such innovations.

B. Current Responsibilities for Technology Development

25. The major contributors to the development of technology are the industry, the national planning development agencies (NPAs), the industrial research institutions and academia with the resultant ever present challenge of commercialization of the results of their endeavours.

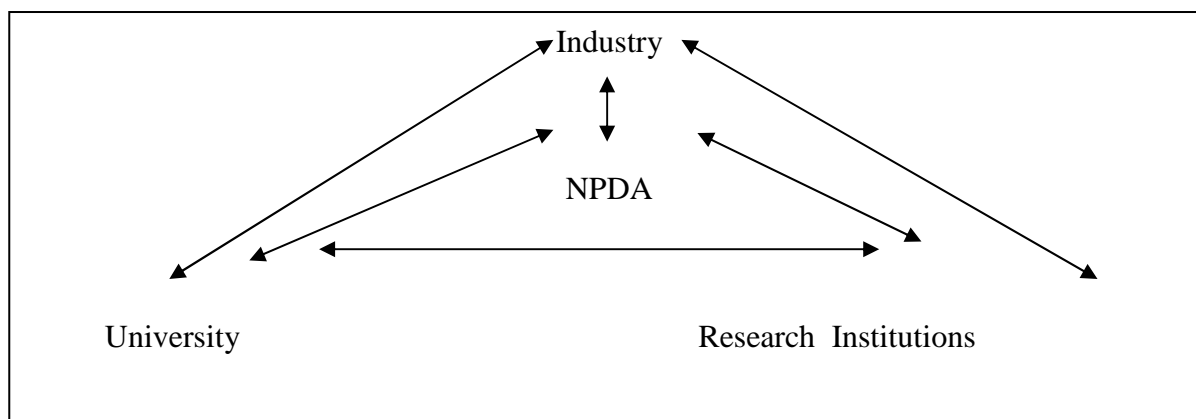
26. Generally, subject to the position taken by each country, the arrangements follow one of two systems which are described below.

Figure 1 - Rectangular Scheme for Inter-Institutional Interaction



27. Activity centers to a much greater extent around the granting of copyright and trademarks. To a large extent, the upsurge in trademark registration is due to increased trade activity in the region; a greater awareness of the need for such activity and has been facilitated by the expansion of the local administrative system.

28. In this arrangement, the NPDA's are primarily concerned with feasibility and funding and there is more focus on technology generation and less on implementation. There is the minimal of concern on intellectual property. Timeliness of delivery tends to be problematic, a factor which has very often resulted in the industry turning elsewhere to acquire its technology (a procedure that is not always in its best interest).



29. In this approach, the NPDA adds the responsibility of focusing the research efforts as part of the national planning process and, as such, there is greater potential for the involvement of the private sector. IPRs in the region need development in attending to the mechanisms of transfer of the technologies to the private sector. The models need to address ownership issues, multiple users, university generated, research-institution generated and combinations of these. The models that are in existence in developed countries can be of tremendous use in this situation.

30. Whatever the model however, due to the limitations of technical personnel, very often such personnel perform dual functions (associated with both university and industry for instance) and there is the continued challenge in defining roles within the IPRs. The establishment of clearance mechanisms for IP under these circumstances can assist with the building of confidence with the private sector. At present, the private sector is more comfortable purchasing the required technology than being part of the development process.

C. Small and Medium Enterprises (SMEs)

31. The majority of industries which exist in the Caribbean fall within the SME category. These are the industries that require the ingress of technology and the building of an internal capacity for innovation. Their scale of operation very often militate against their ability to purchase the required technology that is commercially available. They also tend to rely more on innovative means to compensate for the economies of scale and, too, at times face the situation in which the minimum economic size of equipment that is available is much larger in that they specifically require at a specific stage of the growth. Opportunities exist for the sharing of the costs of development of technology and IP policies should be adopted to assist such situations.

