A NEW MODEL FOR TECHNOLOGY TRANSFERENCE WITHIN FSR/E

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INTRODUCTION

Food production in Central America is mostly in the hands of limited resource farmers who comprise the largest proportion of farmers in those countries. Little has been accomplished for these farmers, not only in terms of generating technology appropriate to their needs and conditions, but also in promoting effectively its use. This fact is strongly influencing the economy of this region since 55% of the population are farmers and the productivity figures per farm and per hectare are low, and total food production is not meeting the needs of a population with a 3.1% annual growth rate, among the highest in the world.

Some of the governmental efforts in each of these countries towards the solution of the previously described problem have been expressed through the establishment of agricultural research programs with emphasis on food production. By 1973 in Guatemala, these efforts resulted in the creation of the Institute of Agricultural Science and Technology (ICTA). This national institution developed a model for agricultural research that focuses in on-farm activities, farmers' participation, and the collaborative effort of regional multidisciplinary teams (Fumagalli and Waugh, 1977; Ortiz, 1980; Gostyla and Whyte, 1980; Whyte, 1981). Through this new approach, ICTA has been able to generate and promote the use of technologies which are appropriate to the needs and resources of the farmers of the country. By the early 80s, this approach had been the key mechanism in an overall agricultural sector strategy that made Guatemala a self-sufficient country, and even exporter, of basic grains (Castillo and Juarez, 1985).

This model has been progressively adopted by other countries in the Central American region but, just as in Guatemala, the potential impact of the model has been restricted by the research/extension gap. The need for a new methodology for massive diffusion of new technology is evident.

A new effort has been made and a project for technology transference, following the fundamentals of the FSR/E approach, has been designed in Guatemala. The project is based on a model known as the Modular System for Technology Transference, which has its origin in working experience that ICTA had in the Guatemalan highlands (Waugh, 1980; Whyte, 1981) and will provide the opportunity to the research and extension agencies to participate together in a joint effort for the generation and transference of appropriate technology for small, family farms.

THE RESEARCH/EXTENSION SYSTEM IN GUATEMALA

The research and extension system was adopted by the Ministry of Agriculture of Guatemala in 1954. This decision was financially supported by the U.S. government through the program for technical assistance, and it was designed

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following the same concepts of the research and extension system of the land grant universities in the U.S. The organizers tried to adapt this system to the local conditions, but the university did not participate and the administrative structure stayed within the rigid bureaucratic framework of the ministry. Besides the lack of specialized and motivated technical staff that would generate technology to support the extension activities, there was never a serious effort to establish a constructive dialogue between research and extension, even though both activities were under the same institution. Relative to the research conducted, technology was generated mostly in experiment stations under conditions that contrasted strongly with those existing in small, limited resource farms. There was hardly any impact on production, consumption began to exceed production, and the country was forced to resort to frequent imports of basic grains to satisfy the national consumption requirements.

The continuous inefficiency of the research/extension system during the 50s and 60s, as it was adapted and structured in Guatemala, led the authorities of the Ministry of Agriculture to reexamine and define the causes contributing to this failure. A critical analysis of the work conducted made some faults evident within the adopted system (Waugh, 1975):

a. Failure to recognize the agro-socioeconomic factors that limit the production efforts of the small farmers; furthermore, there was hardly any knowledge on their crop systems, needs and preferences, available resources, and expectations;

b. There was no agroeconomic field data supporting the recommendations that the extension agents could use for specific conditions;

c. Farmers had no participation, whatsoever, in the technology innovation process; researchers did not consider the needs and expectations of those farmers when planning "their" research, and farmers were not included in the evaluation of new technologies;

d. Lack of competent professionals in the research and extension activities, and also lack of incentives and motivation for the technical staff in the system;

e. Difficulty in working within a rigid bureaucratic environment subjected to political turnarounds and without the opportunity of making decisions that could be promptly executed for the good and normal functioning of the system.

Through the identification of the deficiencies in the system, it was determined that the interrelationship, farmer-extensionist-researcher, would be indispensable for planning and conducting a program of technology generation and validation that would be suitable to the needs and resources of farmers. This interrelationship would also be necessary to ensure an effective transference process of new technologies.

The next step, as part of the solution to the problem previously described, was to establish a new research institute (ICTA), autonomous and

with enough budget, oriented to the identification and solving of agricultural production problems that small, limited resource farmers face. Its organic law assigns ICTA the responsibilities of academic training of its technical staff and the promotion of new technologies. The Rockefeller Foundation and the Agency for International Development (AID) supported the establishment of this new research institution.

