

## Activity-Based Costing and Profitability Management ‘made easy’ using the Prodacapo software and the eTOM framework

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Investaura Management Consultants, January 2018

### **Abstract:**

Service Costing has the reputation to be complicated and time-consuming to implement. It doesn't have to be so. Using the eTOM business process framework for telcos, as well as a top-down approach and a representative data set for a mobile service provider, this white paper presents **the key steps for a rapid implementation** undertaken over a **five-week period** with Prodacapo, the Activity-Based Costing (ABC) software platform. Once the initial model has been set up, it can easily be expanded as required.

In the model, costs are assigned to **4 categories** and then allocated on the basis of the following **cost allocation principles**:

- **Direct costs** are allocated directly from cost accounts to end-user services (voice, data) as well as customer segments (prepaid, postpaid).
- **Staff costs and staff-related costs** are allocated to 79 core processes (activities) across 6 divisions in the organisation; the 79 core activities are captured in a simple, top-down approach. The activity costs are then allocated to the end-user services and customers in a second step.
- **Network and network-related costs** (network D&A, network OPEX) are allocated to ‘network segment’ in a first step and ‘service elements’ in a second steps. Service elements are building blocks that can be combined to create services sold by the mobile operator to end-users.
- **The remaining costs are categorised as common costs** (e.g. image advertising, non-network fees, non-staff fees, bad debt, impairment, goodwill amortisation etc). They represent between 10% and 30% of total costs, and are allocated according to various rules (e.g. on pro-rata of subs, revenues, or not allocated at all in the LRIC calculations). These allocation rules are based on industry experience but also retain an element of arbitrariness. They can be modified as needed in discussion with the management of the service provider, and the telecoms regulator if needed.

For each service, two types of cost results are generated: **Fully Allocated Costs (FAC)**, an 'average' cost measure that includes common costs; **Long-Run incremental Costs (LRIC)**, a 'marginal' cost measure that excludes common costs. Providing two sets of cost results is useful both for **regulatory costing** as well as **retail pricing** purposes, as it provides a **cost range (LRIC = minimum, FAC = maximum)** for each services sold by the service provider to other carriers (B2B) or end-users (B2C).

Beyond the cost results above, we also generate **profitability measures** at the service level (e.g. voice call per minute, data download per Mbyte) as well as the customer segment level (e.g. prepaid1, postpaid2), including **EBITDA** and **EBIT** per service type and per customer type, as well as the associated profit margins.

For this work, we have used the **Prodacapo ABC software solution** from Sweden. Prodacapo is an ‘object-oriented’ solution that greatly helps structure the costing and profitability analysis, capturing in particular the organisation structure, cost centres, processes, activities, products, customers etc. Controllers and strategists love Prodacapo for its ability to take their business detail into account, as well as their financial and commercial data.

A password-protected version of the telecoms model is accessible at [demo.prodacapo.com/telecom](https://demo.prodacapo.com/telecom). Feel free to contact Investaura at [enquiries@investaura.de](mailto:enquiries@investaura.de) and request your password if you would like to get access to the telecoms model online.

The remainder of this white paper is structured as follows:

- in Section I, we start by reviewing why *Costing* matters;
- Section II provides a brief overview of the Prodacapo ABC software platform;
- Section III, also the longest section in this white paper, presents the five steps undertaken for the implementation of the model. A large number of diagrams and screenshots illustrate how the five steps look like in practice;
- In Section IV, we present and discuss a number of key results;
- Finally in Section V, we explain how the model can be further expanded.

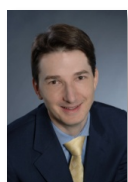
The white paper also includes two annexes:

- Annex A presents and explains the key objects used in a Prodacapo model, from *Organisation* and *Accounts* via *Resources* and *Activities* all the way to *Products*, *Customers* and *Sales*, so that the reader can better understand the key building blocks of a Prodacapo model;
- Annex B provides an introduction to the eTOM business process framework and how the framework (at Level 0, 1, 2, 3) has been implemented in the Prodacapo telecoms service provider model.

#### Keywords:

- **Service Costing, Activity-Based Costing**
- **Regulatory costing**
- **Management Accounting, Profitability Management**
- **FAC (Fully Allocated Costs), LRIC (Long-Run Incremental Costs)**
- **Top-down modelling**
- **ICT Service provider, eTOM process framework**
- **Enterprise Performance Management (EPM) software solution**

#### About the author



**Pierre Lurin** is a Partner at Investaura, a consultancy specialising in Business Planning, Performance Management, and Corporate Finance for the ICT industries. He brings more than 20 years of telecoms and IT industry experience. Pierre started his career in 1995 with Analysys Mason, and later joined Siemens and Nokia in Germany before founding Investaura in 2008. He is the author of “Business Planning for Managers and Entrepreneurs: how to write better business plans that set you apart” (ISBN 3-9813734-2-4, available on Amazon). Pierre can be contacted directly at [pierre.lurin@investaura.de](mailto:pierre.lurin@investaura.de).

Investaura is a Prodacapo Gold certified partner. More information about Investaura professional services and Enterprise Performance Management solutions can be found on [www.investaura.co](https://www.investaura.co).

## I. Costing for Profit: why does it matter?

More often than not, service providers have limited visibility over their real sources of profit. When a company sells hundreds of services to millions of customers, it can be easy (but wrong) to assume that all products and customers are equally profitable. In fact, most costing and profitability analyses show that 70%-80% of profits are generated by 20%-30% of customers and services, as shown in Exhibit 1.

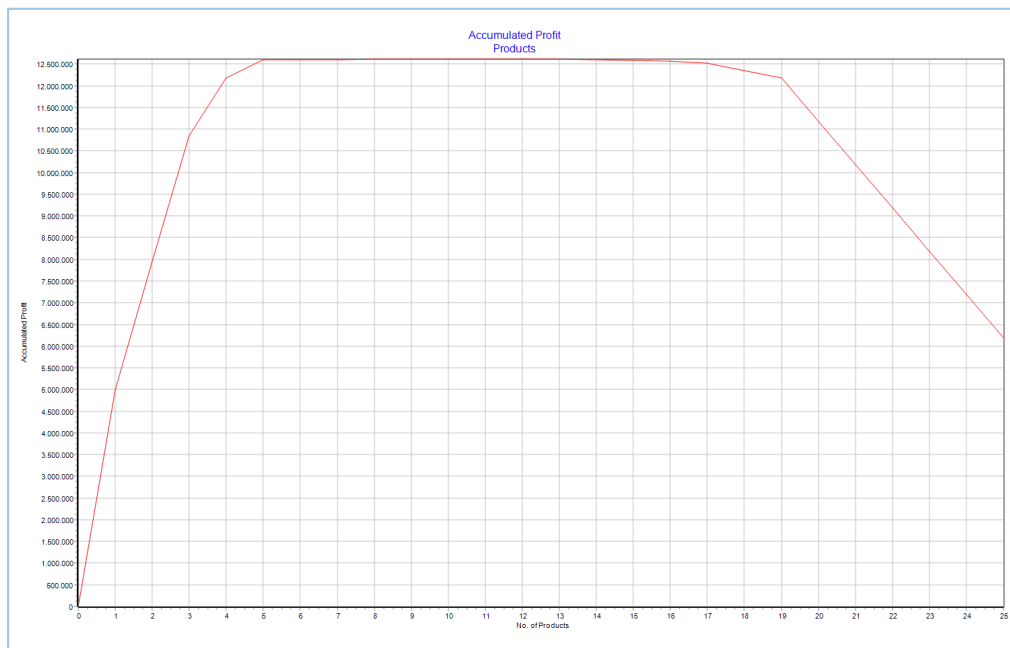


Exhibit 1: Accumulated profits (USD) generated by *Products*: 5 products generate all profits, 10 products are breaking even, and 10 products are loss-making [Source: Investaura]

In today's world, competitive pressure is immense and profit margins can be slim. Therefore, companies need to go beyond managing their profits at the business unit level, and analyse their costs and profits all the way down to the product and customer level. While doing so, companies can put a cost on their current processes and review the way they operate. This in turn opens the door to cost reduction measures and business improvement initiatives such as skill development, standardisation, centralisation, automation, and outsourcing of non-core processes to external parties.

Business models, especially the Excel 'monster' models prepared by consultants for their clients, are often over-complicated, not terribly smart and very difficult to maintain, creating the risk of being abandoned by the client once the project has been completed and the consultants have gone.

Investaura suggests an alternative and better approach, starting with a simple, very structured but straightforward model, and relying on a best-in-class professional software platform designed for costing and profitability management. This approach helps both the client and its consultant quickly generate results, and leaves ample room for addressing further levels of detail once the initial analysis has proved its value, and as the needs of the business evolve over time.

For this work, we have captured the business of a mobile service provider as follows:

✓ **Customer types (2 categories):**

- Prepaid: 5 segments / tariff plans, including Consumers and Enterprise customers.

- Postpaid: 3 segments / tariff plans
- ✓ **Product types (3 categories):** voice, SMS and data:
  - Voice products (6):
    - Outgoing: on-net calls, off-net calls to other mobile operators, off-net calls to fixed operators, outgoing calls to international
    - Incoming: incoming calls from other operators, incoming calls from international
  - SMS products (5):
    - Outgoing: on-net, outgoing to other mobile operators, outgoing to international
    - Incoming: incoming from other mobile operators, incoming from international
  - Data products (2 sub-categories):
    - Connectivity services, such as internet browsing and email service
    - Digital services, such as Premium SMS and CRBT
- ✓ **Organisation:** 6 divisions (CTO, CIO, CCO, CFO, CHRO, CEO) and 30 departments and cost centres in total
- ✓ **Processes:** about 80 core processes, modelled in a top-down, driver-based manner

Once the initial framework is in place, it becomes much easier to build up on the model and add further level of detail to the analysis, such as new resources, network segments or additional services.

## II. Prodacapo Activity-Based Costing and Profitability Management software

Prodacapo is an Enterprise Performance Management (EPM) suite that includes ABC, Process Management and Scorecard.

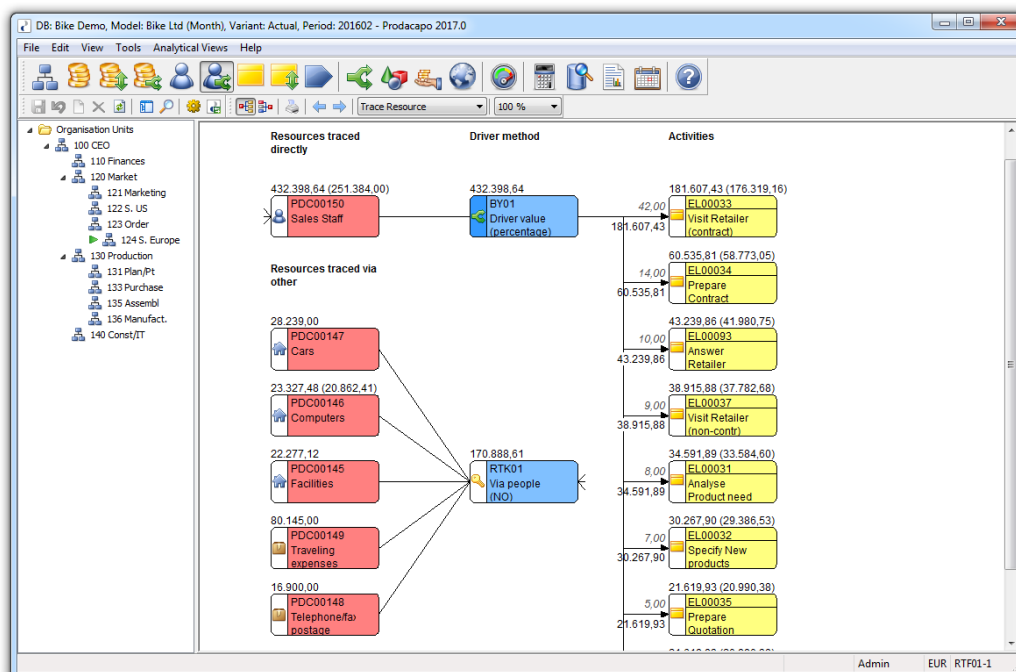


Exhibit 2: Overview of the Prodacapo Windows interface and allocation of *Resource* costs to *Activities* via *Resource Drivers* [Source: Prodacapo]

- ✓ **Prodacapo ABC** is an activity-based costing solution. It uses a driver-based, cause-and-effect logic that captures how customers consume products and services, which in turn consume activities and

the resources required to conduct these activities. Prodacapo ABC enables organisations to better understand the costs in their business, improve operational efficiency and increase profitability.

- ✓ **Prodacapo Process Management** allows companies to identify, measure, improve and manage their business processes across functions in order to improve operational performance.
- ✓ **Prodacapo Scorecard** assists businesses in translating their strategy into specific, measurable targets and initiatives for each relevant business unit, department, cost centre and team. It helps organisations to communicate and implement strategies at all levels, establish responsibility for achievements and focus on the actions that are critical for success.

