Session 6

Regional Seminar on the economic and financial aspects of telecommunications Study Group 3 Regional Group for Latin America and Caribbean (SG3RG-LAC)

Costing Methodologies and Model Developed by The Telecommunications Authority of Trinidad and Tobago

Developing a Cost Model for the Trinidad & Tobago Market

6th July 2010

Telecommunications Authority of Trinidad and Tobago

Overview

- **Background**
- **Rationale for a Cost Model**
- **Key Modeling Principles**
  - ✓ Considerations
  - ✓ Approach adopted
- **Model Development Process**
- **Issues and Challenges**
- **Questions and Answers**

Background

- TATT was established in 2004 to regulate the telecommunications and broadcasting sectors

- TATT began liberalising telecommunications markets in 2004: Flash-cut approach adopted
  - ✓ Domestic fixed networks (including cable networks) and services
  - ✓ Domestic mobile networks and services
  - ✓ International network and services

- Technology neutral approach to licensing and regulation

Background: Market Overview

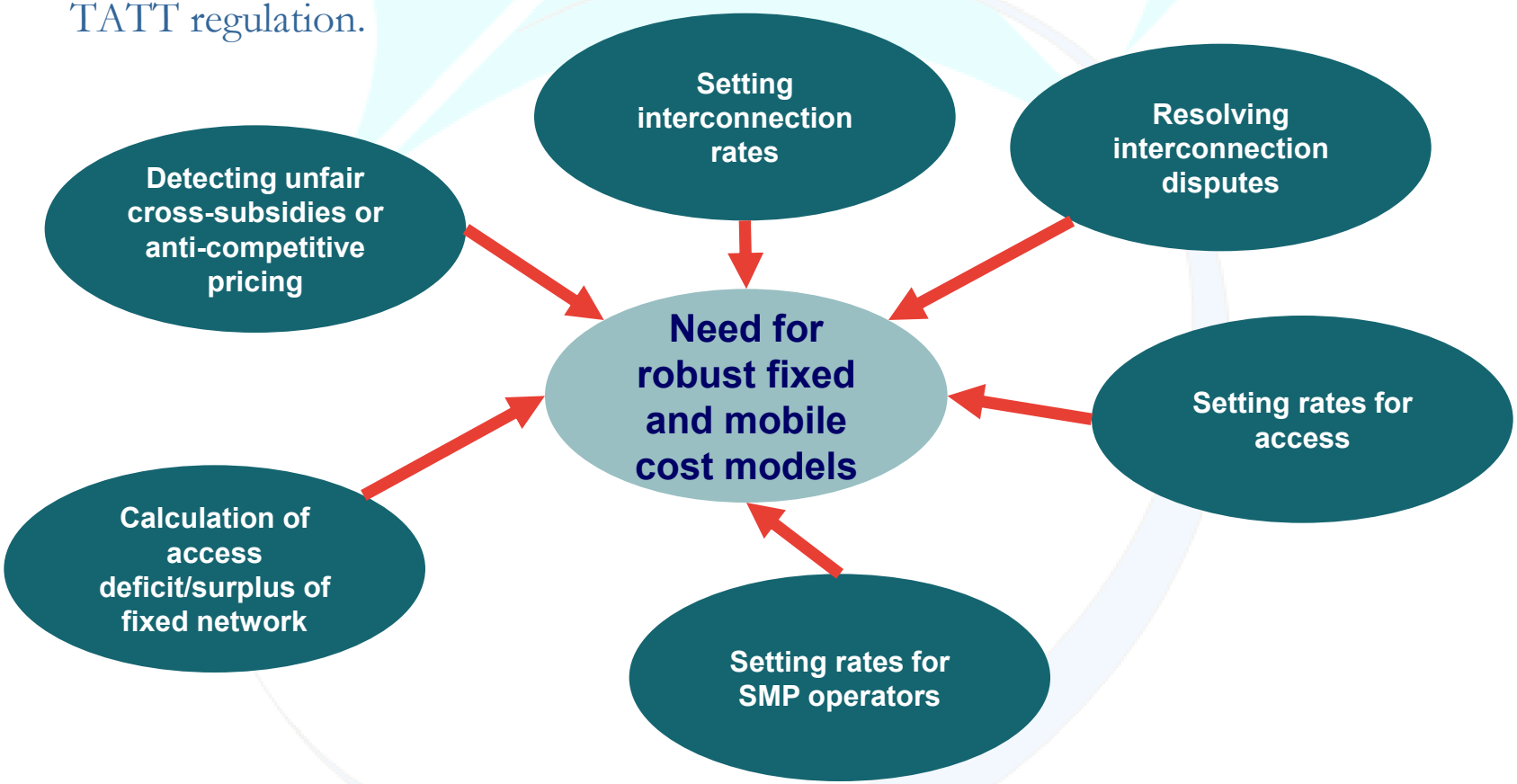
Network /Service Category	Service provided	Concessions granted	Operators providing service
International	Facilities Only	2	2
	Facilities and Services	9	9
Domestic Fixed *Wired or Wireless*	Telephony	8	2
	Internet	7	9
	Subscription TV	8	6
Domestic Mobile	All mobile services	2	2
Subscription TV (Cable) Broadcasting		8	8
Free to Air Broadcasting	TV Radio	9 38	9 38

