ABC
COSTING METHODOLOGY

CONTENTS

Report History

Author	Version	Purpose	Date	
s9(2)(a) OIA	Draft	For review	30 May 2018	
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BACKGROUND

Customs' Activity Based Costing (ABC) model follows best practice ABC principles and Treasury Guidelines for costing, being a robust, and best practice methodology that enables the components of the service cost to be identified and communicated. It demonstrates that Customs is not non-cross product subsidising. The two step methodology that is ABC, fulfils these requirements, particularly when the model is dynamic / resides within a software tool. Customs has chosen ███s9(2)(i) OIA████ software as their pilot modelling tool and it is in this tool that the model will ultimately sit. Being dynamic in nature, interfacing to the various data sources to keep it up to date.

Currently the ABC model resides in a series of three custom-built excel workbooks. This paper is written in reference to these workbooks. The next iteration of the ABC programme is to implement this model using ███s9(2)(i) OIA████

Ministers expect Cabinet Papers recommending cost recovery to:

- Demonstrate that departments understand deeply what drives costs and revenues in the business.

- Include details about volume versus price, and average versus marginal customers.

- Show why proposed changes are fair and efficient and how costs can be contained.

- Evidence appropriate (ideally external) benchmarking.

- Provide alternatives (back up plans) if bids are not approved.

- Show that someone independent has taken a look at the costs

1.1 Key principles in Customs' costing methodology

The principles are:

- All costs are analysed to activity.

- Causal drivers are used.

- The costing is achieved through a two-step costing and is based on the premise that activities consume resources and services consume activities.

- Resources are analysed, and taking into account the resource type (people, premises, equipment etc.) and the materiality, they are assigned a rule (resource driver) on which they are driven to activity.

- Activities have been collected through engagement with every part of the business, and through analysis of individual line items.

- Each activity has been analysed to determine what measure reflects the draw on that activity by services (the Activity Driver).

- Collection of volumes by service (activity driver quantities) for each of these activity drivers has been carried out through interrogating the data warehouse and a number of operational systems and tools.

- Where activity driver quantities are not available from a source system (a gap), the gap has been resolved using a strategy to first look for the next best available from an operational system, or where no system is available, a snapshot survey or estimate has been used.

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- Corporate service providers have been analysed to determine the services they provide. These services have been costed, and a causal driver used to measure and attribute the cost of service based on consumption by internal customers. Business sustaining activities and services carried out in these corporate service providers are not driven to internal customers.
- Only business sustaining activities are driven to business sustaining services (cost objects). These are assigned across service costs in proportion to cost for the purposes of pricing only.

1.2 The model

The model covers all of Customs and it involved a great deal of interaction with, and collection of information from right across the business.

Resource Drivers were collected, not generated using a standard. This enables geographical comparisons, and enhanced the usability of the information for activity based modelling purposes.

The model began as a pilot and was validated with the business.

1.3 Purpose and periodicity

The costing model will provide the costs and fees (where applicable) for each of Customs services. Fee reviews are to be undertaken periodically, for example the Border Clearance Levy (BCL) is reviewed every three years, while services are to be costed (the model will be iterated each quarter). For costing and management purposes, the model will be run on each of the following resource sets:

- Budget
- Reforecast (MBU)
- Reforecast (OBU)
- Actuals Q1
- Actuals Q2
- Actuals Q3
- Actuals Q4

Any additional models would be run to fit scenarios against which costs are to be projected. This will include a model for forecasting a fee to be used in future periods. This will involve basing a model on the forecast for the mid-year of the pricing period for which fees are set.

1.4 Cost impact of volume changes

For models involving future periods / forecasts such as those used in fees, Customs would forecast not only costs, but also volumes. Volumes can be impacted by a number of unpredictable factors, including the world political and economic climate, decisions by airlines, natural disasters etc. As such, predicting them can be challenging. Customs forecast volumes take account of variables affecting volume changes, as well historical trends, and forecasts from objective sources such as other government departments.