The Prodacapo software suite is industry-independent and can be used both in product industries and service businesses. Prodacapo also provides pre-packaged industry-specific solutions that greatly help clients get started and accelerate the initial implementation. Investaura has been working with Prodacapo since 2013 and the company is Prodacapo's preferred partner for the ICT markets, including Telecoms and IT service providers.

Following a thorough selection process, Investaura has chosen Prodacapo's software solution for the following reasons:

- ✓ Prodacapo is a very mature software platform with more than 20 years of experience in the profitability and performance management area;
- ✓ The software solution is easy to roll-out and easy to use;
- ✓ The Prodacapo contact centre in Sweden, as well as Prodacapo's local partners in Europe, North America and APAC, provide very reactive and high-quality support;
- ✓ The Prodacapo software solution can easily be integrated with any ERP solution or database environment (e.g. Oracle, SAP, Microsoft, Sage, Infor, IFS etc).

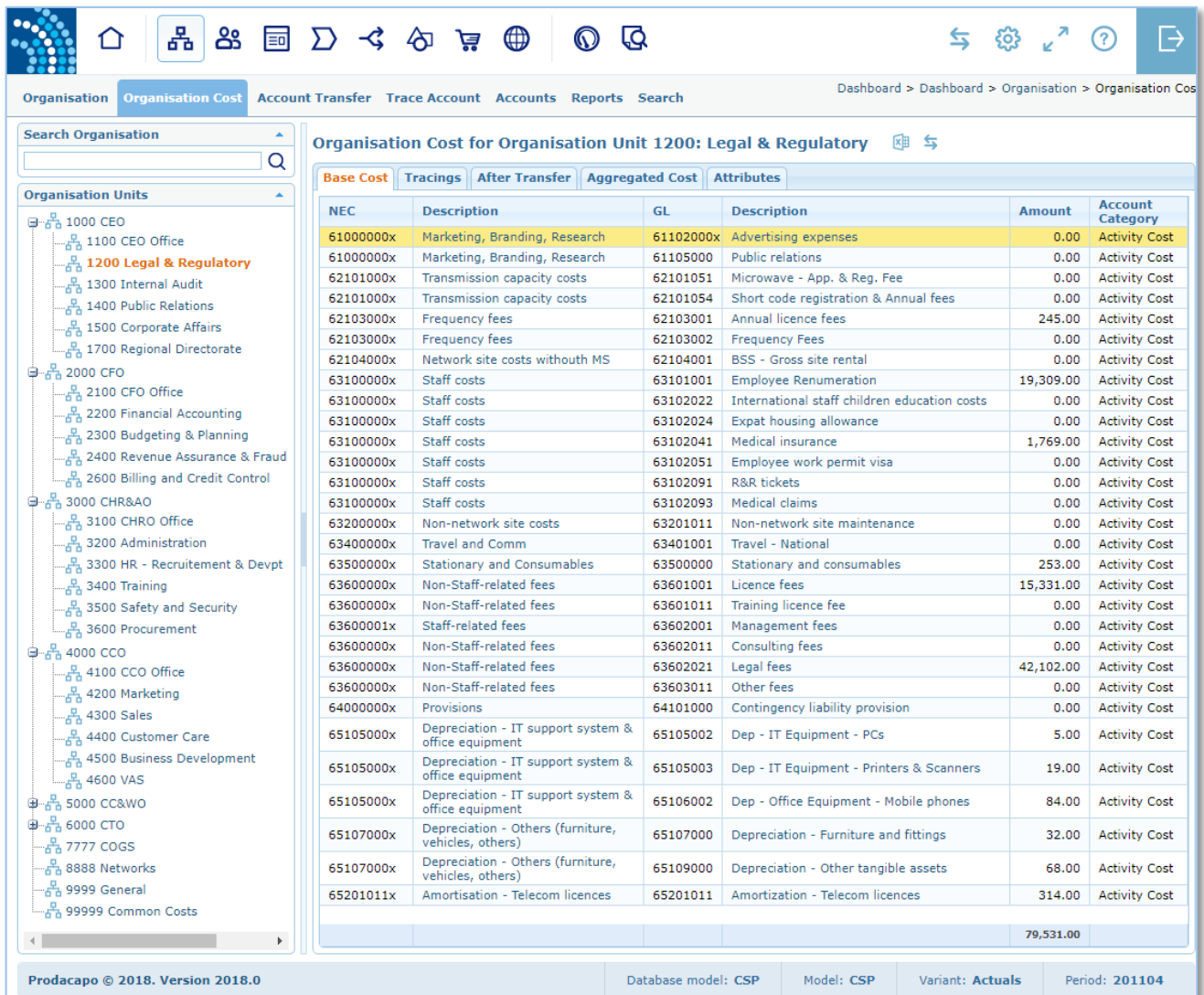
### III. Overview of the implementation

The model presented in this white paper has been designed and implemented in five weeks only. While we recognise that an actual deployment for a client takes longer, in particular because the data preparation in Phase 1 can take time, the five implementation steps are essentially the same in any project. This section provides a step-by-step roadmap that can also be used as a high-level project plan.

The 5 phases of the implementation are the following:

- **In Phase 1**, we prepare the **architecture** of the model (cost centres, accounts etc); upload a trial balance into the system; identify direct costs / staff costs / network costs / other costs; and create new account groupings called NECs to simplify the upcoming cost allocation.
- **In Phase 2**, we define **products (services) and customer types**; upload the related volumes of traffic, revenues and customers into the system; and allocate the direct costs identified in Phase 1 to services and customers.
- **In Phase 3**, we capture the **key activities** undertaken by the employees of the telecoms service provider, as well as the **resources** (staff, equipment, others e.g. external resources) required to undertake those activities. We also allocate the relevant accounts and NECs to those resources and activities.
- **In Phase 4**, we model the **telecoms network**, using resources as building block, and then allocating resources to 'network segments' and 'service elements', and from then on to end-user services.

- In Phase 5, we connect the dots: **we map the activities** identified in Phase 3 to customers and services; we also **allocate common costs** using alternative allocation methods. We also run the model, check that “no cost is lost”, and analyse the costs and profitability results.



The screenshot displays the 'Organisation Cost' interface for 'Organisation Unit 1200: Legal & Regulatory'. On the left, a tree view shows the hierarchy of Organisation Units, with '1200 Legal & Regulatory' selected. The main table shows a breakdown of costs by NEC (Natural Expenditure Category), Description, GL (General Ledger) account, Amount, and Account Category. The table is filtered to show 'Base Cost' and includes tabs for 'Tracings', 'After Transfer', 'Aggregated Cost', and 'Attributes'.

| NEC       | Description   | GL        | Description                                  | Amount    | Account Category |
|-----------|---|-----------|--|-----------|------------------|
| 61000000x | Marketing, Branding, Research                       | 61102000x | Advertising expenses                         | 0.00      | Activity Cost    |
| 61000000x | Marketing, Branding, Research                       | 61105000  | Public relations                             | 0.00      | Activity Cost    |
| 62101000x | Transmission capacity costs                         | 62101051  | Microwave - App. & Reg. Fee                  | 0.00      | Activity Cost    |
| 62101000x | Transmission capacity costs                         | 62101054  | Short code registration & Annual fees        | 0.00      | Activity Cost    |
| 62103000x | Frequency fees                                      | 62103001  | Annual licence fees                          | 245.00    | Activity Cost    |
| 62103000x | Frequency fees                                      | 62103002  | Frequency Fees                               | 0.00      | Activity Cost    |
| 62104000x | Network site costs without MS                       | 62104001  | BSS - Gross site rental                      | 0.00      | Activity Cost    |
| 63100000x | Staff costs   | 63101001  | Employee Renumeration                        | 19,309.00 | Activity Cost    |
| 63100000x | Staff costs   | 63102022  | International staff children education costs | 0.00      | Activity Cost    |
| 63100000x | Staff costs   | 63102024  | Expat housing allowance                      | 0.00      | Activity Cost    |
| 63100000x | Staff costs   | 63102041  | Medical insurance                            | 1,769.00  | Activity Cost    |
| 63100000x | Staff costs   | 63102051  | Employee work permit visa                    | 0.00      | Activity Cost    |
| 63100000x | Staff costs   | 63102091  | R&R tickets                                  | 0.00      | Activity Cost    |
| 63100000x | Staff costs   | 63102093  | Medical claims                               | 0.00      | Activity Cost    |
| 63200000x | Non-network site costs                              | 63201011  | Non-network site maintenance                 | 0.00      | Activity Cost    |
| 63400000x | Travel and Comm                                     | 63401001  | Travel - National                            | 0.00      | Activity Cost    |
| 63500000x | Stationary and Consumables                          | 63500000  | Stationary and consumables                   | 253.00    | Activity Cost    |
| 63600000x | Non-Staff-related fees                              | 63601001  | Licence fees                                 | 15,331.00 | Activity Cost    |
| 63600000x | Non-Staff-related fees                              | 63601011  | Training licence fee                         | 0.00      | Activity Cost    |
| 63600001x | Staff-related fees                                  | 63602001  | Management fees                              | 0.00      | Activity Cost    |
| 63600000x | Non-Staff-related fees                              | 63602011  | Consulting fees                              | 0.00      | Activity Cost    |
| 63600000x | Non-Staff-related fees                              | 63602021  | Legal fees                                   | 42,102.00 | Activity Cost    |
| 63600000x | Non-Staff-related fees                              | 63603011  | Other fees                                   | 0.00      | Activity Cost    |
| 64000000x | Provisions  | 64101000  | Contingency liability provision              | 0.00      | Activity Cost    |
| 65105000x | Depreciation - IT support system & office equipment | 65105002  | Dep - IT Equipment - PCs                     | 5.00      | Activity Cost    |
| 65105000x | Depreciation - IT support system & office equipment | 65105003  | Dep - IT Equipment - Printers & Scanners     | 19.00     | Activity Cost    |
| 65105000x | Depreciation - IT support system & office equipment | 65106002  | Dep - Office Equipment - Mobile phones       | 84.00     | Activity Cost    |
| 65107000x | Depreciation - Others (furniture, vehicles, others) | 65107000  | Depreciation - Furniture and fittings        | 32.00     | Activity Cost    |
| 65107000x | Depreciation - Others (furniture, vehicles, others) | 65109000  | Depreciation - Other tangible assets         | 68.00     | Activity Cost    |
| 65201011x | Amortisation - Telecom licences                     | 65201011  | Amortization - Telecom licences              | 314.00    | Activity Cost    |
|           |   |           |  | 79,531.00 |                  |

Prodacapo © 2018. Version 2018.0 Database model: CSP Model: CSP Variant: Actuals Period: 201104

Exhibit 3: Cost Centre structure and GL accounts for the period Q4 2011 [Source: Investaura]

**Phase 1 (week 1): Structuring the model architecture and preparing the cost data.**

The key activities in this initial phase are as follows:

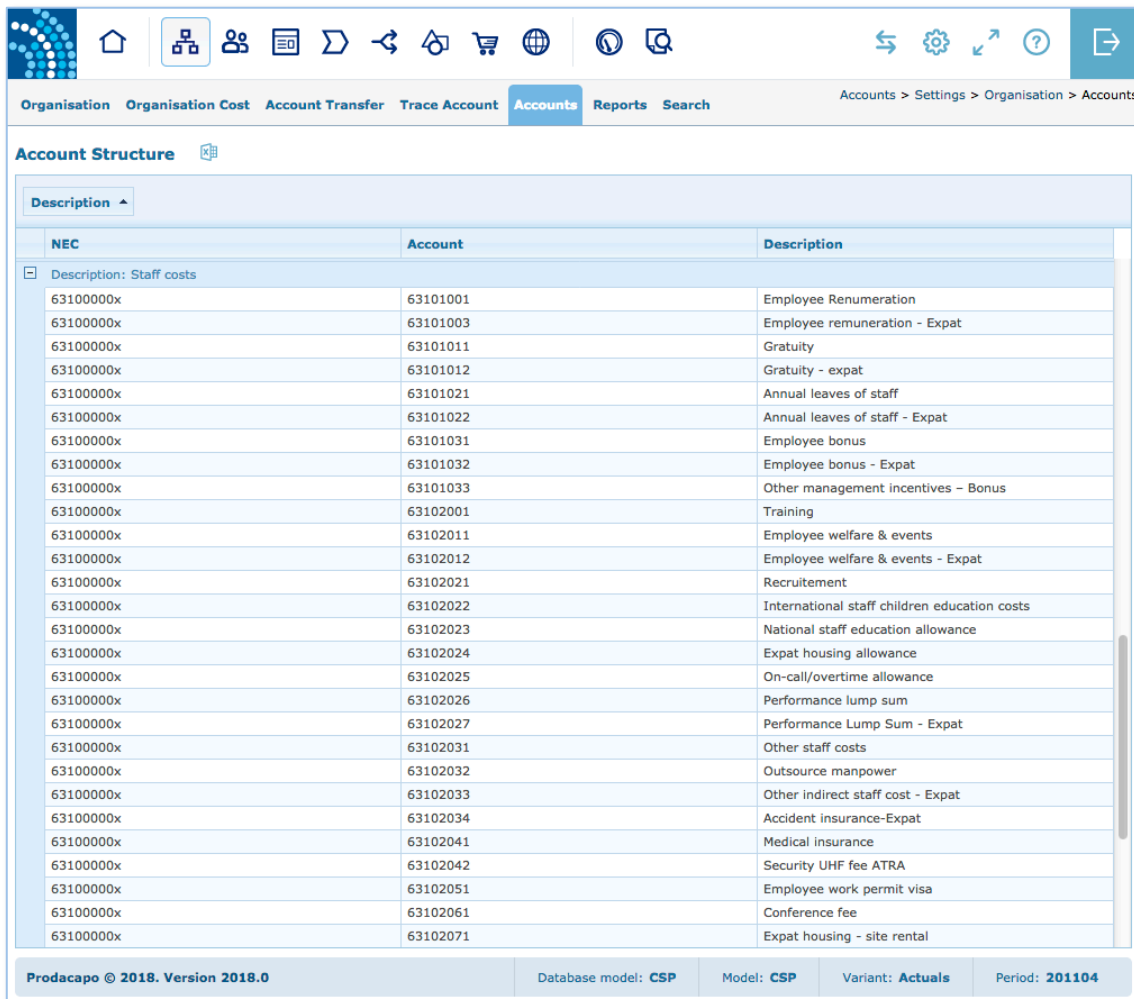


- Discuss and model the **organisation structure** of the telecoms service provider in Prodacapo (divisions, departments).
- Discuss and capture the **Cost Centres** in Prodacapo (usually one cost centre by department).
- Review the **Chart of Account (CoA)** of the client and upload it in Prodacapo. A typical CoA includes 200-500 P&L cost accounts (P&L COGS, P&L expenses) and 20-100 revenue accounts.
- Group the GL accounts in so-called '**Natural Expenditure Categories**' (NEC) in Prodacapo. NECs are summations of expenses that have a similar nature and that can be allocated together. The idea behind NECs is to create a more aggregated accounts structure using 30-80 NECs only, so that the cost allocation becomes more efficient and simpler than allocating 200-500 cost accounts one by one.





one, without losing precision in the results. The ratio of the number of NECs to the number of P&L cost accounts is typically comprised between 1 / 5 and 1 / 10.



| NEC                      | Account  | Description                                  |
|--------------------------|----------|--|
| Description: Staff costs |          |  |
| 63100000x                | 63101001 | Employee Remuneration                        |
| 63100000x                | 63101003 | Employee remuneration - Expat                |
| 63100000x                | 63101011 | Gratuity                                     |
| 63100000x                | 63101012 | Gratuity - expat                             |
| 63100000x                | 63101021 | Annual leaves of staff                       |
| 63100000x                | 63101022 | Annual leaves of staff - Expat               |
| 63100000x                | 63101031 | Employee bonus                               |
| 63100000x                | 63101032 | Employee bonus - Expat                       |
| 63100000x                | 63101033 | Other management incentives - Bonus          |
| 63100000x                | 63102001 | Training                                     |
| 63100000x                | 63102011 | Employee welfare & events                    |
| 63100000x                | 63102012 | Employee welfare & events - Expat            |
| 63100000x                | 63102021 | Recruitment                                  |
| 63100000x                | 63102022 | International staff children education costs |
| 63100000x                | 63102023 | National staff education allowance           |
| 63100000x                | 63102024 | Expat housing allowance                      |
| 63100000x                | 63102025 | On-call/overtime allowance                   |
| 63100000x                | 63102026 | Performance lump sum                         |
| 63100000x                | 63102027 | Performance Lump Sum - Expat                 |
| 63100000x                | 63102031 | Other staff costs                            |
| 63100000x                | 63102032 | Outsource manpower                           |
| 63100000x                | 63102033 | Other indirect staff cost - Expat            |
| 63100000x                | 63102034 | Accident insurance-Expat                     |
| 63100000x                | 63102041 | Medical insurance                            |
| 63100000x                | 63102042 | Security UHF fee ATRA                        |
| 63100000x                | 63102051 | Employee work permit visa                    |
| 63100000x                | 63102061 | Conference fee                               |
| 63100000x                | 63102071 | Expat housing - site rental                  |

Prodacapo © 2018. Version 2018.0 Database model: CSP Model: CSP Variant: Actuals Period: 201104

Exhibit 4: The “Staff costs” NEC is used to group and sum all staff-related cost accounts [Source: Investaura]

- Extract a **trial balance** (for each cost centre) from the ERP system, for a recent accounting period (one quarter or one year). In Excel, the availability and quality of the data can be reviewed before manually pasting the data in the Prodacapo ‘Grid’ via the clipboard (or uploading the Excel file into Prodacapo). Note that a direct, automated integration between Prodacapo and the ERP is possible using Prodacapo Connect, but this is always implemented at a later stage in the project.
- **Upload the trial balance** in Prodacapo, for each time period (quarter, years).
- Identify **staff and staff-related costs** (Opex, Depreciation and Amortisation of staff-related equipment).
- Identify **direct costs**. As direct costs are spread across multiple cost centres in our data set, we regroup them in a dummy cost centre (e.g. “7777 COGS”) using *Account Transfer*.
- Identify **network-related costs** (D&A, Opex). Network-related costs have often been booked to various cost centres in the business, so we re-group them in a dummy cost centre (e.g. “8888 Networks”) using *Account Transfer*.
- Identify the remaining costs i.e. **common costs** (those costs that are neither direct cost, nor network costs, nor staff costs), and re-group them in a dummy cost centre e.g. “99999 Common Costs” using *Account Transfer*.

Exhibit 5: Overview of the direct costs re-grouped in the “7777 COGS” cost centre, after transfer from other cost centres [Source: Investaura]

**Phase 2 (week 2):** Defining **products (services) and customer types**, and allocating the direct costs identified in Phase 1 to customers and services.

In Phase 2, as illustrated in the Exhibit 6, we work ‘at the other end of the value chain’ and capture the **products (services) and customer types** for which we want to calculate cost results (LRIC, FAC). We also capture the **revenue** side in order to analyse the profitability (EBITDA, EBIT) of services and customer segments.

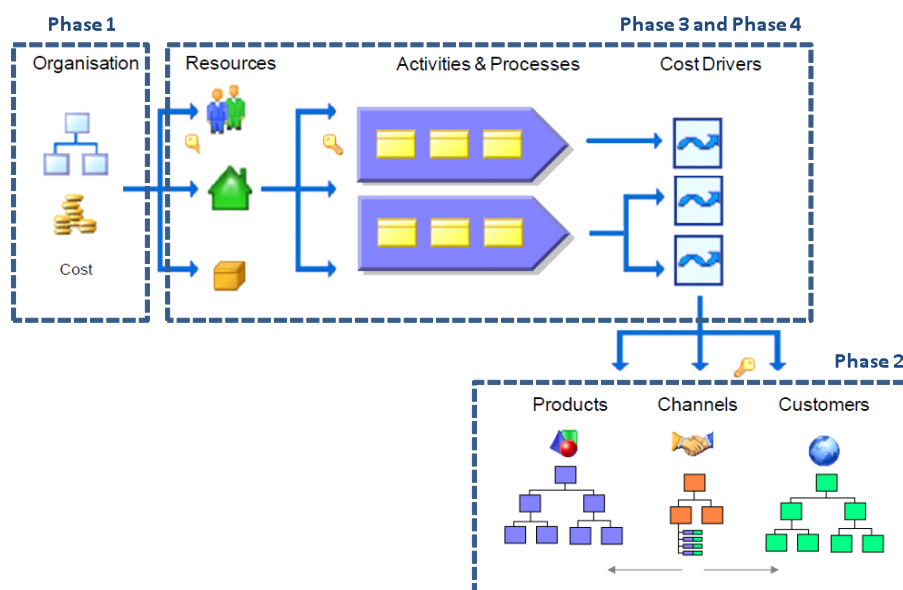





Exhibit 6: Prodacapo objects and cost allocation flow, including the focus of each phase [Source: Prodacapo]





Note that Prodacapo differentiates between 3 types of costing objects:

 'Products',  'Customers' and  'Sales', also called 'Channels' in Exhibit 6 above. The 'Sales'='Channel' object is used not only to capture revenues, but also various Sales channels (direct, franchise, distributors etc).

Note that the 'Sales' object creates a mapping between 'Products' and 'Customers', used to transfer cost and revenues from products to customers and vice-versa, so that revenues and costs available at the individual product level can also be analysed at the customer level.

The key activities in this phase are:

-  Identify the **service types** (voice, SMS, data) and the related traffic volumes (minutes for calls, Mbytes for data). In addition to services, identify the **products** to be captured as well, such as SIM cards, Prepaid vouchers, Mobile handsets, UBS sticks etc.
-  Identify the **customer types** to be analysed as well as their numbers e.g. the number of prepaid and postpaid customers (SIMs). A finer analysis by customer segment (consumer, business) and tariff plan (Plan A, B, C) can also be undertaken. Note that each customer segment will have a particular service consumption profile, and therefore a different profit margin. In addition, an analysis at the customer segment level can be useful if specific processes are used to supply services to various customer segments, e.g. if the sales channels and service support are differentiated, leading to different costs for comparable services consumed by different customer segments.

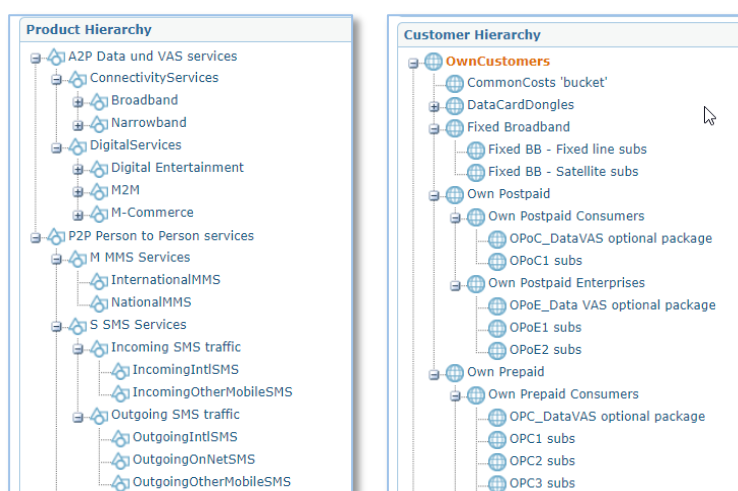


Exhibit 7: Product and Customer structures in the model [Source: Investaura]

- Extract **traffic and customer data** from the data warehouse (or the billing system), export the data to Excel for review and quality check, and upload manually to Prodacapo.
- Extract **revenue data** either from the ERP or from the data warehouse. Export the data to Excel for quality check, and upload the data to Prodacapo in the 'Sales' object (the revenues are then further allocated to 'products' and 'customers' by the Sales object).
- Allocate the direct costs re-grouped in the "7777 COGS" cost centre to end-user services and customers, using the *Cost Driver* element in Prodacapo. Direct cost accounts are simpler to allocate as they don't need to flow through resources and activities, whereas indirect costs go through the following cost allocation steps:

Cost Accounts -> Resources -> Activities (processes) -> Products / Sales Channels / Customers

Most of the data needed for this phase should be available in the data warehouse (or the billing system) as well as the ERP (e.g. revenues). Alternatively the data might be extracted from the budgeting and planning system, if the source (actual) data are available there.