Rationale for a Cost Model

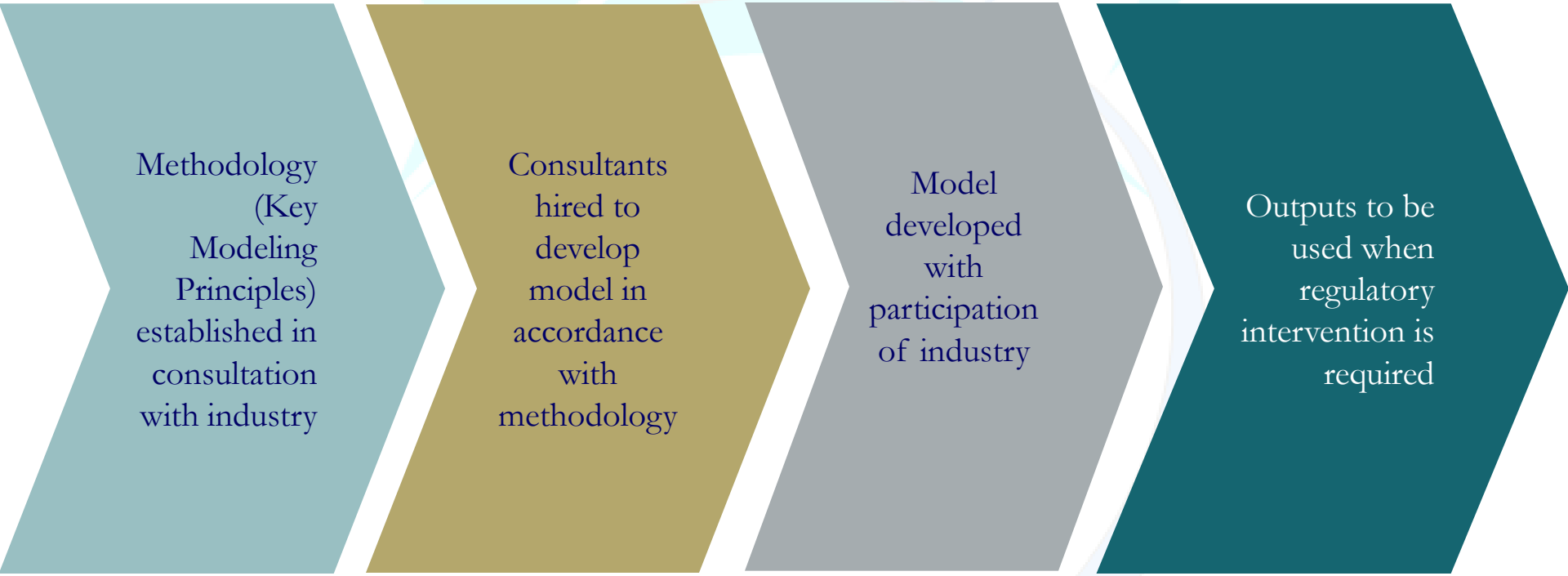
- Telecommunications Act and Regulations require that:
  - ✓ **all concessionaires** establish **interconnection rates** on a cost basis as prescribed by TATT
  - ✓ **where commercial negotiations fail between concessionaires** and a dispute is filed, TATT may set interconnection rates in accordance with an established cost methodology
  - ✓ TATT may regulate **rates for access** to any facility (not including interconnection) in accordance with an established cost methodology