The model would then be backflushed to ascertain the cost impact of these volume changes – taking account of the fixed / variable nature of the costs that make up service costs. The fixed cost component of any service would remain unchanged, while variable costs associated with a service would be increased or decreased in proportion to any change in service volume. Having calculated the cost impact, the associated resources would be added to the forecast costs and this combined resource set would be put into the fee model. The period used would be the middle of the period to be covered by fees.

Note: separate documentation on the volume estimates can be seen in: Appendix 3 Volumes Forecasting Methodology

Customs Investor Confidence Rating (ICR) reflected a lower score as we lacked scenarios to ascertain impact of changing volumes on investments. Once built, and analysis of capacity is complete, the back flushing of the model will enable this impact to be understood and 'what if scenarios' run.

1.5 Fee

Generally Customs sets its fees to meet forecast costs for the next three years. Volume, growth and inflation such as wage pressures need to be considered as well as the cost centre manager's ability to change the service delivery proposition when committing to a three year timeframe to ensure projected costs are recovered, and unit costs are accurate.

The amount to recover will be calculated in the model based on the full year Budget to 30 June 2018. The results of this will inform the additional steps to support the setting of a fee:

- Reforecast at cost centre and account level for the mid period the fee is to recover.
- Adjustment to the reforecast for any budget bids that have been approved.
- The forecasting of likely volumes for the period.
- The comparison of likely volumes with actual volumes for the period of the budget year end 30 June 2018 model.
- The prediction of additional cost likely to result from the increase in volumes between the period for which fees are set, and the Budget year end 30 June 2018.
- The recalculation of the model based on this reforecast cost including allowance for volume growth.

The fees to be charged, as determined by the Pricing Methodology, are a combination of direct cost object to service and also the accumulation of individual cost objects, split by appropriate drivers to service within the Policy Pricing model. To facilitate the summary of costs, Policy have attached an attribute (equating to the fee) to enable the summarisation of individual cost objects costs to fee within the model. However, because their thinking is likely to evolve once the costs are available to them, this tagging of attributes is likely to change. As such they will maintain their own spreadsheet, and there will be no attempt to incorporate it beyond their first tagging within the ABC model until phase 2, when it has stabilised. At this time it will be mirrored as an extra layer within the software version of the ABC model, which phase 2 includes.

1.6 Driver data

Customs has a data warehouse (Nexus) that holds considerable quantities of data, including data originating from Cusmod. Much of the data needed to feed the ABC system comes from this source. Other sources include Statement of Service Performance (a database used for

recording performance data), rostering spreadsheets and other spreadsheets that are used to record activities and events in the business and externally (such as mail volumes which are sourced from NZ Post).

1.7 Services costed

The activities costed in the ABC model (cost objects) are set at a greater level of detail than which Customs set fees. Each cost object is associated with one output class, and each cost object is associated with a fee or many fees; i.e. fees will consist of the sum of many cost objects that have been linked together into one fee for a service.

The cost object definition takes account of the risk levels associated with the type of service. This was done in order to more accurately predict the cost impact of volume changes, taking into account the relative risk around certain cost objects, and enabling a more accurate understanding of the activities required to support them. Customs is facing increased volumes across most of its services and as such, plans to utilise ABC to do 'what if' type scenario analysis of the impact of volumes. This will be developed in phase 2, and will take account of the fixed, variable and semi-variable nature of costs, capacity, and operating costs associated with any necessary increase in capacity.
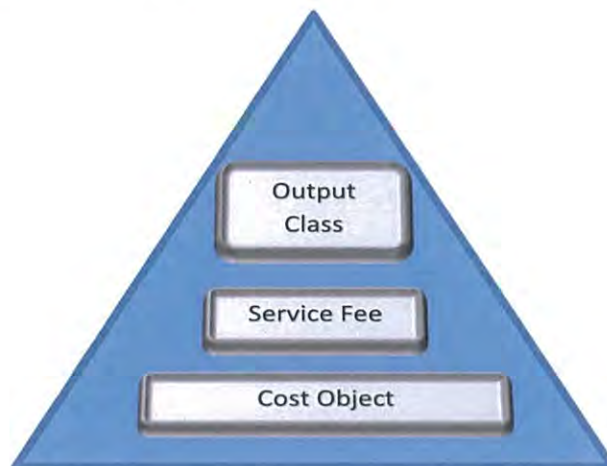
Activities by geographical location have been collected for management purposes, however Customs does not wish to price differentially by geographical location.