Database model: CSP

Model: CSP

Variant: Actuals

Period: 201104

Business Distributors:

Select all

Choose columns

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|  | Sales Record Id          | Product Id                    | Customer Id | Sales Qty        | Revenue       | Product Cost  | Customer Cost | Order Cost   | Separate Traced Cost | Profit        |
|--|--------------------------|-------------------------------|-------------|------------------|---------------|---------------|---------------|--------------|----------------------|---------------|
|  | OL_OPC1_01               | OutgoingOnNet                 | OPC1        | 377,555,606.50   | 7,924,846.43  | 3,717,240.82  | 2,886,170.41  | 549,564.78   | 0.00                 | 771,870.41    |
|  | OL_OPC1_02               | OutgoingOtherMobile           | OPC1        | 46,682,279.60    | 4,554,277.98  | 1,398,342.80  | 1,658,634.33  | 315,825.78   | 0.00                 | 1,181,475.07  |
|  | OL_OPC1_03               | OutgoingPstnNational          | OPC1        | 41,560.69        | 4,148.70      | 4,949.87      | 1,510.92      | 287.70       | 0.00                 | -2,599.80     |
|  | OL_OPC1_04               | OutgoingIntl                  | OPC1        | 19,749,245.30    | 3,559,961.91  | 984,347.73    | 1,296,511.78  | 246,872.88   | 0.00                 | 1,032,229.51  |
|  | OL_OPC1_05               | IncomingOtherMobile           | OPC1        | 46,672,123.67    | 1,201,101.30  | 291,001.09    | 437,432.20    | 83,292.84    | 0.00                 | 389,375.17    |
|  | OL_OPC1_06               | IncomingPstnNational          | OPC1        | 0.00             | 0.00          |               | 0.00          | 0.00         | 0.00                 |               |
|  | OL_OPC1_07               | IncomingIntl                  | OPC1        | 21,060,353.19    | 3,299,275.66  | 131,311.48    | 1,201,571.78  | 228,795.06   | 0.00                 | 1,737,597.34  |
|  | OL_OPC1_08               | RoamingOutOutgoing            | OPC1        | 260,396.90       | 266,145.65    | 142,727.68    | 96,928.27     | 18,456.42    | 0.00                 | 8,033.27      |
|  | OL_OPC1_09               | RoamingOutIncoming            | OPC1        | 86,798.97        | 44,357.61     | 47,575.89     | 16,154.71     | 3,076.07     | 0.00                 | -22,449.07    |
|  | OL_OPC1_DigitalServices1 | CRBT                          | OPC1        | 1.00             | 0.00          | 37,099.40     | 0.00          | 0.00         | 0.00                 | -37,099.40    |
|  | OL_OPC1_DigitalServices2 | Gaming                        | OPC1        | 1.00             | 0.00          | -1,725.60     | 0.00          | 0.00         | 0.00                 | 1,725.60      |
|  | OL_OPC1_DigitalServices3 | MCO                           | OPC1        | 1.00             | 0.00          | -1,725.60     | 0.00          | 0.00         | 0.00                 | 1,725.60      |
|  | OL_OPC1_DigitalServices4 | Music                         | OPC1        | 1.00             | 0.00          | 171,007.40    | 0.00          | 0.00         | 0.00                 | -171,007.40   |
|  | OL_OPC1_DigitalServices5 | SMS Infotainment              | OPC1        | 1.00             | 0.00          | -1,725.60     | 0.00          | 0.00         | 0.00                 | 1,725.60      |
|  | OL_OPC1_DigitalServices6 | Balance Transfer              | OPC1        | 1.00             | 0.00          | -4,414.00     | 0.00          | 0.00         | 0.00                 | 4,414.00      |
|  | OL_OPC1_DigitalServices7 | International Credit Recharge | OPC1        | 1.00             | 0.00          | -4,414.00     | 0.00          | 0.00         | 0.00                 | 4,414.00      |
|  | OL_OPC1_SMS              | OutgoingOtherMobileSM         | OPC1        | 1.00             | 0.00          | 180,389.00    | 0.00          | 0.00         | 0.00                 | -180,389.00   |
|  | OL_OPC2_01               | OutgoingOnNet                 | OPC2        | 368,749,789.50   | 10,753,048.47 | 3,630,542.75  | 2,952,621.38  | 745,692.28   | 0.00                 | 3,424,192.06  |
|  |                          |                               |             | 1,157,068,112.25 | 53,345,666.11 | 16,579,948.45 | 20,879,531.40 | 3,699,365.00 | 0.00                 | 12,186,821.26 |

Exhibit 8: Revenues entered in the *Sales* object, using Order Lines to map *Customers* to *Products* [Source: Investaura]

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Exhibit 9: Overview of the *Cost Drivers* used in the model to allocate direct costs, e.g. the voice interconnection costs are allocated to the 'OutgoingOtherMobile' Product [Source: Investaura]

At this stage, as we have both revenues and costs in the model, we are now in the position to analyse first profitability results. The following exhibit shows the Gross Profit calculations and results for the 'OutgoingOtherMobile' product in the model.



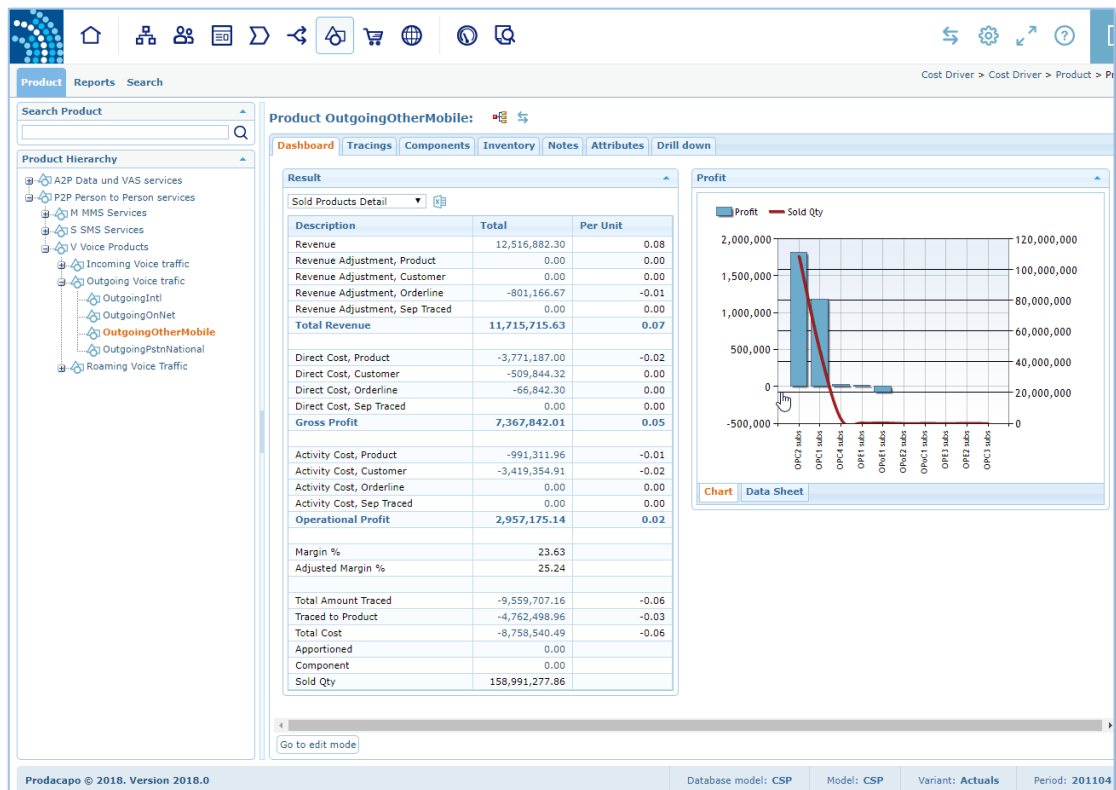


Exhibit 10: Profit and Profit Margin results for the “OutgoingOtherMobile” product [Source: Investaura]

**Phase 3 (week 3):** Capturing the **key business processes and activities** of the mobile service provider, the Resources used for performing these activities, and allocating NEC costs to Activities via Resources.

In Phase 3, the focus of the work turns to identifying the key business processes and activities of the telecom service provider. When working with a client, workshops are undertaken with each division and department, in order to identify the activities undertaken by each individual department. Prodacapo comes equipped with a *Process Designer*, which can be used to facilitate these discussions.

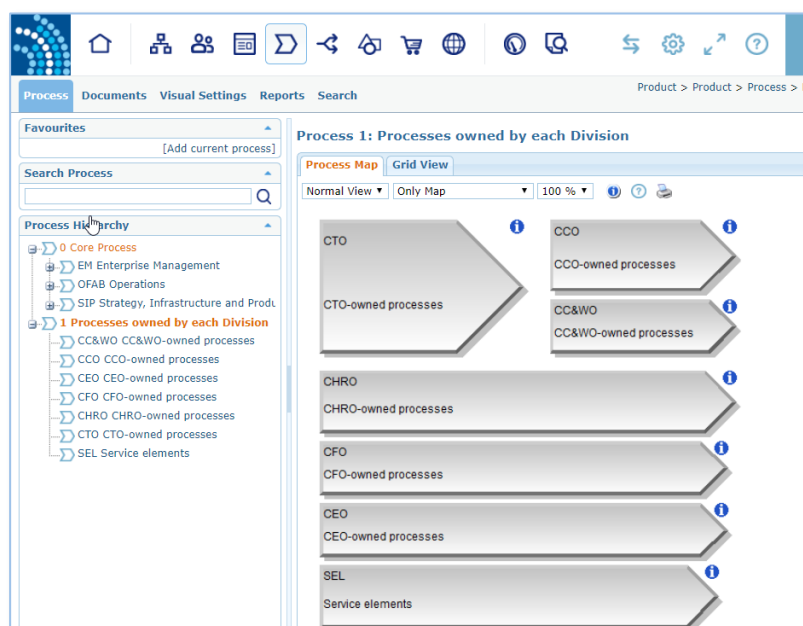
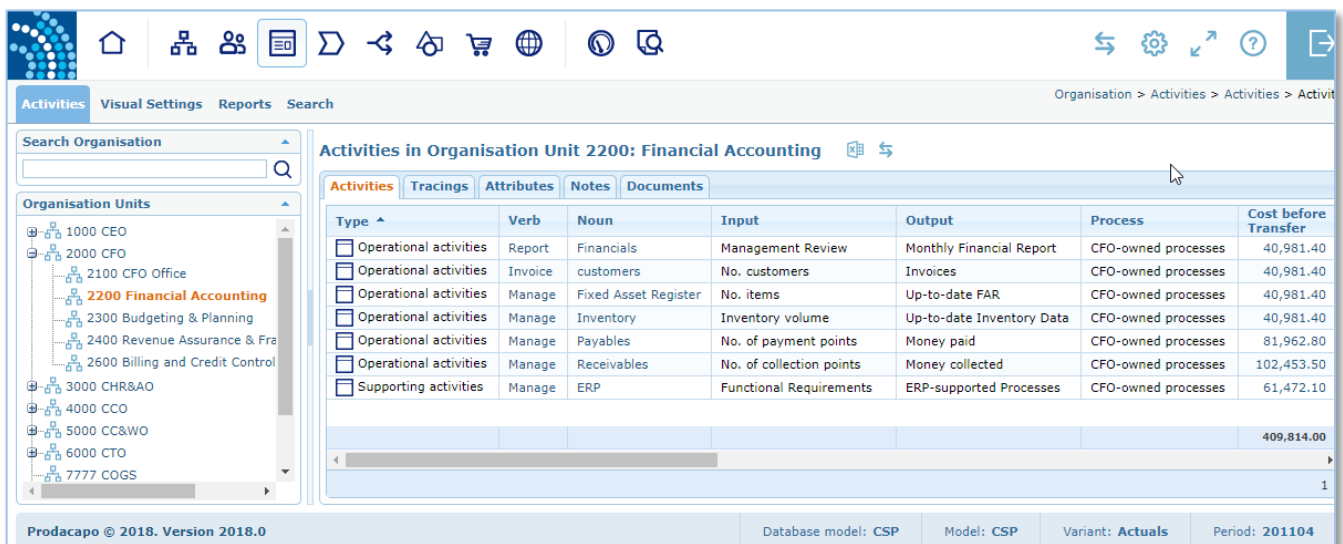


Exhibit 11: Overview of the Process Designer at Level 0 [Source: Investaura]

Using the *Process Designer* is optional but useful:

- ✓ It helps identify, discuss and name the key business *Processes*. The eTOM business process map (see Annex B) is included in the Prodacapo Process designer, so eTOM can also be used as a reference framework;
- ✓ The process designer can be used to create process flow diagrams using standard BPMN elements (events, activities, connections, swim lanes, annotation etc). This can be useful to document selected processes or activities, or undertake a deep analysis of the processes that need to be improved. Note that capturing process flows is entirely optional and not mandatory for calculating activity costs;
- ✓ Help identify the key *Activities* undertaken by each department, activities that can then be captured in Prodacapo. Note that the activities in Prodacapo are the smallest building block where process costs are calculated. Activities are defined at the cost centre level i.e. for each department that ‘owns’ a number of activities.



The screenshot shows the Prodacapo software interface. On the left is a tree view of 'Organisation Units' with '2200 Financial Accounting' selected. The main area displays a table titled 'Activities in Organisation Unit 2200: Financial Accounting'. The table has tabs for 'Activities', 'Tracings', 'Attributes', 'Notes', and 'Documents'. The 'Activities' tab is active, showing a table with columns: Type, Verb, Noun, Input, Output, Process, and Cost before Transfer. The table lists various activities like 'Operational activities' and 'Supporting activities' with their respective costs. At the bottom, there is a summary row with a total cost of 409,814.00.

| Type                   | Verb    | Noun                 | Input                    | Output                    | Process             | Cost before Transfer |
|------------------------|---------|----------------------|--------------------------|---------------------------|---------------------|----------------------|
| Operational activities | Report  | Financials           | Management Review        | Monthly Financial Report  | CFO-owned processes | 40,981.40            |
| Operational activities | Invoice | customers            | No. customers            | Invoices                  | CFO-owned processes | 40,981.40            |
| Operational activities | Manage  | Fixed Asset Register | No. items                | Up-to-date FAR            | CFO-owned processes | 40,981.40            |
| Operational activities | Manage  | Inventory            | Inventory volume         | Up-to-date Inventory Data | CFO-owned processes | 40,981.40            |
| Operational activities | Manage  | Payables             | No. of payment points    | Money paid                | CFO-owned processes | 81,962.80            |
| Operational activities | Manage  | Receivables          | No. of collection points | Money collected           | CFO-owned processes | 102,453.50           |
| Supporting activities  | Manage  | ERP                  | Functional Requirements  | ERP-supported Processes   | CFO-owned processes | 61,472.10            |
|                        |         |                      |                          |                           |                     | 409,814.00           |

Exhibit 12: Activities undertaken by the “Financial Accounting” department, including the “Invoice Customers” activity [Source: Investaura]

Various types of activities can be selected in Prodacapo, in particular:

- ❖ **operational activities:** high-volume, recurring activities e.g. pay invoice;
- ❖ **supporting activities:** these are part of the daily operations but do not have a tangible output relevant for the service delivery e.g. ‘Manage ERP’;
- ❖ **structural activities:** low volume, recurring activities e.g. prepare budget, prepare annual business plan;
- ❖ **other activity types:** internal projects activities, internal service activities, and time-driven activities (where the activity volume and the time required per activity are used to calculate the costs).

