ICT Regulation Toolkit

5.8 Developing Spectrum Management Capacity

Strategies for organization, function, process development, staffing, staff retention and training are important considerations for spectrum regulators. These capacity building strategies flow from legislation, policy and the regulatory framework including which other agencies are involved in certain aspects of spectrum management. Spectrum regulatory functions include:

- Spectrum planning of the future steps required to achieve optimal spectrum use by charting the major trends and developments in technology and considers the needs of current and future users of the radio spectrum.

- Spectrum engineering including the evaluating of information, capabilities and technology choices to support decisions affecting the allocation, allotment and assignment of radio spectrum. Identifying solutions to interference problems and technical compatibility among radio systems are key areas of focus.

- Spectrum authorization involves licensing of radiocommunication equipment and the making of frequency assignments.

- Spectrum monitoring and compliance activities help by avoiding incompatible frequency usage and through identification of sources of harmful interference.

Practice Notes

- **Guidelines for Standard Terms of Reference for Spectrum Management Projects.**

Reference Documents

- **SAMPLE TERMS OF REFERENCE AND STATEMENTS OF WORK FOR SPECTRUM MANAGEMENT CONSULTING PROJECTS**

5.8.1 INTRODUCTION TO DEVELOPING CAPACITY

The contemporary view of capacity building goes beyond the conventional perception of training. The central concerns of spectrum management – to promote spectrum access and efficient use, to resolve conflicting demands, to manage change, to enhance coordination and avoid interference, to foster communication and consultation and to ensure that data and information are shared – require a broader view of capacity development. This definition covers both institutional and individual capacity building.

Spectrum regulators need to consider strategies for developing the spectrum management organization including human resource development, spectrum management functions, process development, staffing and staff retention, and training. These capacity building strategies flow from legislation, policies and the regulatory framework including which other agencies are involved in certain aspects of spectrum management.

The traditional spectrum management regulatory functions include:

- Spectrum planning of the future steps required to achieve optimal spectrum use by charting the major trends and developments in technology and considering the needs of current and future users of the radio spectrum.

- Spectrum engineering including the evaluation of information, capabilities and technology choices to support decisions affecting the allocation, allotment and assignment of radio spectrum. Identifying solutions to interference problems and technical compatibility among radio systems are key areas of focus.

- Spectrum authorization involves licensing of radiocommunication equipment and the making of frequency assignments.

- Spectrum monitoring and compliance activities help by avoiding incompatible frequency usage and through identification of sources of harmful interference.

How spectrum managers fulfill these requirements and meet strategic operational and organization goals represent formidable challenges made more difficult in an environment characterized by change and innovation. These types of capacity building problems are not new nor are they unique to spectrum management. Solutions do exist for developing planning and implementing processes that will improve organization structure, function and to develop necessary and required skills.

Practice Notes

- **Capacity Assessment Grids**
- **Guidelines for Standard Terms of Reference for Spectrum Management Projects.**

Reference Documents

- **TAS-SMO Organization Plan, 2005**

5.8.2 ORGANIZATION

There is little point in developing strategies for spectrum management capacity building without a thorough understanding of the mandate under which the spectrum management organization operates. The country's legal and regulatory frameworks along with policies concerning governance provide the defining building blocks for the spectrum management organization. For example, as was described in Sections I and III, the spectrum management regulatory function is, in some cases, combined with telecoms and broadcasting regulation or it can function separately as a stand alone organization. The implication here for capacity building is the need to develop and maintain human resource skills independently of other organizations or to find ways of sharing in the development and utilization of human resources through strategies such as matrix management or centres of excellence within the combined regulator.

No two spectrum management organizations will be organized in the same manner, yet there are some similarities in structures organized around the key functions of planning, engineering, and authorization and monitoring. Cost and resource availability put pressure on spectrum managers to create organization and design functions which ensure productivity is achieved through sharing and cross-fertilization of skills.