D. Enforcement

32. There are three main areas of concern in the administering of IP regimes (IPRs). The first is in the country in which the patent, copyright or trademark is lodged. In such a case the legal systems must be developed to strengthen the enforcement. Such activity can lead to increase costs to consumers, affect employment and even tax regimes. The situation in the small Caribbean states is more affected by copyrights and trademarks rather than patents. Today for example the small manufacturer who has been serving the local or Caribbean market is faced with legal action of “passing off” on trademarks which they are discovering were registered in other countries and to which they are now being exposed due to the removal of trade barriers and the increase of the traders based on imported products.

33. The second, is the case of patents, copyright and trademarks that are lodged by small companies and their inability to monitor the abuse of their IP. To many, it is an exercise in futility.

34. The third, is the diversity in the matters which require processing by the national offices. There is certainly the need to develop the IPRs in transition so that there is focused/specific sectoral development rather than a widespread thereby diluting the effects of already limited resources.

E. Costs

35. It is well established that at the country level, there are both one-time costs and recurrent costs to meet salaries, etc.

36. Of greater significance is the cost to the individual/company. In the region, the costs of copyright and trademarks is relatively low while the cost of preparation and filing of a patent is significantly higher especially to the individual investor or the SME.

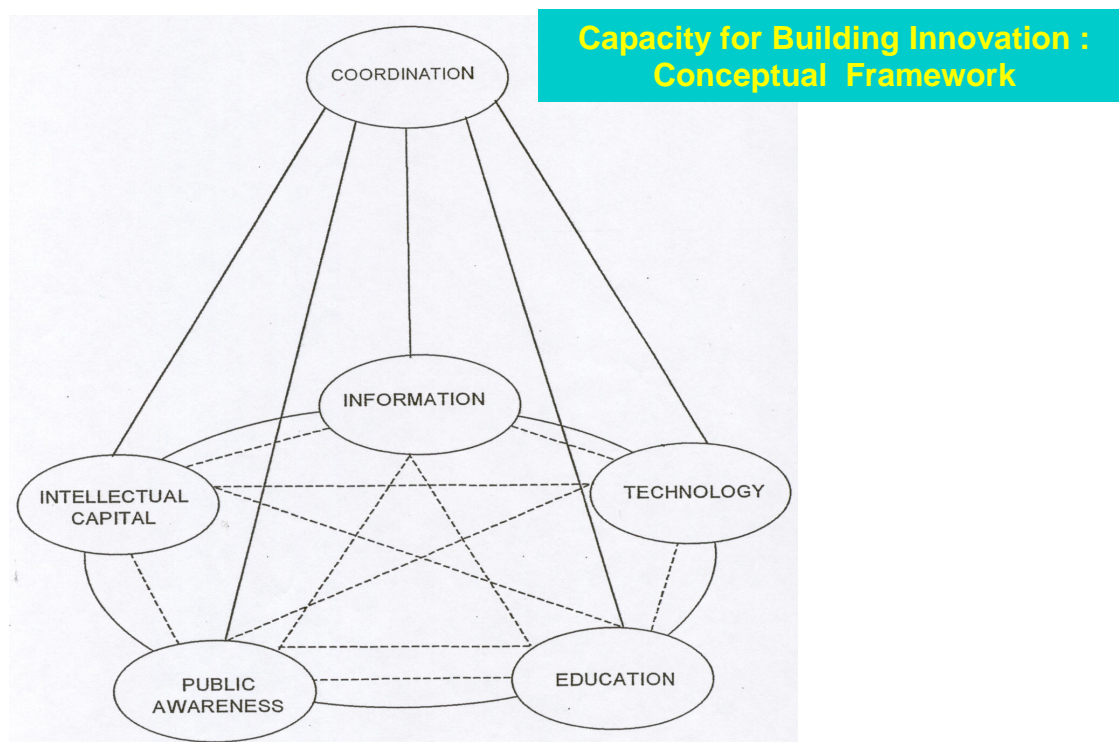
37. The reality is that once litigation is involved, there are basic legal costs which must be met regardless of the size of claim (potential or actual).