1.8 Under and over recoveries

As fees are based on both forecast cost, and forecast volumes, a variance in either of these may result in an under or over recovery. By putting actual costs through the model to determine actual cost, the impact of any changes which have arisen since the fee review can be assessed and the true under or over recovery demonstrated.

Customs is impacted by airline decisions e.g. the time of arrivals impacts on the cost of staff required to clear passengers. E.g. the airlines decision to introduce flights arriving into Queenstown at night, resulted in additional costs of approximately $0.5m to Customs.

Similarly, passengers can be cleared through two channels (providing their passport is from a country included in the eGate policy), eGate, or booth. Families with young children cannot use eGates, nor can passengers with passports which are not electronically chipped. Unless the cost of clearing a passenger through each of these channels is the same, passenger

choice (and policy making that choice available) will also impact on the actual cost associated with a service.

There is currently a memorandum account for the Border Clearance Levy (BCL). There is no memorandum account for goods, though one is planned to be introduced in time for the new financial year.

Government stipulates that the balance of the memorandum account must trend towards zero over time. As such the balance of the memorandum account will be put into the model between the layers of:

- Total cost, and amount to recover. Amount to recover will incorporate the cost of all cost objects within a fee group.

- Dividing amount to recover by the forecast volume will provide the unit fee. As such the balance of the memorandum account should trend towards zero (in the absence of further volume or price variances).

1.9 Maintenance of the model

Like all organisations, Customs will morph and change along with the environment in which it operates. In particular, the new Customs and Excise Act 2018 (C&E Act) has changed the landscape. Minor changes such as to cost centres and accounts will be readily accommodated. The costing team will gather the required data (resource drivers, any new activities and drivers) to ensure they are incorporated within update to the model for incorporation in Cost Perform.

More major will be changes to the way business is undertaken. The work being done with regard to the C&E Act is a good example of that. The costing team will therefore have additional work to do around new activities and services that result from it, and will update the model to reflect the changed organisation on an ongoing basis. An example of that will be when the new infringement notice system is fully activated this will not only change activities and behaviours within Customs but also those exhibited by Customs customers.

2.0 Credits / revenue work in progress

Within Customs some functions are:

- co-funded (such as National Maritime Coordination Centre (NMCC))

- funded through appropriation to Customs with a contribution recovered from others (e.g. Joint Border Management System (JBMS) from MPI)

- viewed as a negative cost

- viewed as revenue

The ABC model drives only those costs which are appropriated to Customs through to activity and cost object. Therefore the NMCC which is manned by Customs, and uses some of our systems, appears in our General Ledger which is treated as a negative cost.

The Joint Border Management System (JBMS) is a system used in conjunction with MPI for border control of all goods, importers and exporters. In the General Ledger (GL), there is a cost for JBMS, as well as 'credit' which is a recovery from MPI for their share of the cost of maintaining the system.

We provide the Cook Islands Border Management System (CIBMS) which is a separate Cusmod system designed and managed as part of our Pacific Partnership arrangements responsibilities which we receive a credit for, but the total cost of providing this service exceeds the monies received.

Together these 'credits' are not included in the cost side of the ABC model as this would distort the true cost of these activities. Instead these are directly attributed to cost object outputs to be incorporated into the pricing model. The Pricing Methodology will have an attributed driver to spread these credits over the appropriate costs so that over recovery or double dipping doesn't occur.

THE MODEL

A diagrammatic view of the model is provided in Appendix 1   Diagram of ABC

Resources

All Customs departmental cost centres are included in the model.

All operating expense accounts are to be included (this includes depreciation and capital charge).

There are some recoveries already enacted within the General Ledger. This includes:

Account id	Account name
3004	Secondment Recoveries
3516	International Accom Recoveries
3519	International Travel Recoveries
4604	Insurance Recoveries

These have been excluded from the ABC model, so that actual costs for the relevant activities are calculated within the model.