Rationale for a Cost Model

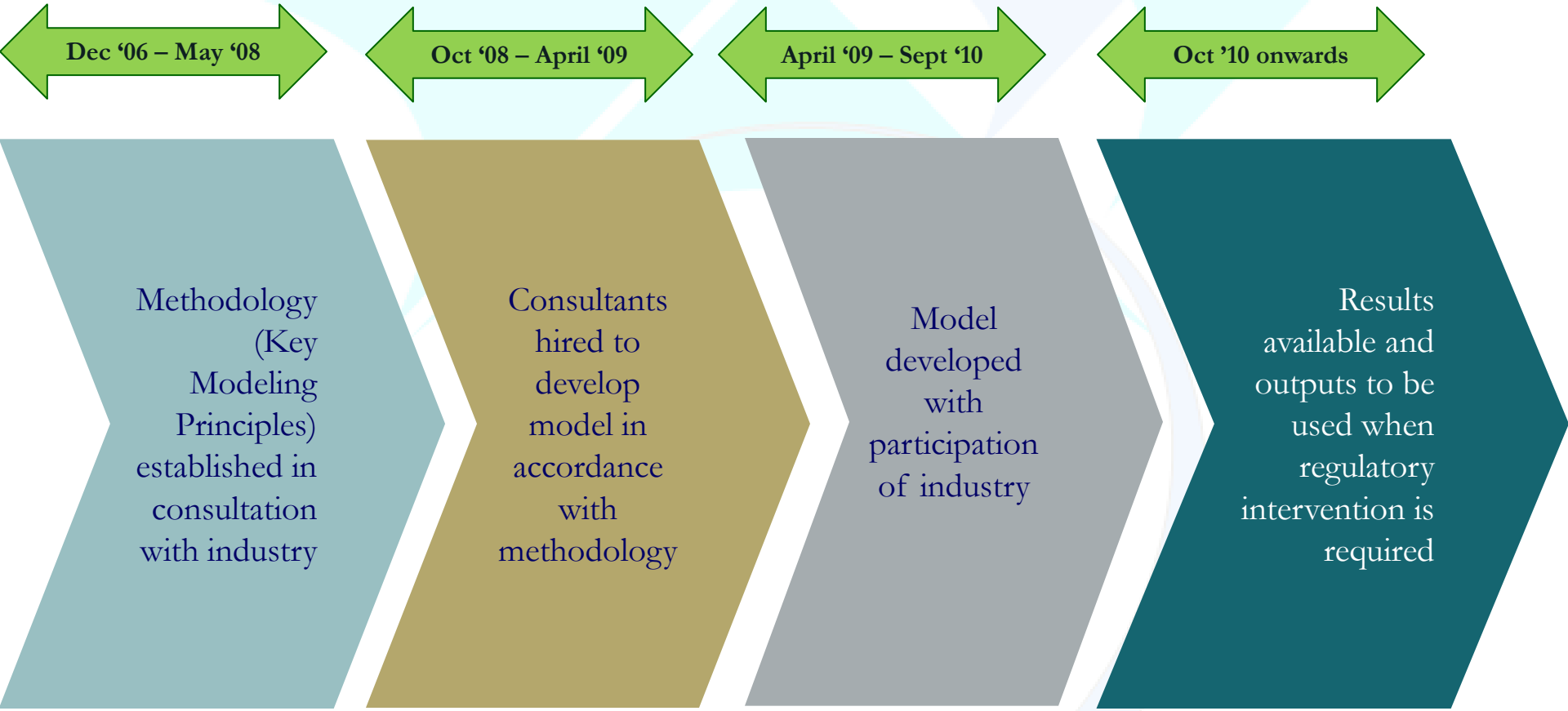
- As TATT has increasingly liberalised the market the number of competition and regulatory issues has increased.
- An independent purpose-built (vs. off the shelf) cost model is necessary to inform TATT regulation.



TATT's Approach



Overall Timeframes



Key Modeling Principles

Key Modeling Principles

- The model will be used to estimate efficiently incurred costs for regulatory purposes
- TATT set out a number of modeling principles in its methodology:

Cost accounting approach	✓ Current cost accounting (CCA) long run average incremental cost (LRAIC) ✓ Assets to be re-valued on a CCA basis ✓ Fully depreciated assets to be excluded
Modeling approach	✓ Top down
Depreciation method	✓ Tilted straight line
Efficiency considerations	✓ Cost Exclusions ✓ Asset Revaluation - Indexation preferred ✓ Efficiency adjustment within model
Joint and common costs	✓ Recover as equi-proportionate mark-up (EPMU) over incremental costs
Rate of return on capital	✓ WACC applied to mean capital employed (MCE)
Network externality	✓ No mark-up permitted

Key Modeling Principles

Cost Accounting Approach - CCA

	Historical Cost Accounting (HCA)	Current Cost Accounting (CCA)
Strengths	Strong Audit trail to existing audited accounts Ensures that operators recover their actual incurred costs	Provides a **proxy** for economic costs
Weaknesses	Little relevance to investment decisions today Reflects operational inefficiencies	Requires time and investment to complete a full re-evaluation of assets

Considerations

- ✓ To ensure economically efficient investment decisions by potential market entrants
- ✓ If telecommunications services' prices are set below current costs then inefficient entry will be encouraged and/or there will be insufficient investment in alternative infrastructure
- ✓ If telecommunications services are priced above current costs then there will be insufficient entry and/or over-investment in alternative infrastructure will be encouraged

Key Modeling Principles

Cost Accounting Approach - LRAIC

	Fully Allocated Costs (FAC)	Long Run Incremental Costs (LRIC)
Strengths	Can be used with either HCA or CCA Based on reconcilable and readily available information Ensures recovery of all costs	Provides economically efficient pricing decisions for investment decisions
Weaknesses	No accounting for potential efficiency gains Does not reflect the economic cost of providing the service	Requires current cost accounting Requires assessment of cost volume relationships which can be complex

Considerations

✓Using LRIC, prices are based on the costs avoided if an increment of output is no longer required – e.g. if an operator were no longer to provide a service

✓The approach adopted by most regulators is known as **Long Run Average Incremental Cost** (**LRAIC**) or, synonymously, Total Service Long Run Incremental Cost (TSLRIC).

✓LRAIC is attractive to regulators because it accounts for all the costs associated with an entire service (including fixed and common costs) as opposed to 'pure' LRIC which only assesses costs incremental to the service.

✓LRAIC also allows costs to be determined without building complex cost-volume relationships for individual network assets.