A NEW RESEARCH APPROACH FOR TRADITIONAL AGRICULTURE

Since its beginning, ICTA committed itself to increase agricultural production and improve the productivity and well-being of the people in the rural areas. This would be achieved by using the scientific method as an effective tool to generate appropriate and economically favorable technology that would not involve a larger risk to the target group for whom the technology would be generated. The most relevant aspects within this new approach are the following (Ortiz, 1980):

1. A thorough knowledge of the agro-socioeconomic conditions of the farmers in a region would be required, and it is obtained by integrating biological and social scientists in regional multidisciplinary teams that identify farmers' resources and constraints in order to generate appropriate technology for those conditions.

2. Most of the research activities would be moved off experiment stations to farms, where they are to be conducted under the farmers' conditions. New technology is then generated under location specific conditions, giving it reliability in terms of appropriateness and precision, since the variability within and between sites has been sampled.

3. The involvement of farmers in all the phases of the technology innovation process, giving them the main role in the final stages of evaluation of new technologies; here, they decide whether the technologies are accepted or rejected, and their decision is to be respected. This is the major and most important change from the previous approach.

ICTA's officials did not consider technology generation as the ultimate objective; they felt that the institutional commitment should be to identify and put into practice transference procedures and methodologies to promote the use of appropriate technologies by farmers. For this purpose, inter-institutional linkages with the extension agency, Directorate of Agricultural Services (DIGESA), were developed, collaborative efforts were established with cooperatives and other farmers' groups, and a strong support was given to the private sector to promote a strategy for seed production and commercialization that was successful (Ortiz, 1980; Castillo and Juarez, 1985). Less than ten years after ICTA was founded, Guatemala had registered significant increases in basic grains production that covered the deficit of previous years and have since then, along with oilseeds (sesame), provided exportable amounts that improve its international

exchange balance (Castillo and Juarez, 1985).

THE RESEARCH/EXTENSION LINKAGE

With the new research approach and a renewed interest in promoting the use of appropriate technology, ICTA and DIGESA, the extension agency, signed a letter of agreement in 1978 that would expedite the joint activities of those institutions for the purpose of technology transference.

The most significant of these efforts, in terms of success, have been the courses for inter-institutional technological linkage that provided the extension agents with the opportunity to participate in on-farm research activities. With their involvement in the technology generation process, the extensionists improved their effectiveness in promoting the use of new technologies (Ortiz, 1980).

But still, the degree of effectiveness in technology transference has not been considered adequate. Technology has been reaching the farmers, but not in the same intensity in each region or in every group. In spite of the inter-institutional efforts for the promotion of new technologies and the evident impact of these technologies on food production, there remains a group of factors hindering the diffusion of technologies to a larger number of farmers.

Among the various reasons for the "limited" diffusion of technology, the most important is that technology transference programs have not been, technically and administratively, designed and executed properly. They lacked qualified personnel; adequate functioning regulations; financing for needed equipment, inputs, and personnel, and an efficient operational methodology to reach a significant coverage. Another important reason limiting the strength of these efforts has been that extension agents were restricted, in most cases, to credit planning and supervision and not enough time to be trained in and communicate new technologies.

In preparing for a new effort in technology transference, the Agricultural and Food Public Sector (SPADA) of Guatemala accepted the fact that a new "attitude" was necessary in the design of the project. This new attitude consists of letting farmers <u>participate</u>, rather than be <u>educated</u>. That is, the extension effort to educate farmers and their families would be substituted, for technology transference purposes, by joint participation of farmers, extensionists, and researchers in all the phases of the technology innovation process.