For purposes of illustration, a model organization chart and functional mapping of key responsibilities are presented below for purposes of clarifying the understanding of spectrum management functions and ctivities.
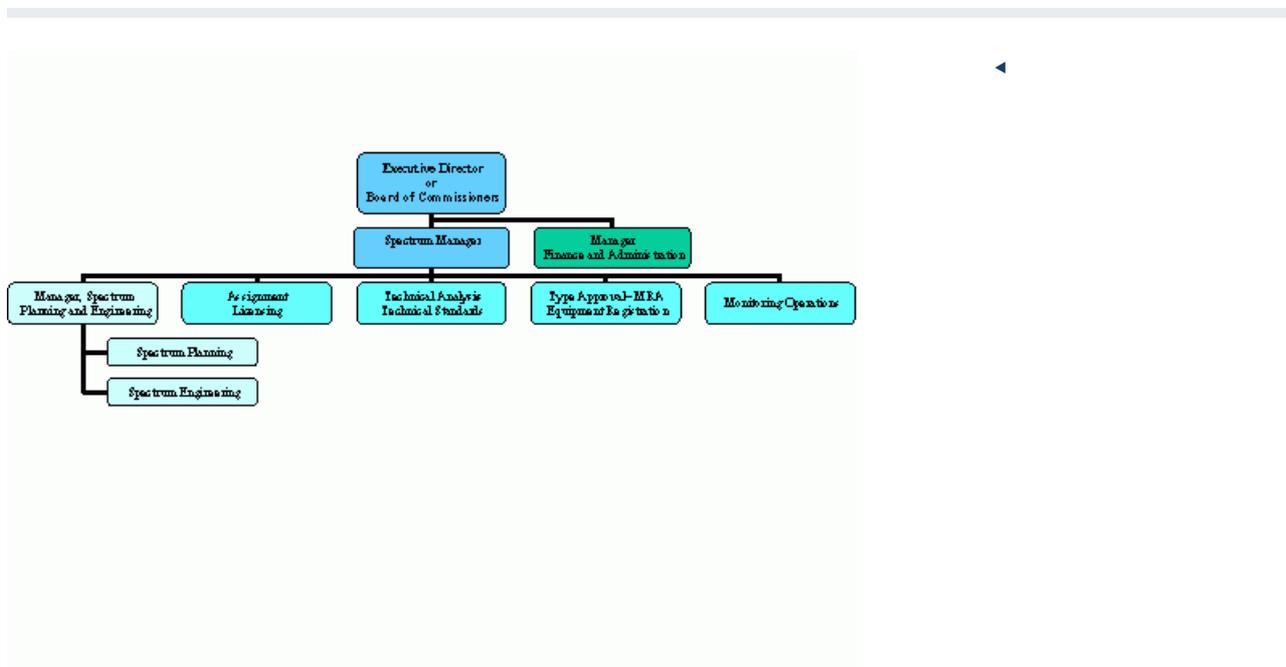
As pointed out earlier, one of the outcomes of the analysis of structure and function is the potential for sharing common resources such as engineering staff in both the planning and engineering functions. As well, it is possible for administrative staff to support spectrum management and telecommunications and/or broadcasting regulatory staff. Another important consideration is deciding to utilize outsourcing options for common services and infrastructure such as information systems and software applications, and human resource management staff. The determining the structure of the desired organization has a direct bearing on staff recruitment, training and capacity building.

5.8.3 HUMAN RESOURCES AND TRAINING DEVELOPMENT

Human resource planning and development through training are essential components of the overall plan and strategy to build capacity within the spectrum management organization. In this section, we explore many of the themes and topics associated with the need to hire, train and retain skilled human resources.

5.8.3.1 HUMAN RESOURCES

Spectrum Management is knowledge-based requiring skilled and committed personnel who are able to keep pace with continuous progress in radio technologies along with increasing complexity and demands coming from improved data handling capabilities and engineering analysis methods used to accommodate the number and variety of users seeking access to the spectrum resource. Providing a challenging and rewarding experience for staff, trainees and new recruits means giving them the tools and support they need for learning and development throughout their careers.

Issues related to new technologies, dynamic market conditions and effective regulatory responses can easily overtake the attention and focus of the spectrum management organization. At the same time, human resource management is strategic to organization development and goal achievement but sometimes relegated to the tail-end of the agenda. The reasons for the lack of focus are often related to budgetary and salary constraints which prevent the recruitment of necessary skilled resources especially when the regulator is competing for the same resources with the private sector or when there is a general lack of sufficient talent or skilled numbers of recruits to draw upon.

There are many challenges for Spectrum Management Organizations to educate, to attract and to keep needed professionals and staff. Some of the trends creating the challenge include the following:

- A continuing shortage of funds and sustainable revenues to support regulatory activity.

- It is more than probable that governments will face significant shortages of qualified professionals over the next 5 to 10 years in both developed and developing countries for very different reasons. In developed countries, changing demographics and the impending shortage of skilled resources has been well documented. In developing countries, the challenge to educate sufficient numbers while the population and economies grow will continue.

- Hurdles exist to some sources of relief for looming shortages. The approach to licensing of foreign-trained experts creates problems as does emigration of locally and foreign educated nationals to richer countries.

- Spectrum managers and other government agencies will face stiff competition nationally and regionally to recruit and retain professional leaders in radiocommunication engineering, economics and finance and legal affairs.

- In addition to pay and benefits, the national and international reputation of the spectrum manager, the telecommunications sector, workload, support for professional development, and roles and responsibilities between professions will be among a number critical factors for professionals in deciding where they choose to pursue their careers.

- Competitive wages needed to attract appropriate personnel are constantly at odds with efforts to control government budgets and to divert more resources away from the telecoms and spectrum regulator to other government priorities.

- Roles and responsibilities among the related professions are changing due largely to innovation and change in the use of technology and changes in the telecoms marketplace. Multi-disciplinary teams are likely to become more common along with the emergence of new types of working arrangements (e.g., outsourcing).