Key Modeling Principles

Modelling Approach - Top-Down

	Bottom-Up	Top- Down
Strengths	Minimum Cooperation needed from incumbent Accounts for theoretical operational efficiency Avoids data confidentiality problems	Based on actual costs Accounts for cost details Provides strong audit trail
Weaknesses	Little resemblance to actual costs Poor transparency; hard to authenticate Can't deal with operational costs Substantial investment required	Cannot take full account of potential efficiency improvements Substantial upfront investment required Data Sources and confidentiality

Considerations

✓Top Down model would provide results that would be easier to validate, particularly in the event of legal challenges to regulatory decisions

✓Although bottom up models account for theoretical operational efficiency, a top down model using CCA will provide a good proxy to efficient costs

Key Modeling Principles

Depreciation Method- Tilted Straight Line

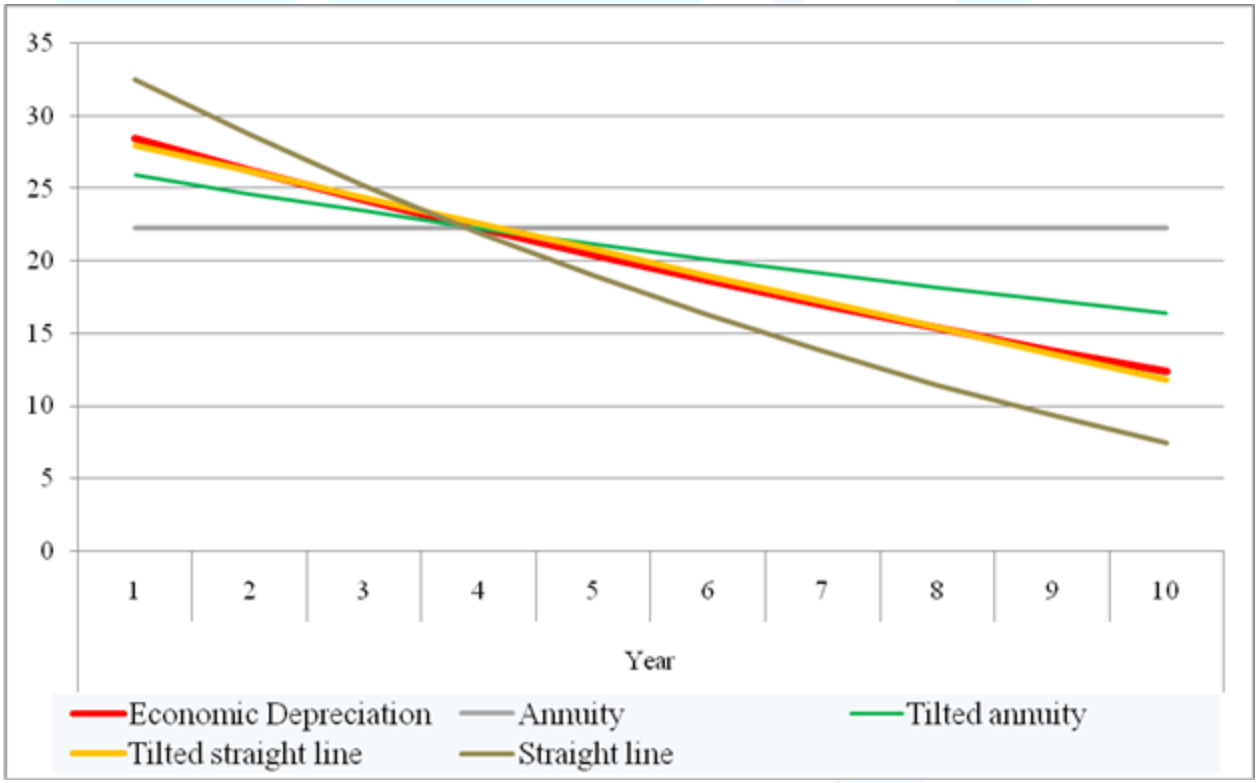
Considerations

- ✓Two main approximations to economic depreciation: tilted straight line vs. tilted annuity
- ✓Tilted straight line depreciation allows for the forward-loading of straight line depreciation to precisely the extent justified by the average annual decline in asset prices. In other words it requires the adjustment of HCA straight line depreciation to reflect the current replacement cost of the asset
- ✓Tilted annuity depreciation likewise tilts the basic annuity calculation (in which the total capital charge, equal to depreciation plus return on capital, is held constant throughout an asset's lifetime)
- ✓The tilted annuity approach is commonplace in bottom-up cost models, because bottom-up models tend to work on the assumption that the network is redesigned each year to be efficient for the subscriber and traffic requirements of that year
- ✓In a top-down model there is no such reason to prefer the tilted annuity approach.

Key Modeling Principles

Depreciation Method- Tilted Straight Line

Profile of different depreciation accounting methods



The tilted straight line profile is closest to the economic depreciation profile.