Note that costs are mapped to activities via *Resources*. As a whole, a resource is anything that generates cost (OPEX, Depreciation & Amortisation of CAPEX), and GL accounts (or NECs) can be attached to resources and then the resources mapped to activities.

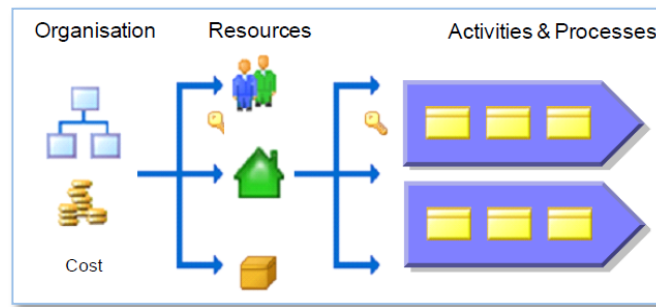


Exhibit 13: allocation of NEC costs to Resources, and Resources to Activities [Source: Prodacapo]



There are 3 categories of resources:

- ❖ staff (e.g. CxO, Managers, Operational staff, Support staff)
- ❖ facilities and equipment, including tangible and intangible assets (e.g. land, building, Towers, Power supply, BTS, MSC, software licences, spectrum, etc)
- ❖ other resources, often better understood as cost element in this case, such as third party costs (e.g. security costs, managed services costs, spectrum fees, leased capacity etc) or any other types of expenses that the modeller doesn't want to bundle with other staff or equipment resources, because there is value to keep them separately. This would be the case when the costs of those resources are of a different nature (typically categorized as "other costs" in the Chart of Account), or when the costs should not be allocated to activities using the same allocation rules used for staff resources and equipment resources, but in a different manner.

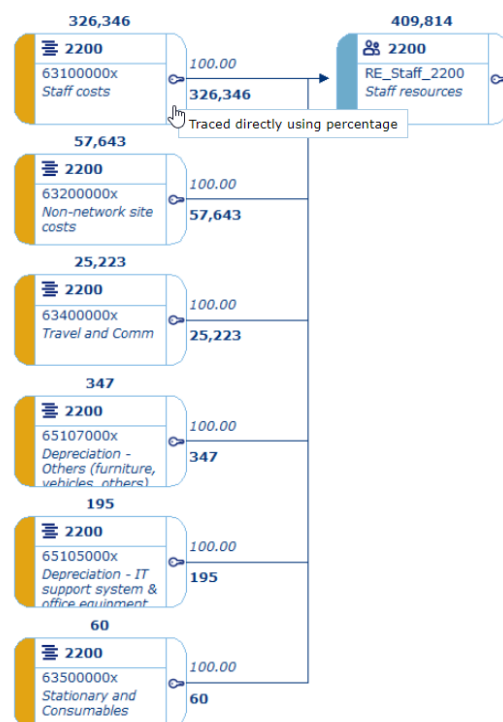


Exhibit 14: Allocation of staff-related costs (NECs) to the "RE\_Staff\_2200" resource in the "2200 Financial Accounting" organisation unit [Source: Investaura]

In summary, the key activities undertaken in Phase 3 of the project are:



- Identify the key business processes of the company and the right level of detail for the analysis (not too few processes, not too many processes)

- Identify the main processes / activities owned by each organisation unit, and define each activity with text fields (input + verb and noun to describe the activity + output)
- Create *Activities* in Prodacapo, for each cost centre. A good naming convention for activities is as follows:
  - Cost Centre 1100, 'Invoice Customers' activity => AY\_InvoiceCustomers\_1100
- Identify and create *Resources* in Prodacapo, for each cost centre. We recommend the following naming convention for resources:
  - Cost Centre 1100, Management staff => RE\_Management\_1100
  - Cost Centre 1100, Operational staff => RE\_OperationalStaff\_1100
  - Cost Centre 1100, Computers => RE\_Computers\_1100
- For each cost centre: map the cost centre NECs to the resources in the same cost centre, using the 'Trace Account' functionality and percentages to split the expenses and allocate the cost to various resources, when costs are shared (joint costs) across multiple resources that have the same nature
- For each cost centre, map resources to activities using the 'Trace Resources' functionality. Resources that are consumed by multiple activities can be allocated on pro rata of various cost drivers.
- Optionally, if needed: use the 'Activity Transfer' functionality to transfer costs from one activity to other activities in the same or other organisation units (e.g. IT support activity can be transferred to other activities on pro rata of the number of FTEs). Note that it is also possible to transfer resource costs from one resource to another resource within the same cost centre, using 'Resource Transfer'.

The following exhibit shows how the costs associated with a resource are allocated to various activities in the organisation unit that uses the resource.

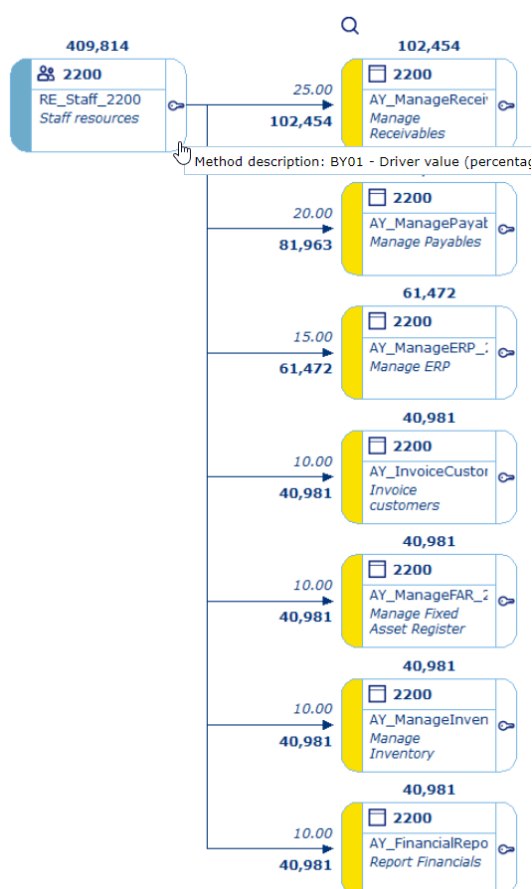


Exhibit 15: Allocation of the "RE\_Staff\_2200" costs to various activities in the same organisation unit [Source: Investaura]

**Phase 4 (week 4):** Undertaking the **network modelling work**, using Resources as ‘Network segments’ and Activities as ‘Service elements’.

The network is ‘the production engine’ of the telecoms service providers. A large portion of the costs incurred by a telecoms service provider is network/IT costs (depreciation of CAPEX) or network and IT-related expenses. The key network costs are:

- **Active equipment** costs: TRX, BTS, BSC, NodeB, RNC, eNodeB, Microwave backhauling, Fibre assets, Ducts, MSC, Servers, Interconnection Gateways, Satellite earth stations etc.
- **Passive equipment** costs: Civil works, Towers, Diesel Generators, Buildings etc.
- **Intangible asset** costs: Spectrum licence, Office software, BSS/OSS software, IPRs etc.
- **Third party** costs e.g. Site acquisition, Installation and Commission, Field Services, Managed Services, Security costs, Fuel costs, Leased capacity, Spectrum fees etc.
- **Network and IT Staff** costs e.g. Network Planning and Design, Network Optimisation, Network Build, Network Operations and Maintenance, Billing operations, IT support etc.

Network costs (Depreciation, Opex) are very substantial and can amount to 40% of the total costs incurred by a brownfield operator (and an even higher portion for a greenfield operator). Furthermore, a very high portion of network costs is fixed costs (i.e. insensitive to traffic volume), or share across multiple end-user services (e.g. voice, data). Therefore the allocation of costs to services is not entirely straight forward, and can be undertaken according to various principles, which leads in particular to the FAC (Fully Allocated Costs) approach on one hand, and the LRIC (Long Run Incremental Costs) approach on the other hand.

In a top-down model, the modelling of the network is, most of the time, limited by the lack of detail provided by the Chart of Account. For example, the number of GL accounts used to capture the depreciation of the network assets is often too low, and assets are often pooled (aggregated together) in a manner that might make sense for accounting purposes (e.g. “Depreciation of Access Network”, “Depreciation of Core Network”) but is hardly helpful when the objective is to cost voice services (e.g. 1 voice call minute over GSM) and data services (e.g. 1 Mbytes of Internet browsing over 4G) with precision, as all active access network equipment have been pooled in the “Depreciation Access Network” account.

To solve this conundrum and allocate network costs, we recommend using the following methodology:

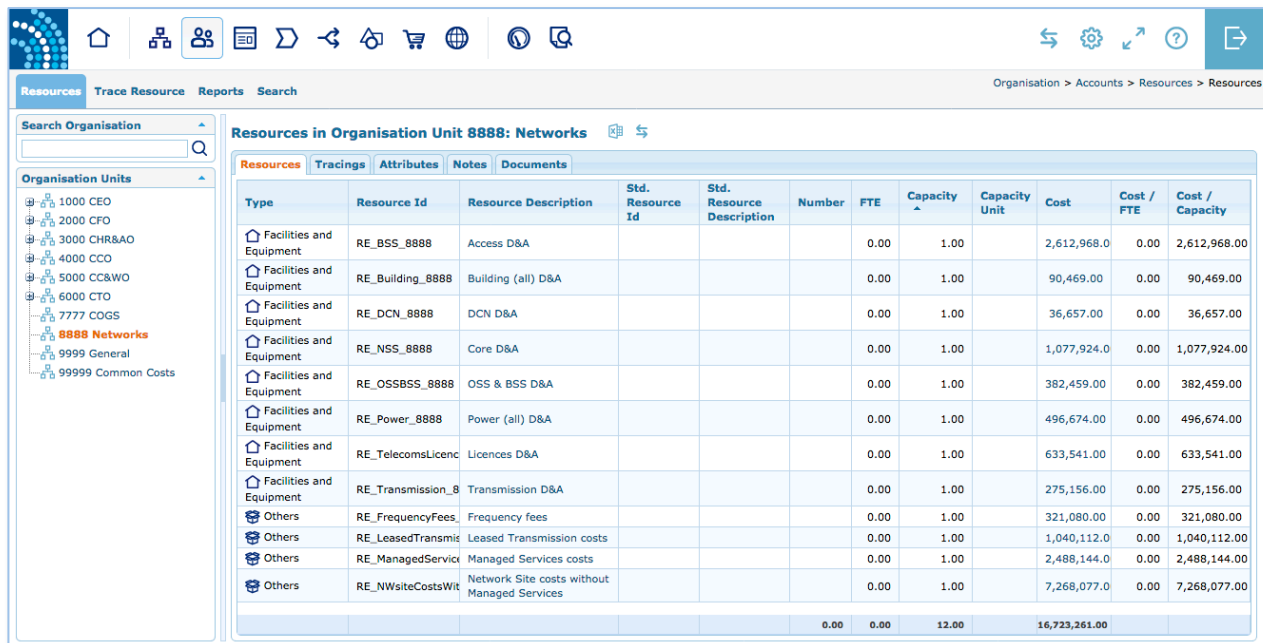
- **Disaggregate the network costs** by introducing new accounts (or NECs) in the model (let us call them ‘Network elements’ accounts), so that a higher number and more relevant network-related accounts providing a finer level of detail is now available. This activity is time consuming and complex as it requires going back to transaction data in the Journal (or even supplier contracts).
- **Re-aggregate the ‘Network elements’ accounts into new ‘Network segments’ Resources** created in the model, in the “8888 Networks” organisation unit. In our terminology, the network is split into identifiable ‘Network segments’ that perform a commonly accepted set of functions (e.g. 2G access, 3G access, 4G access, backhauling, local switching, long-distance transmission etc). Each ‘network segment’ comprises a set of network elements, which are identifiable pieces of equipment or infrastructure (e.g. BTS, NodeB, ducts, poles, power etc.).
- **Define new Activities in Prodacapo and use them as ‘Service elements’.** Instead of allocating ‘Network segment’ costs directly to end-user services, we first allocated them to ‘Service elements’, which take the perspective of the network. Service elements characterise the smallest level of network functionality that may be feasibly tariffed, although not necessarily offered individually as a



service. For example “1 minute of voice traffic going from the BTS to the core network”, “1 voice call switched by the core network” would be service elements (SE). Service elements can then be combined to create services sold to end-users such as

- 1 minute on-net voice call = 1x Access SE + 1x Switching SE + 1x Access SE
- 1 minute voice call to international = 1x Access SE + 1x Switching SE + 1x Int'l Gateway SE + 1x International Termination SE

While this methodology can be seen as the ‘ideal’ and ‘target’ to strive for, we didn’t have access to Journal data in the present case, so we had to take a short cut. Based on the CoA that was available, we created 12 Network segment resources, as shown in the following exhibit in the bottom left hand quadrant.