This paper presents a description of this new effort for a wider diffusion of new technologies. Three institutions of SPADA prepared and will conduct this technology transference project: ICTA, DIGESA, and the Directorate of Livestock Services (DIGESEPE). This last institution is the extension agency for animal health and production. The project has recently been approved to be financed by the Inter-American Development Bank (BID Loan 473/OC/GU) and the International Agriculture Development Fund (FIDA Loan 154 GM) and will begin its activities in 1986 in three regions of

Guatemala. The basic features in this transference effort are the following:

1. For this specific project, a "new" extension agent (AG-promoter) within DIGESA and DIGESEPE will be trained and dedicated to technology transference activities. That is, the new research approach has been accepted and a new extension approach is adopted;

2. There will be a joint participation of researchers and AG-promoters in the generation, testing, and promotion of new technologies. This will provide an excellent training for the "new" extension agents in the knowledge and management of new technologies;

3. Rural leaders (AG-leaders) will be recruited and their salaries paid by the project, and trained by the AG-promoters in the management of new technologies. These AG-leaders will be in charge of promoting new technologies among organized groups of farmers in the communities;

4. An effective transference strategy through the establishment of a Modular System, and

5. The participation of farmers throughout the whole technology innovation process.

A NEW MODEL FOR TECHNOLOGY TRANSFERENCE

The flow chart of a modular system for technology transference (Figure 1) illustrates the new research/extension linkage concept for a faster, wider coverage and more effective technology transference. This model is the essence of the new Project for Crop/Livestock Technology Generation and Transference and Seeds Production (PROGETTAPS) that will be conducted by ICTA, DIGESA, and DIGESEPE in three regions of Guatemala beginning in 1986.

In this flow chart (Figure 1), which is an expanded version of ICTA's Agricultural Technological System (Fumagalli and Waugh, 1977), the first two stages: research on experiment stations and on-farm trials, are the responsibility of the research teams and are conducted in the same fashion as ICTA conducts its work; but in this case, the AG-promoters from DIGESA and DIGESEPE will be involved in the system, especially in the agro-socioeconomic evaluation of on-farm trials. From this stage on, already familiar with ICTA's new technologies, the AG-promoter takes over the training of rural leaders (AG-leaders) in the concept of the overall transference strategy and in the management of the technological innovations. These AG-leaders will be prominent farmers that are well-known and respected in their respective communities.

Within the project, the rural leader constitutes the key element in the technology transference process. Through their influence with farmers and working with groups, the expected multiplying effect could be obtained. These AG-leaders will be coordinated and constantly oriented by the

AG-promoters, who will have the continuous technical/scientific support from ICTA's field teams (Technology Testing and Transference Teams).

The new technologies will be promoted in "transference plots" conducted by the AG-leaders on their own farms and farms of collaborators. These plots will be used to irradiate technology to groups of farmers in each community, using a mixture of methodologies used in the research/extension system as transference activities, such as visits, seminars, field days, technical meetings, production clinics, participative work, and demonstration methods.

By establishing this model, it is expected that the research will be responsible not only for technology generation, but also for promoting its use. On the other hand, the "new" extension agent (AG-promoter) will be responsible for technology transference and will collaborate closely with the researcher in the technology generation and promotion acitivities.

ORGANIZATION AND FUNCTIONING OF PROGETTAPS

ICTA, DIGESA, and DIGESEPE will be jointly responsible for the organization and operation of the Modular System for Technology Transference (MSTT) within the new project, PROGETTAPS. The various modular systems will operate under this directive inter-institutional nucleus, and the number of modules within each system will vary from region to region. The module is the basic unit and the system has as many modules as it is feasible to establish within a given region or subregion.

Each module (Figure 2) will be integrated by a "tecnico"[2] of ICTA's Technology Testing and Transference Team (4 T's) in the subregion, with logistic support from ICTA's regional team, one AG-promoter, and 10 rural leaders. This researcher will have two responsibilities: generate technologies and promote their use through the training of the AG-promoters in the characteristics and management of these technologies. The AG-promoters have already been trained in activities of formation (youth clubs), motivation, and promotion. This fact makes possible that the AG-promoters may work with different groups or categories of farmers. These "new" extension agents will participate with the researcher in conducting researcher-managed and farmer-managed on-farm trials; they will also participate in the planning of the research activities, make AG-promoters active participants in the generation of technology, motivate them in understanding the whole system and the role they play, and give them full knowledge of the characteristics and management of new technology to increase their effectiveness in promoting its use.

Each AG-promoter will be responsible for the training of 10 rural leaders in the new technologies in coordination with "tecnicos" of ICTA's 4 T's. These AG-leaders will be hired and paid by the project and recruited based on their degree of leadership within a community, geographical location within the area of the project, land ownership, and, whenever possible, ability to read and write. The main activity of these rural leaders will be to organize a group of 20 farmers and conduct "transference

plots" on his farm, and on their farms. These transference plots will be the field laboratories where farmers will have the opportunity to observe and learn by themselves the results of using technological innovations which are based on their needs and available resources. The inputs and labor in the transference plot are the responsibility of the owner of the farm where this is conducted, just as in the farmer-managed trials that ICTA's 4 T's conduct (Ortiz, 1980).