Key Modeling Principles

Asset Revaluation – Indexation as preferred method

	HCA as a Proxy	Modern Equivalent Asset (MEA)	Direct	Indexation
Strengths	Not as burdensome as CCA valuations	Can be used when the asset is no longer available for purchase or technology is outdated.	Considered to be robust	Detailed information on the quantity and specification of assets is not required
Weaknesses	Can produce inefficient results	Difficult to compensate for the potential differences in operating costs of, and functionality between, the MEA and the existing asset. Implementation can be resource intensive.	Information on quantity and price of assets in FAR needed. Info typically found in independent databases resulting in no direct link between the valuation and the FAR.	Still requires from FAR: age profile of all assets in a given asset class, split between individual cost elements. Reliable price indices may not be available.

Considerations

✓ Indexation is appropriate for assets where there has been little technological change and all direct costs incurred and capatilised to date would be incurred if the asset were replaced today

✓There are particular asset classes where a reliable price index is not available and cannot be constructed

✓There are therefore specific circumstances under which alternative revaluation approaches may be required

Key Modeling Principles

Criteria for Choice of Alternative Valuation Approach

Alternative Valuation Approach	Criteria
Direct Valuation	Where suitable price indices do not exist BUT where information on unit replacement costs and asset quantities are available
MEA Valuation	Where assets are no longer available for purchase or the technology of the existing asset is outdated
HCA Valuation Proxy	Where , the asset is relatively new and there are no expectations that the value will change; OR the asset has a relatively short life; OR the asset does not contribute materially to the overall value of the asset base.

Key Modeling Principles

Efficiency Adjustments

The LRAIC Model should reflect the forward looking costs that are efficiently incurred in the provision of services. As a result the following may be adjusted or excluded where the Authority considers it appropriate :

- ✓*Sunk Costs*
- ✓Stranded Assets
- ✓Fully Depreciated Assets

The above costs must be provided on an HCA basis to allow for re-conciliation of CCA outputs with statutory accounts.

An efficiency study will also be conducted.

Key Modeling Principles

Cost of Capital - WACC

Calculating the return that an operator must be expected to earn

The cost of capital is typically measured using a weighted average cost of capital (WACC) and includes both the cost of equity and debt finance, weighted by the assumed debt to equity ratio for a company.

Calculating the Cost of Equity: Capital asset pricing method (CAPM)

$$r_e = r_f + \beta \times (r_m - r_f)$$

Where:

r_e is the cost of equity;

r_f is the risk-free rate;

β (beta) is the measure of relative risk of the relevant assets; and

r_m is the expected return on the equity market. The difference between the market return and the risk-free rate is known as the equity risk premium (ERP).

Key Modeling Principles

Cost of Capital - WACC

CAPM:

Considerations and Assumptions

CAPM is a simple and transparent method.

Estimations to be used for CAPM:

r_f : the return on benchmark risk free government securities such as US government bonds.

β : based on information on the calculated beta for a sample of comparable operators in other jurisdictions.

Note: Concessionaires are not publicly listed so it will not be possible to directly estimate the beta for any of the concessionaires.

ERP: US Based Estimates

In order to reflect any greater perceived risk of investing in Trinidad and Tobago, for example due to currency exchange risks, it may be appropriate to add a country specific risk premium to the estimated cost of equity.

Key Modeling Principles

Cost of Capital - WACC

The Cost of Debt:

Considerations

Calculating the Cost of Debt

The Authority will consider the debt premium by observing the actual cost of debt of comparator telecoms companies. In making this comparison, the following factors will be taken into account:

- ✓the size, credit rating and gearing levels of the comparator firms;
- ✓the maturity of debt held by comparators;
- ✓the time period over which the debt premium is calculated;
- ✓any country specific risk premium;
- ✓decisions on the debt premium made by other telecoms regulators; and
- ✓available information on the optimal debt to equity ratio.

Key Modeling Principles

Cost of Capital - WACC

Other Considerations

Decisions yet to be made in consultation with industry

Should there be:

- ✓One industry WACC;
- ✓Concessionaire specific WACCs; or
- ✓Market specific WACCs?

Factors to consider include:

- ✓the extent to which different concessionaires face different risks;
- ✓the extent to which different markets are subject to different risks given differences in the demand, cost and technology characteristics;
- ✓the impact on the incentives of concessionaires to invest;
- ✓the feasibility of estimating separate WACCs for each concessionaire will be limited by data availability. Data availability for T&T is limited and the estimation is likely to rely on a significant amount of benchmark data.

Key Modeling Principles

Calculating Joint and Common Costs - EPMU

Fixed common and joint costs between increments are recovered by use of an **EPMU (Equi-proportionate Mark-up)**, whereby fixed common costs are recovered pro rata to incremental costs.

The model will calculate common costs for subsets of increments, (such as the network) on a cost category by cost category basis as set out below:

- ✓For each LRAIC cost category the sum of component incremental costs (where each component is removed in turn) is compared to the incremental cost for the subset of components as a whole (where all components are removed at once).

- ✓The difference between these two sets of costs is the fixed common and joint costs across these increments for this cost category. These common costs to the subset of components are then allocated to the components using an EPMU approach.