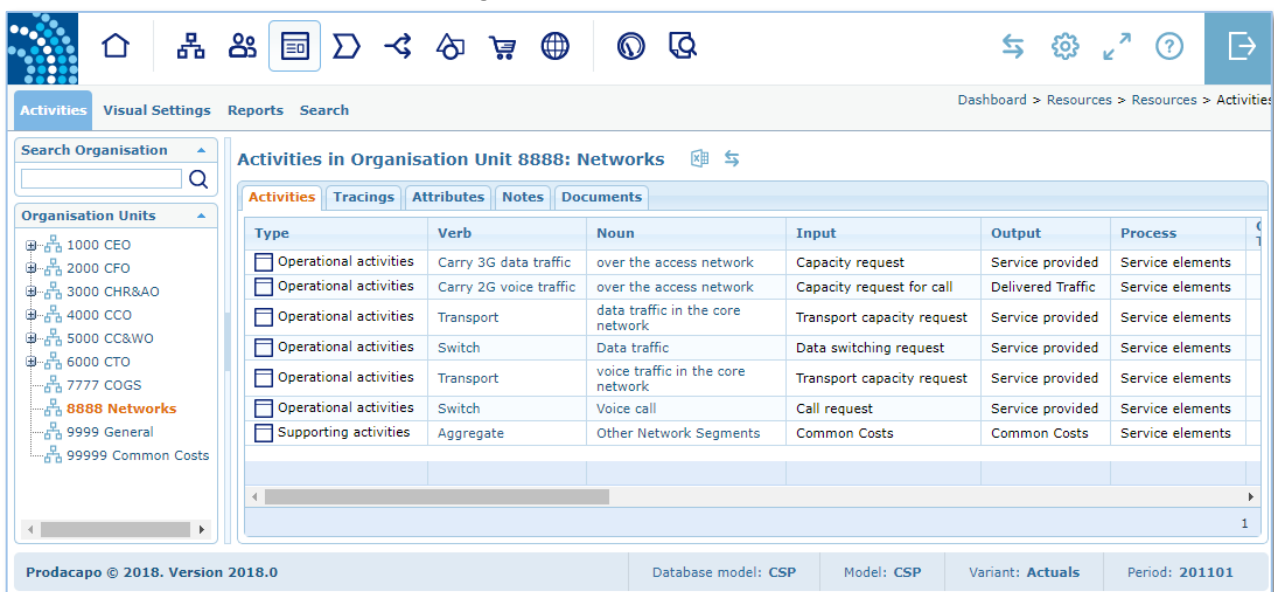


Resources in Organisation Unit 8888: Networks

| Type                     | Resource Id       | Resource Description                        | Std. Resource Id | Std. Resource Description | Number | FTE  | Capacity | Capacity Unit | Cost          | Cost / FTE | Cost / Capacity |
|--------------------------|-------------------|---|------------------|---------------------------|--------|------|----------|---------------|---------------|------------|-----------------|
| Facilities and Equipment | RE_BSS_8888       | Access D&A                                  |                  |                           |        | 0.00 | 1.00     |               | 2,612,968.00  | 0.00       | 2,612,968.00    |
| Facilities and Equipment | RE_Building_8888  | Building (all) D&A                          |                  |                           |        | 0.00 | 1.00     |               | 90,469.00     | 0.00       | 90,469.00       |
| Facilities and Equipment | RE_DCN_8888       | DCN D&A                                     |                  |                           |        | 0.00 | 1.00     |               | 36,657.00     | 0.00       | 36,657.00       |
| Facilities and Equipment | RE_NSS_8888       | Core D&A                                    |                  |                           |        | 0.00 | 1.00     |               | 1,077,924.00  | 0.00       | 1,077,924.00    |
| Facilities and Equipment | RE_OSSBSS_8888    | OSS & BSS D&A                               |                  |                           |        | 0.00 | 1.00     |               | 382,459.00    | 0.00       | 382,459.00      |
| Facilities and Equipment | RE_Power_8888     | Power (all) D&A                             |                  |                           |        | 0.00 | 1.00     |               | 496,674.00    | 0.00       | 496,674.00      |
| Facilities and Equipment | RE_TelecomsLicenc | Licences D&A                                |                  |                           |        | 0.00 | 1.00     |               | 633,541.00    | 0.00       | 633,541.00      |
| Facilities and Equipment | RE_Transmission_8 | Transmission D&A                            |                  |                           |        | 0.00 | 1.00     |               | 275,156.00    | 0.00       | 275,156.00      |
| Others                   | RE_FrequencyFees  | Frequency fees                              |                  |                           |        | 0.00 | 1.00     |               | 321,080.00    | 0.00       | 321,080.00      |
| Others                   | RE_LeasedTransmis | Leased Transmission costs                   |                  |                           |        | 0.00 | 1.00     |               | 1,040,112.00  | 0.00       | 1,040,112.00    |
| Others                   | RE_ManagedService | Managed Services costs                      |                  |                           |        | 0.00 | 1.00     |               | 2,488,144.00  | 0.00       | 2,488,144.00    |
| Others                   | RE_NWsiteCostsWit | Network Site costs without Managed Services |                  |                           |        | 0.00 | 1.00     |               | 7,268,077.00  | 0.00       | 7,268,077.00    |
|                          |                   |   |                  |                           |        | 0.00 | 0.00     | 12.00         | 16,723,261.00 |            |                 |

Exhibit 16: ‘Network segment’ resources created in the “8888 Networks” organisation unit [Source: Investaura]

We also created 7 service elements (using Activities), as shown below.



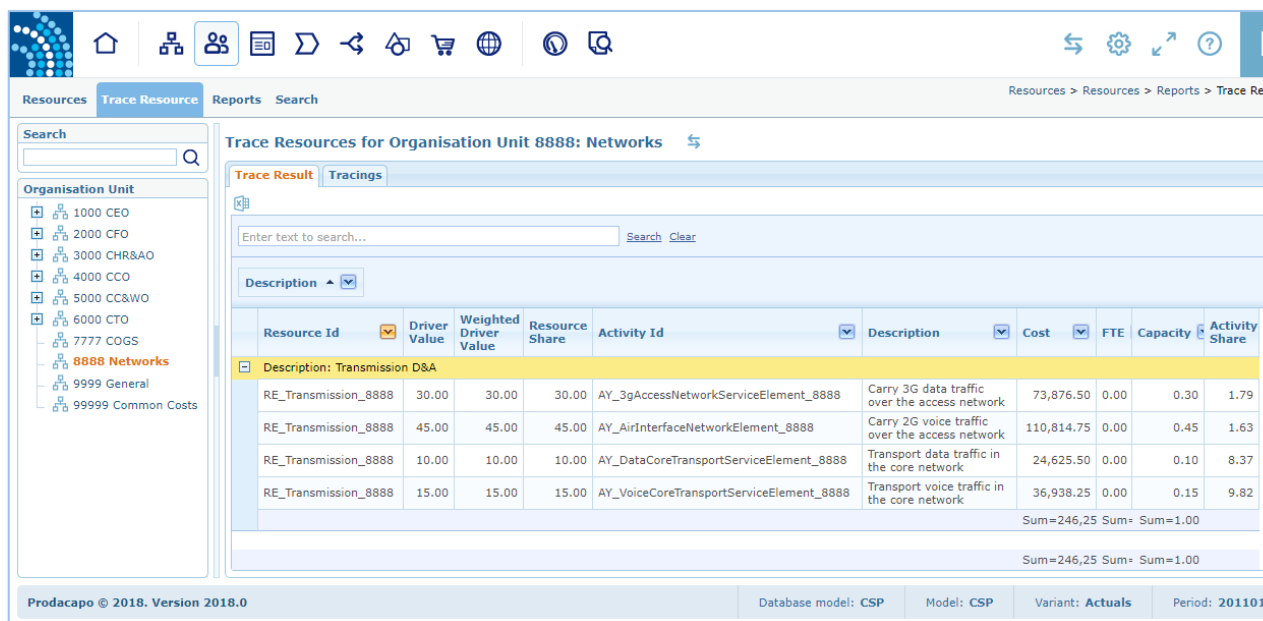
Activities in Organisation Unit 8888: Networks

| Type                   | Verb                   | Noun                              | Input                      | Output            | Process          |
|------------------------|------------------------|-----------------------------------|----------------------------|-------------------|------------------|
| Operational activities | Carry 3G data traffic  | over the access network           | Capacity request           | Service provided  | Service elements |
| Operational activities | Carry 2G voice traffic | over the access network           | Capacity request for call  | Delivered Traffic | Service elements |
| Operational activities | Transport              | data traffic in the core network  | Transport capacity request | Service provided  | Service elements |
| Operational activities | Switch                 | Data traffic                      | Data switching request     | Service provided  | Service elements |
| Operational activities | Transport              | voice traffic in the core network | Transport capacity request | Service provided  | Service elements |
| Operational activities | Switch                 | Voice call                        | Call request               | Service provided  | Service elements |
| Supporting activities  | Aggregate              | Other Network Segments            | Common Costs               | Common Costs      | Service elements |

Exhibit 17: Service elements defined in the “8888 Networks” organisation unit [Source: Investaura]



The network segment resources were then mapped to the service elements using a number of rules, derived from network engineering principles.



| Resource Id                              | Driver Value | Weighted Driver Value | Resource Share | Activity Id                              | Description                                    | Cost       | FTE  | Capacity | Activity Share |
|--|--------------|-----------------------|----------------|--|--|------------|------|----------|----------------|
| <b>Description: Transmission D&amp;A</b> |              |                       |                |  |  |            |      |          |                |
| RE_Transmission_8888                     | 30.00        | 30.00                 | 30.00          | AY_3gAccessNetworkServiceElement_8888    | Carry 3G data traffic over the access network  | 73,876.50  | 0.00 | 0.30     | 1.79           |
| RE_Transmission_8888                     | 45.00        | 45.00                 | 45.00          | AY_AirInterfaceNetworkElement_8888       | Carry 2G voice traffic over the access network | 110,814.75 | 0.00 | 0.45     | 1.63           |
| RE_Transmission_8888                     | 10.00        | 10.00                 | 10.00          | AY_DataCoreTransportServiceElement_8888  | Transport data traffic in the core network     | 24,625.50  | 0.00 | 0.10     | 8.37           |
| RE_Transmission_8888                     | 15.00        | 15.00                 | 15.00          | AY_VoiceCoreTransportServiceElement_8888 | Transport voice traffic in the core network    | 36,938.25  | 0.00 | 0.15     | 9.82           |
| Sum=246,25                               |              |                       |                |  |  | Sum=       | Sum= | Sum=1.00 |                |

Exhibit 18: Allocation of the “Transmission” network segment costs to four service elements [Source: Investaura]



Finally the service elements were mapped to end-user services. The network costs were allocated on pro-rata of traffic, subscriber or revenues, using the following cost drivers, also visible in Exhibit 19 below:

- CD101 Pro rata – Air Interface Traffic
- CD102 Pro rata – Subs
- CD103 Pro rata – Postpaid subs
- CD104 Pro rata – Revenues
- CD107 Pro rata – Interconnection traffic
- CD108 Pro rata – Roaming traffic
- CD109 Pro rata – Data connectivity services subs
- CD110 Pro rata – VAS services subs
- CD111 Pro rata – Mobile financial services subs
- CD112 Pro rata – Data traffic
- CD113 Pro rata – Voice traffic
- Etc

We have now reached the end of Phase 4. While the approach taken above may seem simplistic and crude, our primary concern was to set up an initial network model in a short period of time, so that first results could be generated quickly. In a follow-up version of the costing system, the network model should be refined and improved (cost data disaggregation, network elements, network segments, service elements, allocation rules).