- New regulatory requirements arising from new approaches to service will affect how spectrum management professionals work with each other and with stakeholders.

Strategies

Spectrum managers need to develop and maintain strategic human resource development plans which identify needs, gaps

in capability and strategies to fill or compensate for deficiencies in human resource numbers and skills. Strategies need to be consistent with overall government policy and legislation governing public service employment yet responsive to changing requirements. Planning and development of strategies are essential.

Several helpful references to review are listed below:

- Robert L. Katz, Skills of an Effective Administrator, Harvard Business Review: Reprint 74509.
- Frederick Herzberg, One more time: How do you motivate employees? Harvard Business Review: Reprint 87507.

5.8.3.2 TRAINING DEVELOPMENT

Spectrum managers are responsible for ensuring their agency and staffs promote and ensure the efficient use of the radio frequency spectrum resource. To satisfy this responsibility, spectrum managers must not only understand current spectrum-dependent technologies, but also understand the likely interference interactions between the services provided by incumbent spectrum users and the services envisioned to be provided through the use of cutting edge technologies. Obtaining or developing effective training programs for spectrum managers, and making these programs available to private sector entities can help to ensure that all spectrum managers operate from a common frame of technical and analytical reference.

Spectrum managers should be able to use the latest spectrum management analysis tools. Spectrum managers should also be aware of the commercial services available that could satisfy their functional requirements for spectrum services.

There is also a need for additional spectrum management expertise. Spectrum management needs highly-trained staff capable of adapting to technological change, instituted engineering recruitment and training programs.

There is a similar need for such training throughout the spectrum management community. By building in-house expertise, non-government spectrum managers and spectrum users can make more informed choices on equipment purchases and on other spectrum management issues.

Practice Notes

- **Guideline: Spectrum Management Regulatory Functions, Skills, and Institutional Capacity**
- **Training at ITU**

5.8.4 BUSINESS PROCESSES

There are numerous complex tasks and processes within the spectrum management organization which need to be planned:

- Routine tasks and methods are associated with licensing of radiocommunications, type approval of radio equipment and routine monitoring. Routine tasks are supported by well defined administrative processes which can be dramatically improved and made more cost effective through the use of efficient information management systems. Quality of service can be improved by placing service points of presence close to clients and users.
- Technical tasks require staff with extensive formal and methods-based training and experience. Frequency assignment, technical standards, spectrum engineering, information systems and radio monitoring are tasks that require these levels of training. Core professionals/specialists work closely with clients.
- Conceptual and coordination tasks. These are associated with planning, coordination, consultation, and strategic initiatives associated with international consultation on spectrum planning matters.

Several techniques (Business Process Re-engineering, Process Improvement, Performance Management Framework, to cite a few), developed in the area of management science are available to the spectrum manager to assist in the design and evaluation of improved, more effective business processes. If a decision is made to re-engineer the processes of the organization to better align them with changing market dynamics, technology or regulation, it is important to stage the training and development of staff so that the training effort coincides with the creation of new processes and systems to support them.

Reference Documents

- **ITU: Spectrum Management Systems for Developing Countries, 2006**

- **Not a "Tool Kit": Practitioner's Guide to Measuring the Performance of Public Programs**

5.8.5 CONSULTATIVE PRACTICES

The Spectrum Management Organization needs to communicate and consult with stakeholders to be effective. The spectrum manager needs to take effective measures to provide information on the policies, rules and practices of the administration and provide mechanisms for feedback to evaluate polices, rules and practices. Consultation is another means for building overall support for compliance by users. Another impetus for consultative mechanisms for stakeholders arises from the need for improved short term planning and assignment processes which reflect the economic value of spectrum to the public and improved transparency in decision-making. The discussion of consultative processes takes place within a broader discussion of the role, contribution and extent to which industry and stakeholder groups should participate in the implementation and monitoring of the broader agenda of planning and efficient usage of spectrum. Action based on partnerships and involvement of major groups opens up a wider political sphere for the participation of social and economic actors and constitutes a "bottom-up" source of strength.

Consultative processes occur at several levels including international and regional efforts and processes can be formalized, informal or *ad hoc*. Planning subjects range from policy and regulatory framework development and formulation through forecasting of demand and technology application to procedural such as channel planning for broadcasting frequencies.

Industry participants in various segments of the market – mobile, satellite, microwave and broadcasters should be encouraged to form associations which can formulate recommendations reflecting the common needs and interests of the sector. As well, the spectrum manager can request from the associations expert advice on contentious matters such as interference resolution solutions, band channeling plans and band clearing options. Individual licensees and users are not precluded from submitting formal briefs of their own in addition to the industry wide brief submitted to the regulator.

Reference Documents

- **Hong Kong: OFTA, Frequency Bands for Broadband Wireless Applications, 2006**

The ICT Regulation Toolkit is a joint production of infoDev and the International Telecommunications Union (ITU).

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