V. THE WAY FORWARD – CHALLENGES / STRATEGIES

A. Utilizing Intellectual Property for Competitive Advantage

38. Basic to any attempts at strengthening the national capacity (both public and private sectors) for the generation of technology is the developing of a national culture of innovation. The core elements of a conceptual framework are identified in Figure 3. This framework demands a meaningful integration of each of these elements into a cohesive national programme. The use of one element without the others is useless in attaining the goal of capacity building for innovation.

Figure 3 - Capacity Building for Innovation



39. Elements of this framework exist in each Caribbean country in some form. There is the need however to integrate these elements. The experiences of developed countries in devising their own systems of IPRs in harmony with the implementation of their programme, for capacity building, can be useful learning points. However, the countries of the Caribbean need to ensure that such IPRs are customized as to meet their individual national priorities and synchronized with the development of their own associated infrastructure.

B. Technology Management / Technology Monitoring Systems

40. There is almost a complete absence of any coordinated systems for undertaking such activity. The results of such a situation is that technology acquisition in the private sector and research efforts in the public funded organizations are very often far apart. Additionally, there is tremendous scope for planning at the national level with respect to incentives, opportunities for networking amongst existing similar companies, etc.

41. Existing technical information systems in national institutions should be developed with end users in mind. Additionally, many existing companies require assistance in establishing databases within the Companies. In many instances as well they are simply unaware or take little notice of the value of their intellectual property or require assistance in documenting their data. Issues such as these if addressed through relevant assistance programmes lead very often to establish a greater awareness of the significance of IPRs especially in SMEs.

42. Technology monitoring systems in the private sector can be a somewhat more complex challenge as many are reluctant to provide much detail on the technology in use since there is the continued feeling that the sharing of such information can cause them to lose their competitive edge. Appropriate systems would obviously have to be designed.

C. Optimal Use of Pertinent Resources to Assimilate and Make Use of Technology

43. The greater portion of the technology that is in use in the region is imported. There continues to be experiences of technology “overkill” and “loaded” packages which contain such licensing arrangements as to “lock in” the users in a seemingly never ending journey of costly technology updates. While the private sector in the region is learning by experience, the cost is quite high.

44. There is the need to strike a balance between the national goals for development of an indigenous capability for technology generation and the purchase of technology. The challenging of the experiences of the private sector and the experiences of the more progressive of the developing countries can assist with the advancement of the desired programmes.

D. Strengthen the R&D Institutional Framework

Public funded institutions are the main R&D service providers in the region. Relevant regional policies are evolving and today there is a much more recognized and accepted position on the need for R&D with a greater bias towards the developmental aspects of the investigations. One of the factors which have militated against efforts to obtain greater funding at the national level has been the relatively low level of projects which have been implemented. Amongst the main reasons for this situation are:

- Since most of the R&D is undertaken by public funded agencies, there is the need for IPRs which recognize ownership, transparency in selecting of host private sector companies, exclusivity, etc;
- The confidence of the private sector has to be earned by the Agencies concerned. Too common is the fact that the regulatory agencies are being used in an advisory capacity, a situation which is fraught with potential conflict;
- The tendency of most purchasers of technology especially those with limited funds to want to actually see the technology in operation; and
- There is however, the need in the planning for industrial growth in these countries for greater focus of R&D with national objectives.

45. Additionally, there is the urgent need to establish mechanisms to strengthen the linkages and incentives between private sector firms and the research institutions. IPRs should be developed beyond the basic administrative stage through the provision of special funding to assist with patent registration, enforcement, monitoring, etc.

46. Inter-institutional linkages can be strengthened in the area of intellectual property ownership issues. For example, the type of arrangements which are available when technology is generated in a regional institution as compared to a national one.