Resource to resource assignments

Some costs are held centrally in one cost centre on behalf of other cost centres who consume them. This is handled by assigning costs from the centre to the cost centre of those who consume it (a resource to resource assignment) which happens prior to the resource to activity stage of the costing. These expenses are:

- Deployment
- Accommodation
- Depreciation
- Capital Charge
- Corporate Services

Depreciation is currently coded to individual cost centres corresponding to major asset classes such as eGate and JBMS rather than to the cost centre that uses and manages the asset. As

such, a user field has been introduced to hold activity i.d. and each asset has been analysed as to what activity it supports. In this way, drivers for depreciation (depreciation cost), and capital charge (original historic cost) are extracted from the Fixed Asset Register.

The memorandum account balance at year end (for each fee type that one is operated) will be fed back into the ABC resource module for inclusion in the fee calculation. Thus, providing there are no price or volume variances, will bring the memorandum account to zero. In reality, while price variances are rare (Customs achieves budget), volume variances pose a problem.

Resource attributes and cost types:

Expenses within the model have been tagged with cost types (being those types which cost object costs being able to be broken down (e.g. avoidable/unavoidable, fixed / variable)), and attributes required to meet objectives for more summarised reporting.

These include:

- Geographical location (note: within Customs, cost centre is not the same geographical location in every case).

- Location type (major international airport, regional international airport, marine port, International Mail Centre, cargo inspections facilities, Integrated Targeting Operations Centre (ITOC), NMCC, overseas post).

- Avoidable / unavoidable.

- Fixed / variable (and in the next iteration – semi-variable).

Each activity has been broken down by geographical location to provide a report of activity by location.

Corporate service costs will be assigned to those cost centres that consume their services on a causal basis. When we are using modelling software (Cost Perform), reiterative assignments for consumption of one corporate service provider by another is easily facilitated. This enables the cost of those activities undertaken by users of corporate services to include not only those costs that reside within their own cost centre, but the complete cost of undertaking that activity e.g. staff time, the cost of the payroll, the cost of their accommodation, the use of any IT applications involved etc. Note that corporate service providers will have each of the services they provide costed and only those performed for internal customers will be assigned out. Business sustaining activities such as statutory reporting, OIAs etc. do not impact on the service, and hence will not be attributed to that service following ABC protocol. When taking costs on to 'amount to recover' (i.e. pricing), these business sustaining costs can be attributed on an agreed basis such as revenue, volume, direct cost, (by definition there is no causal basis for assignment of these costs).

In the current Excel model we use the following cascade method for the allocation of corporate services on a causal basis.

Also see a diagrammatical view of the cascade model in the

Appendix 2   Diagram of the Corporate Cascade

Customs has the following corporate service providers:

- Information Services
- Finance, Strategy and Performance (inc. Corporate Support)

- People and Capability
- Policy, Legal and Governance
- Comptroller

The various services each corporate service provider provides to internal customers have been analysed, and the cost of each of those services has been assigned to customer cost centres based on the volume of each of the services consumed. Those business sustaining services (e.g. audit) will not be driven to cost centres but to their own activity and then to the business sustaining part of the cost object in ABC. During the fee setting (a move from cost to 'amount to recover') these business sustaining costs will be attributed to service on the basis of cost to provide a fully absorbed cost.

This corporate service assignment is the first step within the ABC model. The most complex part of this, is the costing of the IT services and applications. To facilitate this, corporate service costs flow down in a cascade (whereby costs can only flow down the cascade, not up – e.g. if IT were above Finance in the cascade, any usage of IT services such as the running of the FMIS would be attributed from IT to Finance, however any usage of Finance by IT would not have the associated cost attributed).

The order of the cascade within the model is:

Level 1: Occupancy costs, depreciation and capital charge

Level 2: People and Capability (P&C)

Level 3: Information Services

Level 4: Comptroller and Finance, Strategy & Performance (FS&P)

Level 5: Policy, Legal & Governance (PLG)

Costs undergo an initial iterative step to ensure that operational and PLG cost centres (being at the lowest level of the cascade) do not draw unduly high costs relating to shared services types of activities such as recruitment, FMIS maintenance, accounts payable processing, Payroll, etc. which are activities that are consumed within all levels of the cascade. As an example, although FS&P sits lower in the cascade than P&C, P&C will receive some initial costs from FS&P based on the number of cost centres in P&C and how many accounts payable invoices each of those cost centres may have required processing, for example.