The Model Development Process

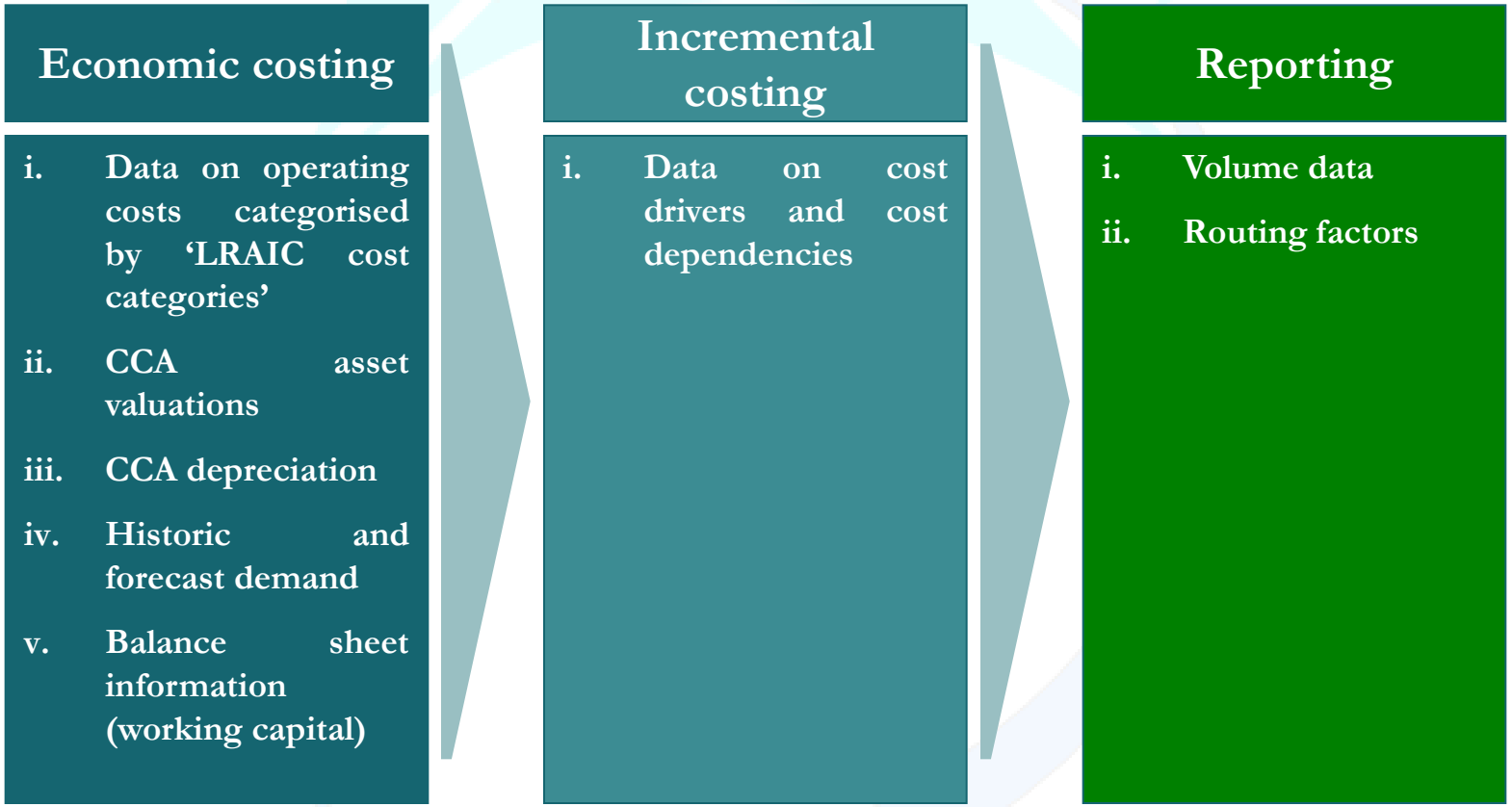
Overview of Modeling Process

- ✓ Data Requirements
- ✓ CCA Revaluation Study
- ✓ LRAIC Model Outputs
- ✓ LRAIC Model Inputs

Data Requirements

Role of Operators:

To provide inputs into each stage of the model development process to ensure that the model results reflect the underlying operating conditions in Trinidad and Tobago.