The described module covers 200 farmers, but its potential is larger. Just by increasing to three the number of AG-promoters to enlarge the multiplying effect, the number of farmers directly exposed to new technologies will reach 600 (Figure 3). The desired coverage will be a function of the number of established modules, which, in its turn, will be determined by size of the area, number of farmers, infrastructure, and available resources for the project in that given area. It is estimated that each modular system will reach 7,200 farmers. The project includes the establishment of four modules and will finance activities for four years. This means that 115,200 farmers are expected to be reached directly by new technologies.

Monitoring and feedback will be important activities during the process, and the participation of researchers, AG-promoters, AG-leaders, and farmers is included. For those purposes, there will be technical meetings, programmed visits to transference plots, and the annual presentation of results and planning of activities for the coming cycle. The final evaluation of the project will be conducted by ICTA, DIGESA, DIGESEPE, and the Sectorial Unit of Agricultural Planning (USPADA).

ESSENTIAL CONDITIONS FOR PROJECT SUCCESS

PROGETTAPS, as any other development project, requires a high degree of coordination and cooperation among institutions if the established objectives and goals are to be reached. This is particularly true, even more so, when trying to conduct projects of inter-institutional nature where it is often necessary to establish priorities among activities based on available resources. For this reason, SPADA has established certain criteria or regulations that are necessary to consider before the approval of inter-institutional projects.

These essential conditions for inter-institutional projects are the following:

1. The involved institutions must make a formal commitment of active participation throughout the project;

2. There must be common objectives that guarantee the institutions' interest to participate and keep participating, even after the project is over;

3. A uniform work methodology that expedites the conduction of the different activities within the project;

4. Integrated work plans within the project and a well-defined organizational structure that determines the functions and responsibilities of the participating institutions;

5. Establish monitoring and evaluation activities for each stage of the project, and

6. Adequate financing throughout the project life.

All these actions are foreseen in the development of PROGETTAPS, and their inclusion gives strength to the project and in a high degree guarantee its success.

Footnotes

[1] ICTA's Technology Testing and Transference teams operate at a subregional level. Region and subregion are political/geographical divisions used by the Agricultural and Food Public Sector.

[2] The "Tecnicos" from ICTA's 4 T's are mostly university graduates, and most of them are agronomists.