In effect, this step reflects the complete cost of cost centres undertaking their activities within the organisation based on the centralised shared services activities it consumes such as:

Centralised Shared Service Activity	Driven by
Payroll	No. of Employees (by cost centre)
Recruitment	No. of New Employees (by cost centre)
General Ledger Maintenance	No. of Cost Centres on FMIS (by cost centre)
Accounts Payable	No. of APs Processed (by cost centre)
Asset Register Maintenance	No. of Fixed Assets on FA Register (by cost centre)

This step has been introduced to ensure that all cost centres receive a fair distribution of centralised shared services costs, rather than the cost centres at the bottom of the cascade picking up the lion's share of these centralised costs because of their position within the cascade.

From this point, a waterfall distribution approach sees cost centres within each cascade level spread their absorbed costs (including the above iterative costs) to cost centres sitting in lower levels only (so not within the same level or higher), using the same volume consumption basis defined in the original collection.

In further developments of the model (within ABC software), reiterative or recursive corporate service costing can be achieved. Software uses simultaneous equations to resolve any loops to a specified number of decimal places meaning all corporate service providers consumption of other corporate service providers is handled appropriately – enhancing the quality of the costing information for the purposes of benchmarking as well for accurate activity and cost object costing.

Policy will be responsible for the pricing policy, on the basis of the cost information. Finance will enact this policy in one of the final stages of the model within phase 2.

Resource Driver Quantities (RDQs)

Resource drivers were assigned with regard to the materiality of each of the GL line items, and driver quantities were gathered. These were gathered by interviews with the Cost Centre Manager or through analysis of supporting detail such as the fixed asset register, invoices, budget documents etc.

The RDQs obtained via these initial interviews would be updated six monthly, via survey.

Activities

Activities are to reflect geographical location so that the cost per activity per location can be generated and compared. This facilitates benchmarking for best practice transfer, as well as providing additional information for modelling changes to volumes, as well as enabling the pricing policy to consider any geographical differences.

Activities are analysed as to whether they support other activities, or services, and if so, a driver chosen (being a measure of the draw on that activity by each of the services). In choosing the driver, materiality is taken into account, along with consideration as to whether it is appropriate to weight it for different services. The measures of this driver were then sought from the various operational systems within Customs. The drivers chosen can be seen in the Activity Dictionary worksheet of the model. Where the driver was not able to be sourced, a next best available one was chosen or a proxy was chosen. Where material and appropriate, a snapshot survey was undertaken.

Cost objects

The cost object is the level at which the model costs. This is lower than fees. These can be seen in the cost object master worksheet. Each cost object is attributable to one output class and as such, it is through summarising cost object costs that output class costing is achieved.

Cost Object output Quantity

Actual volumes by cost object were obtained from within Customs' operational systems and can be seen within the model.