Data Requirements

Economic Costing Information	
Description of data required	✓ Data on operating costs categorised according to 'LRAIC cost categories' ✓ CCA asset valuations for various asset groups ✓ Balance sheet items
Possible sources	✓ Revaluation Study ✓ Activity based costing (ABC) studies that may have been conducted in the past ✓ Asset register ✓ Financial management information ✓ Purchasing orders

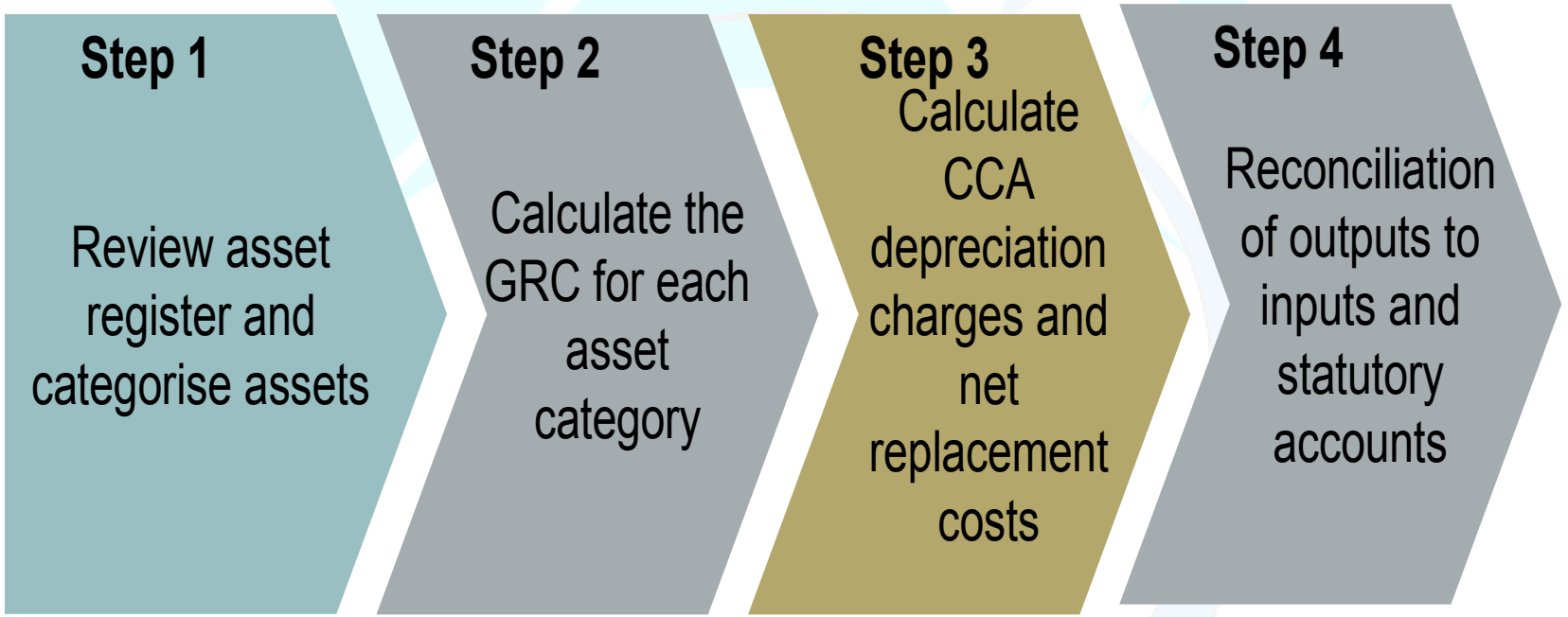
Data Requirements

Incremental Costing Information	
Description of data required	✓ Data on how costs vary as different service volumes change ✓ Data on how the cost of one cost category can impact other cost categories (such as how the number of call minutes drives the number of switches which in turn drives building space requirements which in turn drives maintenance costs and therefore HR costs) ✓ Engineering rules underlying the network and capacity constraints on network elements
Possible sources	✓ Financial management information ✓ Network engineers that understand the dimensioning of the network and/or that work in network planning ✓ ABC studies if available of management estimates

Data Requirements

Reporting Information (Routing Factors)	
Description of data required	✓ Traffic data ✓ Data on how individual services make use of the network such as how calls are routed over the network ✓ Diagram of network topology
Possible sources	✓ Billing systems (retail and wholesale) ✓ Network planning engineers

CCA Revaluation Study



Overview of CCA Data Collection Process

Stage	Role of TATT	Role of concessionaire
Initial review of data availability	Ascertain level and nature of data already collected by concessionaires for day to day commercial and regulatory purposes	Respond to requests for high level information
Issue of detailed data request	Issue CCA reference paper that sets out the requirements for the CCA study and reflects the level of data available, the time scale for data collection and the LRAIC model requirements	Seek clarification on any aspects of the data request not fully understood
Submission of initial CCA results	Review CCA data as it is submitted Request clarification of data submitted where necessary Provide clarification of data requested as required by operators Assist operators in methodological issues and identifying potential data sources	Submit data as it becomes available and before the deadline for data submission Provide clarification/validation of data requested as required within a reasonable time period
Submission of final version of CCA data		Submit final version of CCA data and full documentation of methodology, sources and results
Input data submitted into LRAIC model	Input data into LRAIC model and sense check the outputs	Provide clarification where necessary

LRAIC Model Outputs

Services covered

Fixed network

- ✓ On-net calls, off-net calls and call termination
- ✓ Line rental (access)
- ✓ Internet, Data services
- ✓ Leased lines (point to point transmission)

Mobile network

- ✓ On-net calls, off-net calls and call termination
- ✓ Roaming
- ✓ SMS and packet data services

Time periods

- ✓ **Based on historic data**
- ✓ **Annual data**

Format of output

- ✓ **Separate outputs for concessionaires**
- ✓ **Total and unit costs in nominal TTD and USD**

LRAIC Model Outputs

Other Applications

- ✓ Ex-post competition cases (e.g. predatory pricing)
- ✓ Access Deficit calculations

Other Requirements

✓The model further needs to take into account any unregulated services that:

- are provided over the same infrastructure as the above; and
- share common cost with the above services.