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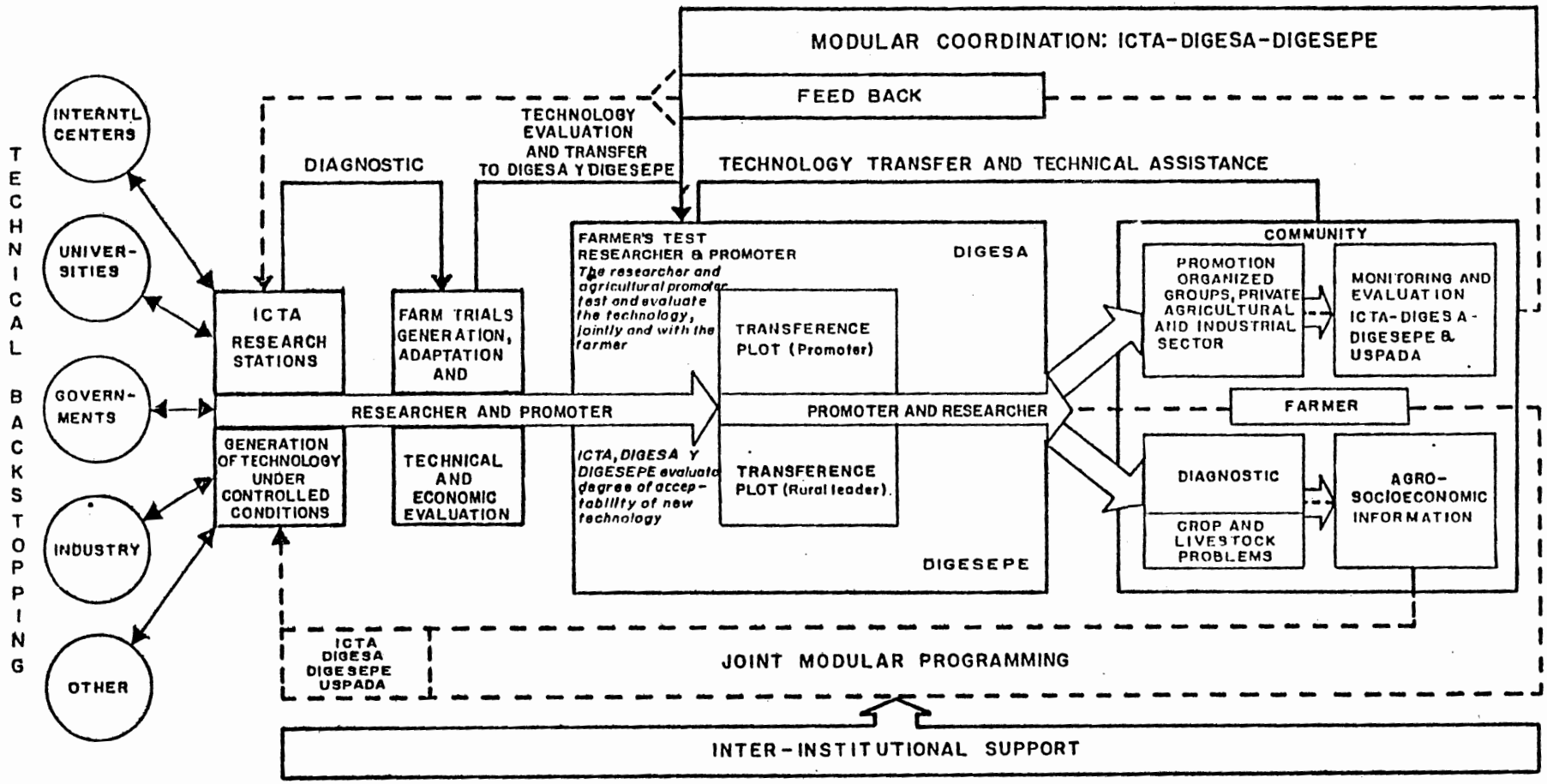
FIGURE 1

A FLOW CHART DIAGRAM OF A CONCEPTUAL FRAMEWORK FOR TECHNOLOGY TRANSFERENCE IN A MODULAR SYSTEM



Source: "Generación y Transferencia de Tecnología Agropecuaria y Producción de Semillas (GU-0065)". Informe de Proyecto. Banco Interamericano de Desarrollo, PR-1350-A, Guatemala. Mayo 1, 1984.