The forecast volumes used for pricing have been undertaken and a link to their methodology provided.
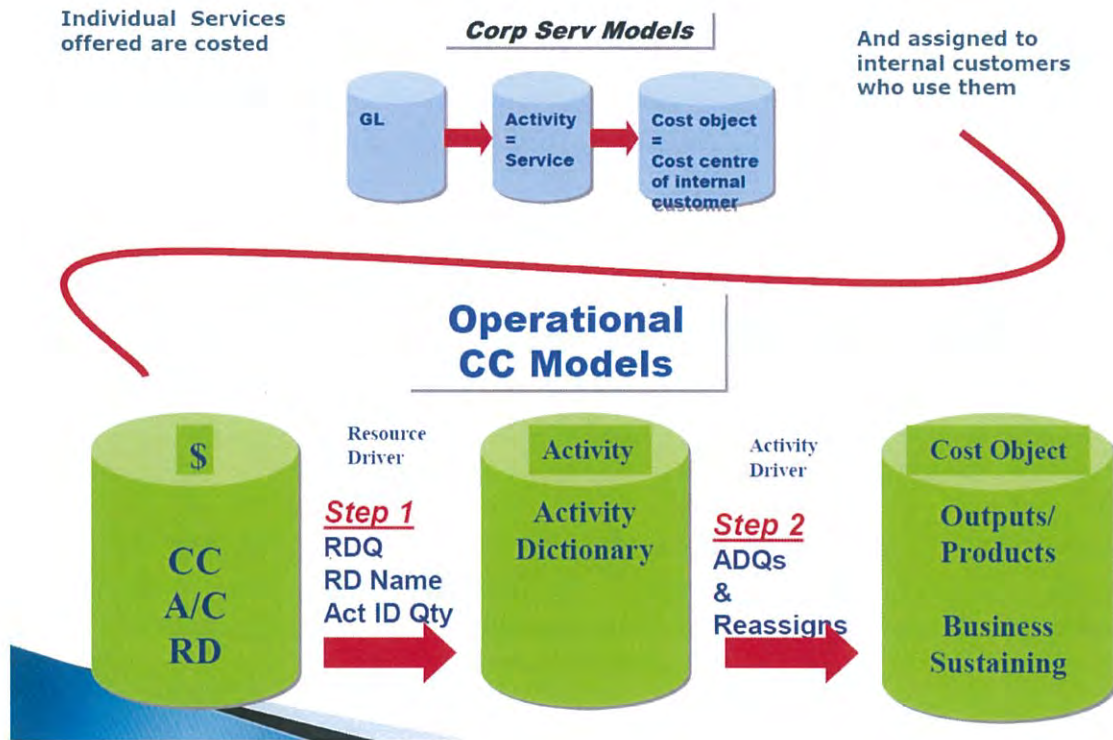
Validation

The model has undergone six weeks of validation. Validation teams looked at results and where they appear out of alignment with intuitive / gut feel, are drilled down on, assumptions, drivers and source data questioned etc. – improved where necessary, or beliefs changed.

Stages in the Costing

| Stage	From	To
1	Corporate service provider	Individual corporate service offered
2	Each corporate service	Internal customer / operational cost centre
3	Operational cost centre parents	Children cost centres
4	Fully loaded operational cost centres	Activity
5	Activity	Activity
6	Activity	Cost object (service, customer, channel, business sustaining)
7	Cost object rollup	e.g. service to customer
8	Revenue	Service to enable under or over recovery
9	Cost object output quantity	Unit cost
10	Assign business sustaining for Treasury reporting	Fully absorbed output costing
11	Service costing	Price (applying the pricing policy and memorandum account balance)

Corporate Services

Individual Services offered are costed

Corp Serv Models

GL → Activity = Service → Cost object = Cost centre of internal customer

And assigned to internal customers who use them

Operational CC Models

| $ CC A/C RD | Resource Driver **Step 1** RDQ RD Name Act ID Qty | Activity Activity Dictionary | Activity Driver **Step 2** ADQs & Reassigns | Cost Object Outputs/ Products Business Sustaining |