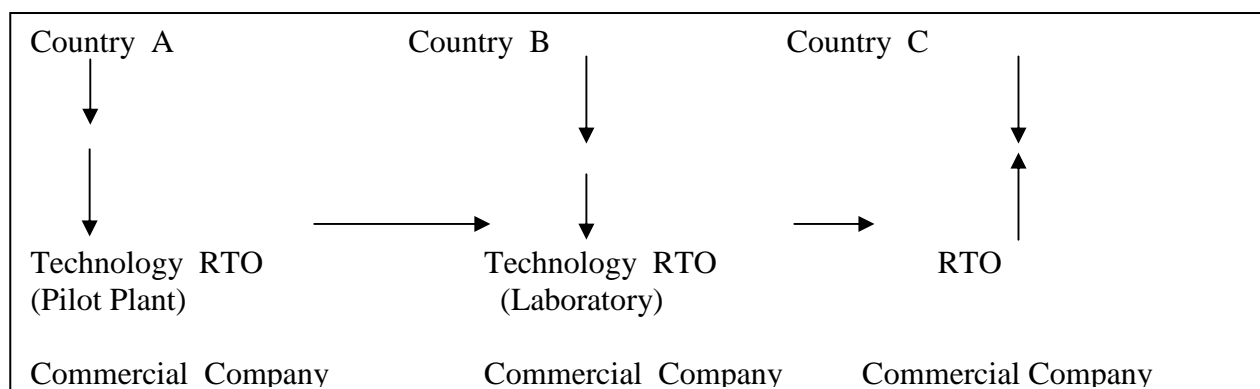
47. The government has the prime role to strengthen the national R&D and associated institutions because in reality the long term nature of such institutions is not attractive enough to obtain the attention of the private sector. Further, it must be continually borne in mind that R&D is a means of fortifying the competitive edge in industry regardless of the size of such industry.

VI. NETWORKING MODELS / NETWORKING MODELS

48. When all of the factors, as they relate to small island states, are considered there is the need to develop special models if there is to be any meaningful progress in the process of the acquisition of technology.

A. Networking through WAITRO

49. Traditionally, each RTO develops its technology and faces the challenges of commercialization. In such a process, the final product resides with a commercial entity.



50. The cost of the technology from commercial companies A and B to C is quite large since at that stage there are much larger investments involved. Figure 4 which follows, summarizes relevant cost and risk factors in the Technology Cycle.

Figure 4: The Technology Life Cycle

Technology Generation Level	Cost to Acquire	Risk of Success
Laboratory	Low	High
Pilot Plant	Medium	Medium
Commercial	High	Low

51. Within the cycle, technology transfer can be effected at any level amongst the RTOs.
52. It is proposed that a system of networking be established which shall encourage RTO - RTO technology transfers which while being available at relatively low costs, lead to the reduction of duplication of efforts, the sharing of costs and identify key personnel for consultancies, training, etc.
53. An additional advantage is that in instances where there are technologies which are available for commercialization the RTOs can be of assistance to each other in their respective countries, perhaps in some sort of distributorship arrangement.
54. There is the need for the developing of this dimension in existing IPRs and both WIPO and WAITRO should investigate relevant funding in developing this model.

B. Networking of IP functions

55. Within the Caribbean area, there has been some attempts at establishing a regional industrial property system. While this is desirable, focus is primarily along the lines of administration and the establishment of system basics as is the case with other similar efforts internationally.
56. Of greater need at present, is to establish terms for protection and monitoring of regionally generated activity (patents, trademarks, copyright) through a collective effort as small island states. Can there be the sharing of such responsibilities?

57. This IPR Fusion can provide a basis for:

- Sharing of already finite pertinent resources thereby reducing duplication;
- Sharing of costs for legal action;
- Facilitating monitoring;
- Facilitating enforcement; and
- Enhancing international leverage.

VII. CONCLUSION

58. It is quite evident that the Caribbean small states qualify for special consideration. They need to determine the advantages and disadvantages of the types of IPRs which are best suited for them. They need to actively participate in forum such as this to continually have their positions addressed and solutions determined.

59. Uppermost in the list of challenges for achieving enhanced technology transfer is greater public/private sector integration.

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