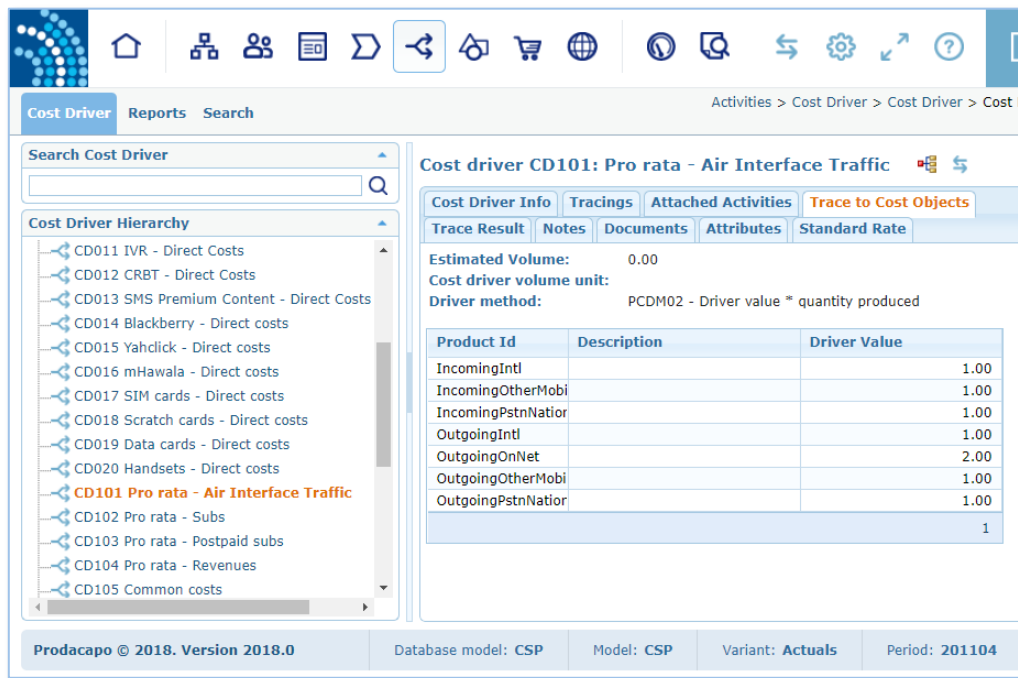


Exhibit 19: Allocation of activity costs, on pro rata of air interface traffic, to various end-user services, with On Net calls carrying a double weight as these calls use the air interface twice [Source: Investaura]

**Phase 5 (week 5): Connecting the dots:** mapping activity costs to *Customers* and *Products* via *Cost drivers*; allocating common costs using *Cost Drivers* using alternative cost allocation methods; running the model and checking that “no cost is lost”.

At this stage of the implementation, the modelling work is almost finished. To complete the model, we only need to finalise the allocation of costs to Products and Customers. The direct costs and the network costs have already been allocated in Phase 2 and Phase 4 respectively, so we are now getting back to the activity costs calculated in Phase 3 as well as the common costs identified in Phase 1.

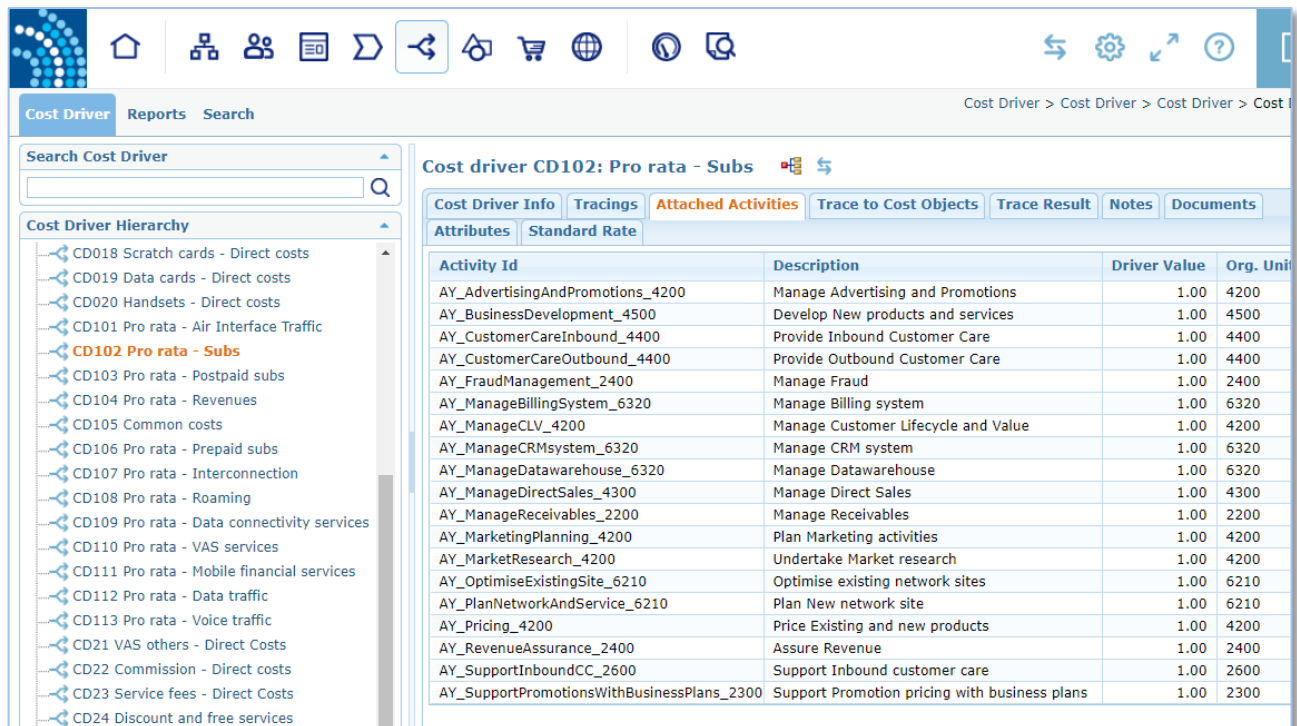


To allocate the activities costs, we return to the Cost Driver area of Prodacapo. As shown in exhibits 9 and 19 above, we already have created 30+ costs drivers, and we can use them again to build the mapping of activities to end-user services.

For each activity, we need to identify what the best driver for this activity and its costs is: Subscribers? Traffic? Revenues? We proceed as follows:

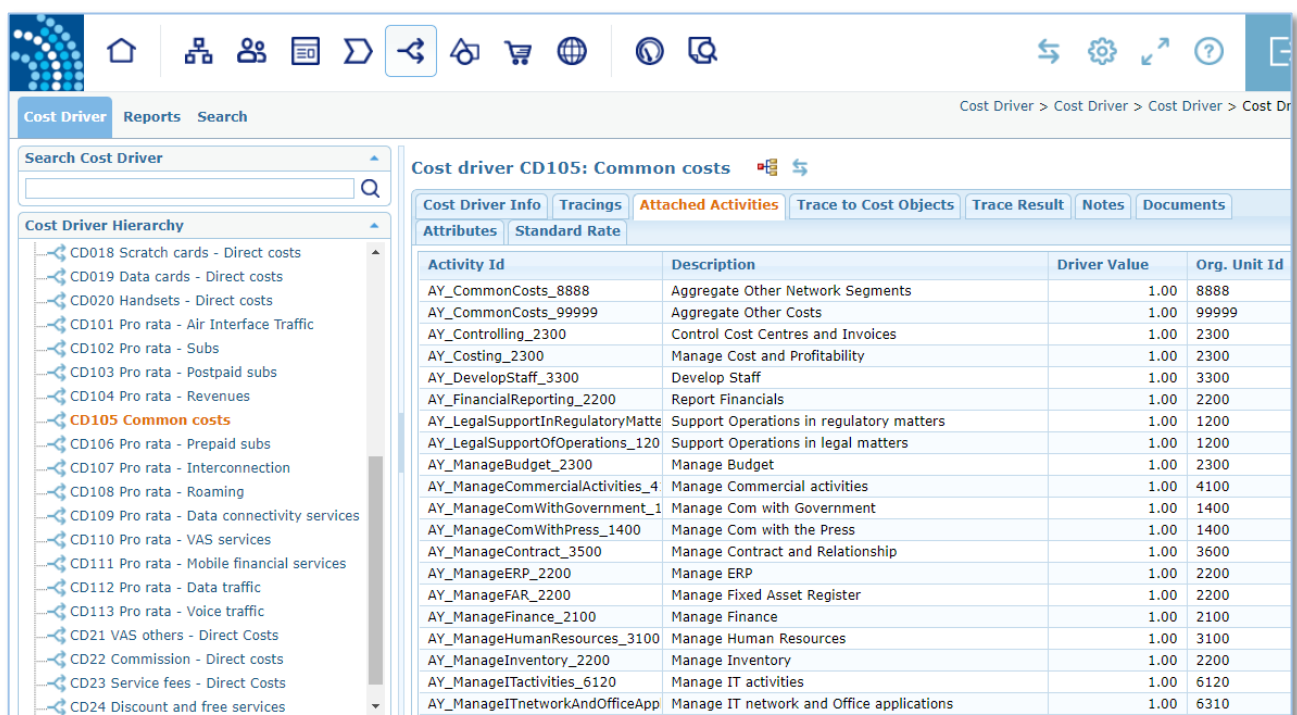
- The best drivers for the cost allocation of activities can be identified in discussion with the management of each organisation unit. For example, a number of activities in the ‘4200 Marketing’, ‘4300 Sales’ and ‘4400 Customer care’ organisation units were thought to be primarily driven by the number of subscribers (both prepaid and postpaid), so the related activities were attached to the ‘CD102 Pro rata – Subscribers’ cost driver, as shown in Exhibit 20 below.
- In case no driver can be identified for the activity, then we treat the costs associated with this activity as ‘common cost’ and attach it to the ‘CD105 Common costs’ driver, as shown in Exhibit 21 below. Note that the modeller should try to minimise the number of activities attached to this cost

driver, in order to keep the common costs as low as possible, and should strive to find a subscriber, traffic or revenue cost driver instead.



| Cost driver CD102: Pro rata - Subs         |   |              |                     |
|--|---|--------------|---------------------|
| Cost Driver Info                           |   | Tracings     | Attached Activities |
| Attributes                                 | Standard Rate                                 |              |                     |
| Activity Id                                | Description                                   | Driver Value | Org. Unit           |
| AY_AdvertisingAndPromotions_4200           | Manage Advertising and Promotions             | 1.00         | 4200                |
| AY_BusinessDevelopment_4500                | Develop New products and services             | 1.00         | 4500                |
| AY_CustomerCareInbound_4400                | Provide Inbound Customer Care                 | 1.00         | 4400                |
| AY_CustomerCareOutbound_4400               | Provide Outbound Customer Care                | 1.00         | 4400                |
| AY_FraudManagement_2400                    | Manage Fraud                                  | 1.00         | 2400                |
| AY_ManageBillingSystem_6320                | Manage Billing system                         | 1.00         | 6320                |
| AY_ManageCLV_4200                          | Manage Customer Lifecycle and Value           | 1.00         | 4200                |
| AY_ManageCRMsystem_6320                    | Manage CRM system                             | 1.00         | 6320                |
| AY_ManageDatawarehouse_6320                | Manage Datawarehouse                          | 1.00         | 6320                |
| AY_ManageDirectSales_4300                  | Manage Direct Sales                           | 1.00         | 4300                |
| AY_ManageReceivables_2200                  | Manage Receivables                            | 1.00         | 2200                |
| AY_MarketingPlanning_4200                  | Plan Marketing activities                     | 1.00         | 4200                |
| AY_MarketResearch_4200                     | Undertake Market research                     | 1.00         | 4200                |
| AY_OptimiseExistingSite_6210               | Optimise existing network sites               | 1.00         | 6210                |
| AY_PlanNetworkAndService_6210              | Plan New network site                         | 1.00         | 6210                |
| AY_Pricing_4200                            | Price Existing and new products               | 1.00         | 4200                |
| AY_RevenueAssurance_2400                   | Assure Revenue                                | 1.00         | 2400                |
| AY_SupportInboundCC_2600                   | Support Inbound customer care                 | 1.00         | 2600                |
| AY_SupportPromotionsWithBusinessPlans_2300 | Support Promotion pricing with business plans | 1.00         | 2300                |

Exhibit 20: Activities attached to the 'CD102 Pro rata – Subscribers' cost driver [Source: Investaura]



| Cost driver CD105: Common costs  |   |              |                     |
|----------------------------------|---|--------------|---------------------|
| Cost Driver Info                 |   | Tracings     | Attached Activities |
| Attributes                       | Standard Rate                             |              |                     |
| Activity Id                      | Description                               | Driver Value | Org. Unit Id        |
| AY_CommonCosts_8888              | Aggregate Other Network Segments          | 1.00         | 8888                |
| AY_CommonCosts_99999             | Aggregate Other Costs                     | 1.00         | 99999               |
| AY_Controlling_2300              | Control Cost Centres and Invoices         | 1.00         | 2300                |
| AY_Costing_2300                  | Manage Cost and Profitability             | 1.00         | 2300                |
| AY_DevelopStaff_3300             | Develop Staff                             | 1.00         | 3300                |
| AY_FinancialReporting_2200       | Report Financials                         | 1.00         | 2200                |
| AY_LegalSupportInRegulatoryMatte | Support Operations in regulatory matters  | 1.00         | 1200                |
| AY_LegalSupportOfOperations_120  | Support Operations in legal matters       | 1.00         | 1200                |
| AY_ManageBudget_2300             | Manage Budget                             | 1.00         | 2300                |
| AY_ManageCommercialActivities_4  | Manage Commercial activities              | 1.00         | 4100                |
| AY_ManageComWithGovernment_1     | Manage Com with Government                | 1.00         | 1400                |
| AY_ManageComWithPress_1400       | Manage Com with the Press                 | 1.00         | 1400                |
| AY_ManageContract_3500           | Manage Contract and Relationship          | 1.00         | 3600                |
| AY_ManageERP_2200                | Manage ERP                                | 1.00         | 2200                |
| AY_ManageFAR_2200                | Manage Fixed Asset Register               | 1.00         | 2200                |
| AY_ManageFinance_2100            | Manage Finance                            | 1.00         | 2100                |
| AY_ManageHumanResources_3100     | Manage Human Resources                    | 1.00         | 3100                |
| AY_ManageInventory_2200          | Manage Inventory                          | 1.00         | 2200                |
| AY_ManageITactivities_6120       | Manage IT activities                      | 1.00         | 6120                |
| AY_ManageITnetworkAndOfficeApp   | Manage IT network and Office applications | 1.00         | 6310                |

Exhibit 21: Activities attached to the 'CD105 Common costs' driver [Source: Investaura]



We then created a new customer type called "Common costs bucket" to allocate the common costs to a costing object, and we attached the 'CD105 Common costs' driver to this cost object. Alternatively, common costs can be allocated according to an arbitrary rule, for example to prepaid and postpaid subscribers, or on pro rata of service revenues.