APPENDIX 2   DIAGRAM OF THE CORPORATE CASCADE

Centralised Shared Services Cost Model and Cascade
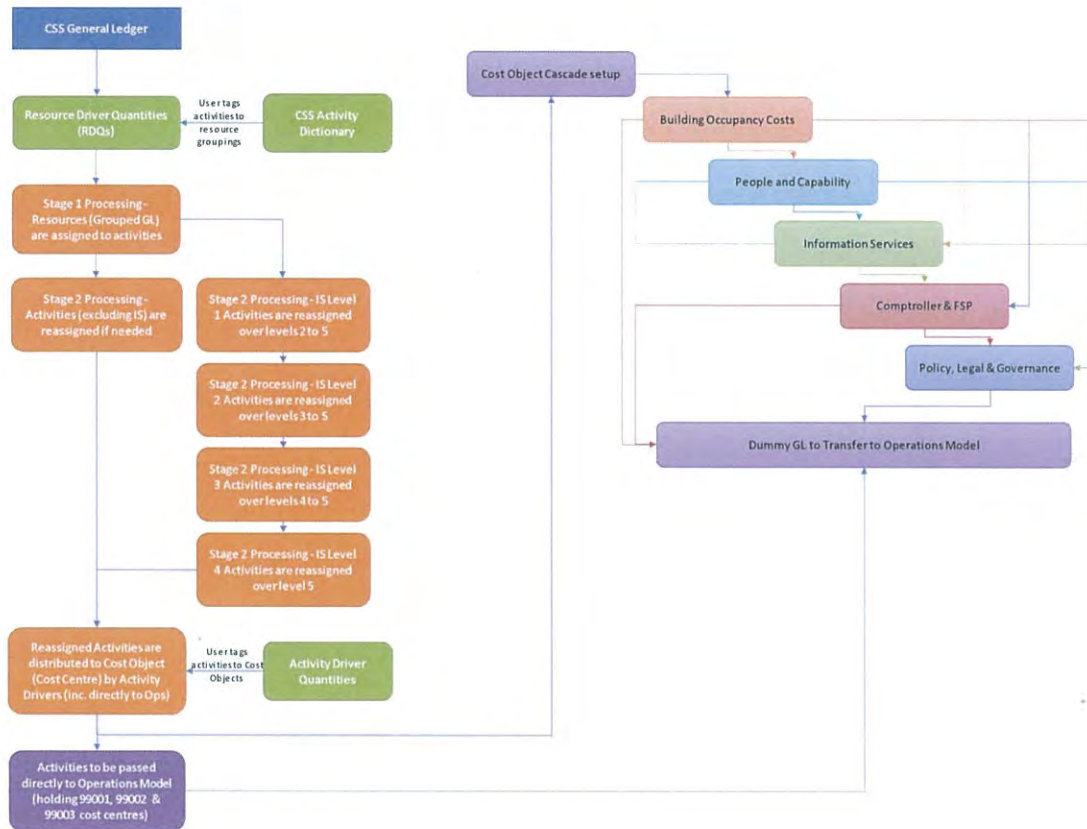
APPENDIX 3   VOLUMES FORECASTING METHODOLOGY

Performance Analysis and Reporting forecasting

Introduction

Performance Analysis and Reporting (PAR) were approached by Policy Group to complete forecasting for cost recovery work. Policy provided their forecasting requirements for PAR to develop models to predict future volumes. Joint Border Analytics (JBA) also provided PAR with guidance and advice around the model development. The cost recovery work will forecast three years in the future. The model building uses, where possible, a time series of 10 calendar years. If 10 years of data was unavailable the maximum number of years were used.

Methodology

Where there is an official forecast available we have used that eg the International Tourism Forecasts produced by MBIE. If unavailable PAR used R Studio software to build the forecasting models. Initial time series data is extracted either from the Nexus data warehouse or from .csv flat files provisioned by Information Services and uploaded into the R Studio workspace. The process for producing the forecasting models is as follows.

Time series model is produced using the auto.arima and forecast functions. The auto.arima function tests multiple models and chooses the best one based on the time series. As we are dealing with annual data there is no seasonal component to any of the models.

Forecast growth rates produced from the auto.arima model are assessed against actual of 2018 compared to 2017. If the rates are consistent then the auto.arima model is accepted.

If the auto.arima model is significantly different from the actual growth rate then a model is manually produced using the arima function. Variables for differencing, moving averages and drift components are tried and tested against the actual growth rate to fit the best model

Assumptions

The forecast models are based on historic time series and do not account for industry information (eg cruise bookings for 2018). Industry information PAR have access to is compared directly alongside forecasting models produced.

Capacity will have no impact on the forecast volumes.

Outward cargo reports include Outward Cargo Reports and Electronic Cargo Information.

Due to limitations with data SES entries are countd as those that are entered into the Customs database with 'SEP' included in the other information part of the export entry.

Reviewed by: s9(2)(a) OIA   JBA, s9(2)(a) OIA   PAR

    Date: 11/5/18 and 28/8/18

    Approved by: Gary McAdam, Manager Business Performance

    Date: 24/10/2018

APPENDIX 4   ACTIVITY DICTIONARY