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FIGURE 2

BASIC UNIT OF THE MODULAR SYSTEM

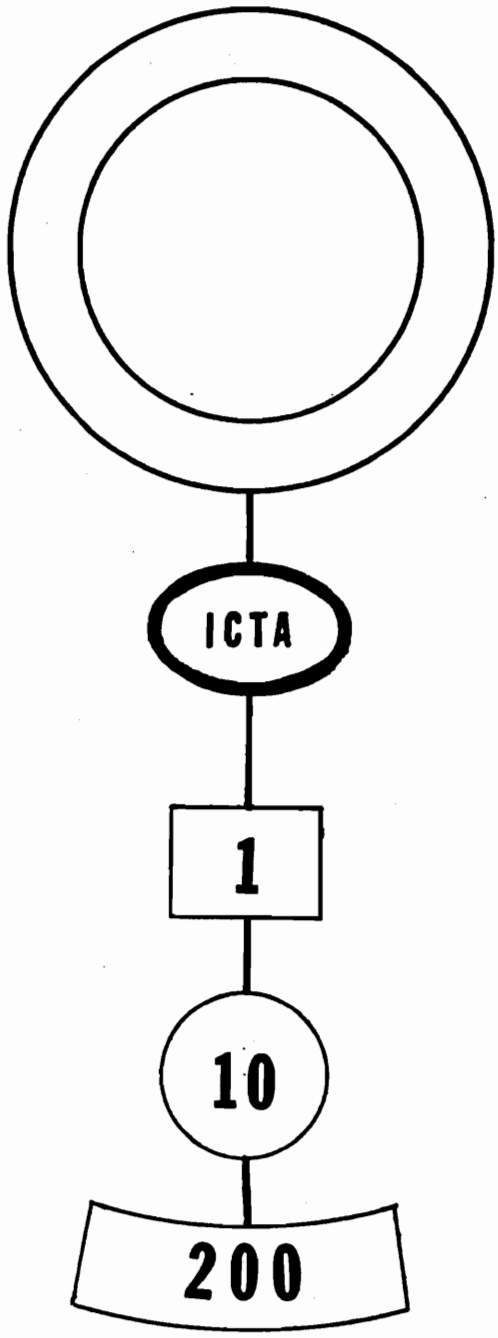
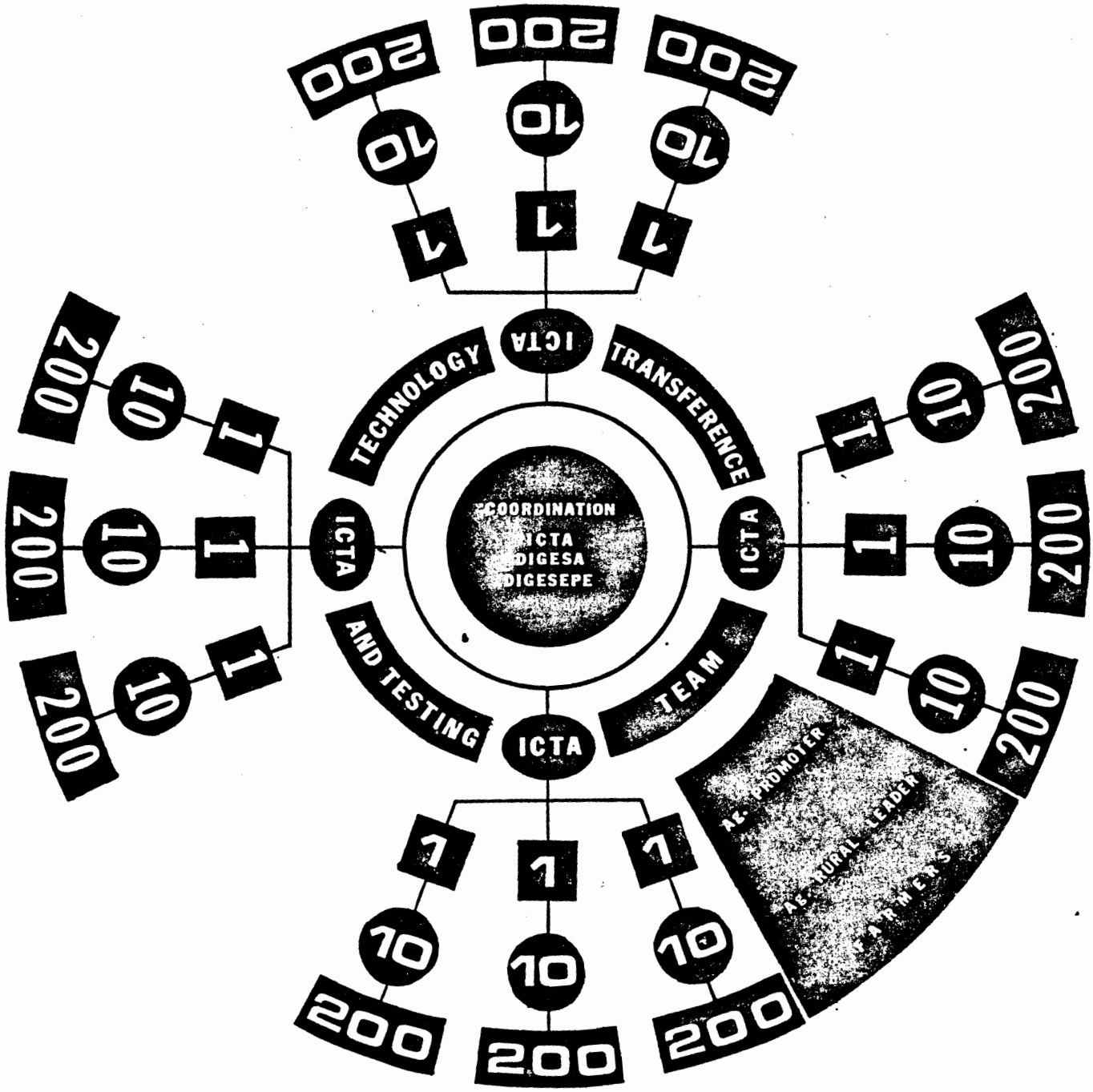


FIGURE 3 MODULAR SYSTEM FOR TECHNOLOGY TRANSFERENCE



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