✓As the market develops the structure of the relevant markets may evolve. Thus the model should reflect a forward looking view of networks, as far as this is possible and proportionate.

✓It should be noted that the market definitions are technology neutral. However for the purposes of service costing, the model will not explicitly produce separate costs for services using differing technology.

✓Given that the nature and scope of *ex post* competition investigations cannot be defined in advance, the LRAIC model developed will need to be flexible enough to provide input to the process for any services or markets required.

Cost Categories

To group cost information together into a LRAIC cost category:

- ✓costs must share the same driver
- ✓costs must have the same dependencies

Eight (8) groups of LRAIC cost categories:

- ✓network components;
- ✓network infrastructure and support equipment (e.g. network power equipment)
- ✓non-network assets (e.g. office furniture, billing systems)
- ✓network activities (including network maintenance)
- ✓product management (e.g interconnect product management)
- ✓support activities (e.g. HR and finance department costs)
- ✓direct costs, cost of sales, and so on (e.g. interconnection out payments)
- ✓balance sheet items.

LRAIC Model Inputs

The LRAIC model requires the following key inputs:

- ✓ Base cost information
  - operating expenditure, direct costs, cost of sales, depreciation, capital employed
- ✓ Cost of capital
- ✓ LRAIC cost categories
- ✓ Cost drivers
- ✓ CVRs
- ✓ Hierarchy of dependencies
- ✓ Increment specific fixed and common costs (ISFC)

Issues and Challenges

Issues and Challenges to date

Stage	Concerns and /or Challenges Faced	Solution	Could have been avoided by:
Pre Model Development	Unable to set cost based rates using an independent model (e.g. interconnection) Limited regulatory resources	Benchmarking, although it is difficult to acquire cost-based benchmarking data Training of staff	Prioritising establishment of a cost model pre-liberalisation
Establishing Model Principles	Had to be done in consultation with industry in accordance with consultation procedures, therefore time consuming (approx. 2 yrs). Difficult to agree on basic principles Limited regulatory resources	Limiting consultation periods as far as possible (written, face-to-face). Limiting consultation to only basic principles. Benchmarking with other jurisdictions (careful analysis of local circumstances) Training of Staff	Establishing key principles in legislation – pre-liberalisation Combining consultation on principles with development of model as one project (although this *may* have presented different challenges).

Issues and Challenges to date

Stage	Concerns and /or Challenges Faced	Solution	Could have been avoided by:
Selecting a Suitable Consultant	Allocating enough funds	Benchmarking costs (based on required model functionality), although this information may not always be readily available.	Still to be tested.
	Getting the best value for money	Widespread advertisements (locally, internationally recognized periodicals)	
	Ensuring that actual project team are experts in cost model development	Requiring references in proposals. Soliciting and evaluating reference feedback. Including consultants proposed project team as a contractual obligation. Establishing approval process for replacements where this may be unavoidable	

Issues and Challenges to date

Stage	Concerns and /or Challenges Faced	Solution	Could have been avoided by:
Data Collection Process	Resource intensive for concessionaires, particularly smaller ones. Delays due to late data submissions.	Allocating enough time in project plan. Providing data templates. Issuing initial data request at very beginning of project and having face-to-face meeting opportunities. Possibly providing assistance to smaller concessionaires or making data requirements as simple as possible.	Not completely avoidable. Limiting costing obligations to dominant or incumbent operators in legislation as done in other jurisdictions (although it may be argued that there are benefits to small market players participating in such an exercise: • better understanding of own costs •Better understanding of industry cost accounting practices • could facilitate increased efficiency and therefore increased competitiveness in a globalised environment.)

Issues and Challenges to date

Stage	Concerns and /or Challenges Faced	Solution	Could have been avoided by:
Model Specification and CCA Reference Consultation	Low participation by concessionaires, particularly smaller ones (may not have required in-house expertise or appreciate the relevance of the exercise). Delays due to: • extended deadline to facilitate other consultations • late responses	Allocating enough time in project plan. Providing opportunities for face-to-face meetings in addition to soliciting written feedback. Possibly providing training to smaller concessionaires on LRAIC modeling and CCA principles.	Limiting costing obligations to dominant or incumbent operators in legislation as done in other jurisdictions (although it may be argued that there are benefits to small market players participating in such an exercise: • better understanding of own costs •Better understanding of industry cost accounting practices • could facilitate increased efficiency and therefore increased competitiveness in a globalised environment. Possibly providing industry training at an earlier stage.
Model Development, Population & Implementation	Potential for: •Low participation by smaller concessionaires •Further delays	Possibly providing assistance or exercising forbearance to smaller concessionaires or making data requirements as simple as possible.	

The End