We are finally ready to run the model and check that “no cost is lost”. The following exhibit shows how the costs are flowing from GL accounts to resources to activities to cost drivers to costing objects:

- For the period in question, the total expenses to be allocated amount to \$47.1m, as shown on the left hand side of Exhibit 22.
- The costs flow via resources and activities to cost drivers in the middle of the picture, except direct costs (the upper loop), which are assigned directly to cost drivers.
- On the right hand side, the costs are allocated to products (services), customer segments, and sales (order lines), and the system checks that the totals add up to \$47.1m.
- Finally on the far right, the system indicates whether the mapping between “products” and “customers” is complete i.e. all customer segments are mapped to products that they consume and vice versa, all products are attached to customer segments that use these products. In the exhibit below, the common costs stay at the customer segment level (in the ‘CommonCosts bucket’) and are not mapped further to products, hence the numbers in red. We can also see that the common costs amount to \$47.1m - \$31.7m = \$15.4m, or about 33% of total costs.

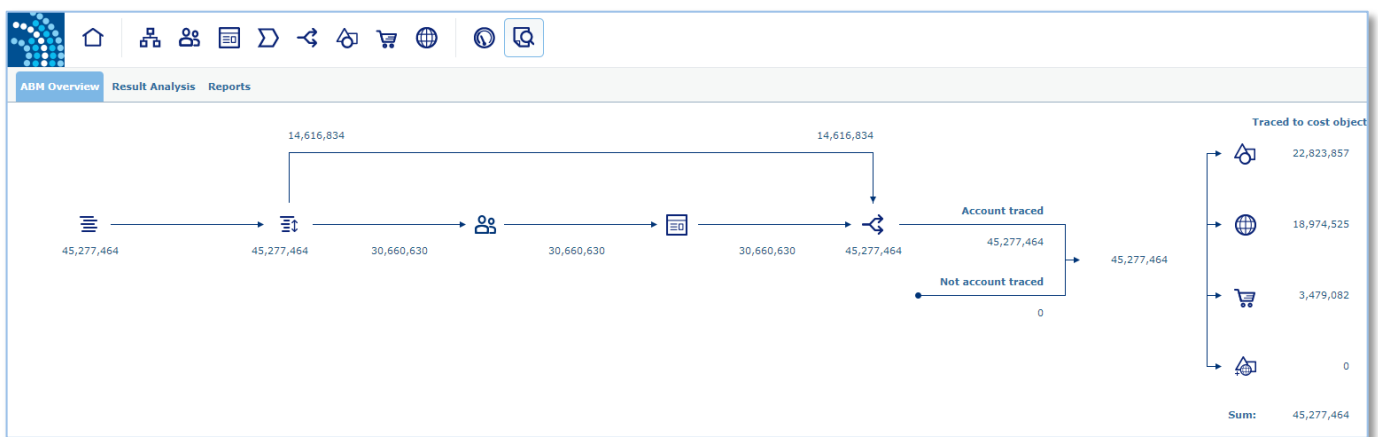


Exhibit 22: Checking that “no cost is lost” in the allocation process [Source: Investaura]



Using the *Tracings* functionality for *Customers*, we can also visualise where the costs in the ‘Common costs bucket’ come from, as show in the following exhibit, with the costs flowing from expense accounts via resources and activities to cost drivers and into the ‘Common costs bucket’.

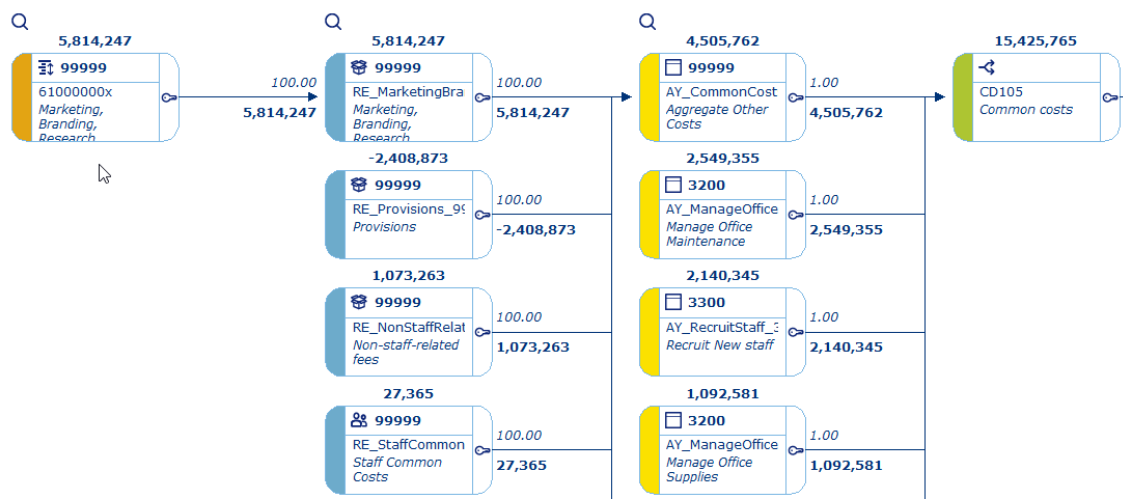


Exhibit 23: Tracing the sources of common costs in the model [Source: Investaura]

As the common costs are extremely high in the model, we decided to modify the model and allocate those costs on pro rata of the number of prepaid and postpaid subscribers (SIMs). This approach is consistent with the idea of 'cost recovery' through the adequate pricing of tariff plans for prepaid and postpaid subs. This is also in the spirit of a Fully Allocated Costs (FAC) calculation.

#### IV. Overview of Key results



Generating and visualising costs and profitability results, whether in tabular or chart format, is very easy in Prodacapo as the software includes a large number of predefined results and reports. Revenues, costs and profit margins can be analysed at the product, at the customer and at the 'sales order line / sales channel' level. We run the model with 10 quarters and analyse the results, under "Analysis" and "Reports".



A number of key results were already shown in Exhibit 1 and Exhibit 10 above. Additional interesting results are shown in Exhibit 24 and 25 below, and time-dependent results in Exhibit 26.

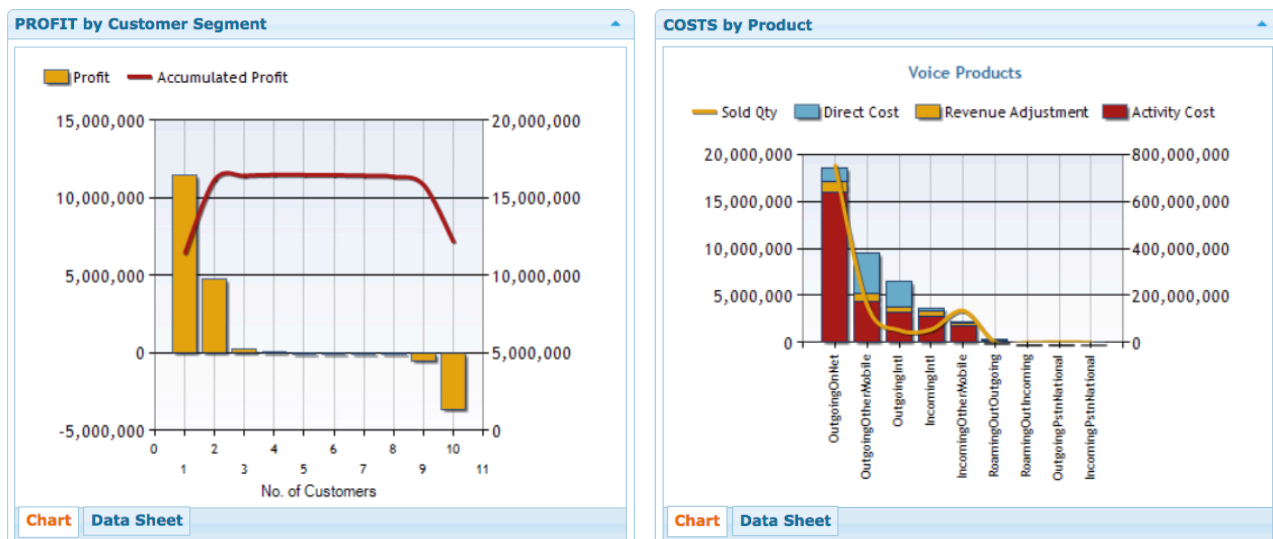


Exhibit 24: Profit by customer segment, and Costs by Product [Source: Investaura]

| 29 Customer Profitability     |                     |                      |                    |                      |                 |                      |                     |
|-------------------------------|---------------------|----------------------|--------------------|----------------------|-----------------|----------------------|---------------------|
| 15/03/2018 12:38:59           |                     |                      |                    |                      |                 |                      |                     |
| Customer                      | Revenue             | Customer Cost        | Order Related Cost | Product Cost         | Separate Traced | Total Cost           | Profitability       |
| DataCardPostpaid subs         | 0.00                | 0.00                 | 0.00               | 996,743.32           | 0.00            | 996,743.32           | -996,743.32         |
| DataCardPrepaid subs          | 0.00                | 0.00                 | 0.00               | 1,993,486.63         | 0.00            | 1,993,486.63         | -1,993,486.63       |
| Fixed BB - Fixed line subs    | 0.00                | 0.00                 | 0.00               | 5,197.13             | 0.00            | 5,197.13             | -5,197.13           |
| Fixed BB - Satellite subs     | 0.00                | 0.00                 | 0.00               | 5,197.13             | 0.00            | 5,197.13             | -5,197.13           |
| OPC_DataVAS optional package  | 0.00                | 0.00                 | 0.00               | 996,743.32           | 0.00            | 996,743.32           | -996,743.32         |
| OPC1 subs                     | 19,519,308.24       | 7,594,914.41         | 111,364.55         | 7,091,988.36         | 0.00            | 14,798,267.32        | 4,721,040.92        |
| OPC2 subs                     | 29,437,553.92       | 8,635,852.66         | 167,951.65         | 9,185,551.52         | 0.00            | 17,989,355.82        | 11,448,198.10       |
| OPC3 subs                     | 0.94                | 3,640,672.43         | 0.01               | 0.01                 | 0.00            | 3,640,672.45         | -3,640,671.51       |
| OPC4 subs                     | 716,238.49          | 250,320.84           | 4,086.39           | 215,888.80           | 0.00            | 470,296.03           | 245,942.46          |
| OPE1 subs                     | 134,119.67          | 22,317.97            | 765.20             | 48,802.09            | 0.00            | 71,885.26            | 62,234.41           |
| OPE2 subs                     | 0.94                | 37,885.35            | 0.01               | 0.01                 | 0.00            | 37,885.37            | -37,884.43          |
| OPE3 subs                     | 0.94                | 11,124.81            | 0.01               | 0.01                 | 0.00            | 11,124.83            | -11,123.89          |
| OPoC_DataVAS optional package | 0.00                | 0.00                 | 0.00               | 996,743.32           | 0.00            | 996,743.32           | -996,743.32         |
| OPoC1 subs                    | 0.94                | 2,034.15             | 0.01               | 0.01                 | 0.00            | 2,034.16             | -2,033.23           |
| OPoE_DataVAS optional package | 0.00                | 0.00                 | 0.00               | 996,743.32           | 0.00            | 996,743.32           | -996,743.32         |
| OPoE1 subs                    | 123,951.10          | 615,898.73           | 707.18             | 37,717.63            | 0.00            | 654,323.55           | -530,372.45         |
| OPoE2 subs                    | 0.94                | 68,510.04            | 0.01               | 0.01                 | 0.00            | 68,510.05            | -68,509.12          |
| <b>Grand Total:</b>           | <b>9,931,176.11</b> | <b>20,879,531.40</b> | <b>284,875.00</b>  | <b>22,570,802.60</b> | <b>0.00</b>     | <b>43,735,209.00</b> | <b>6,195,967.11</b> |

Exhibit 25: Customer Profitability Report [Source: Investaura]



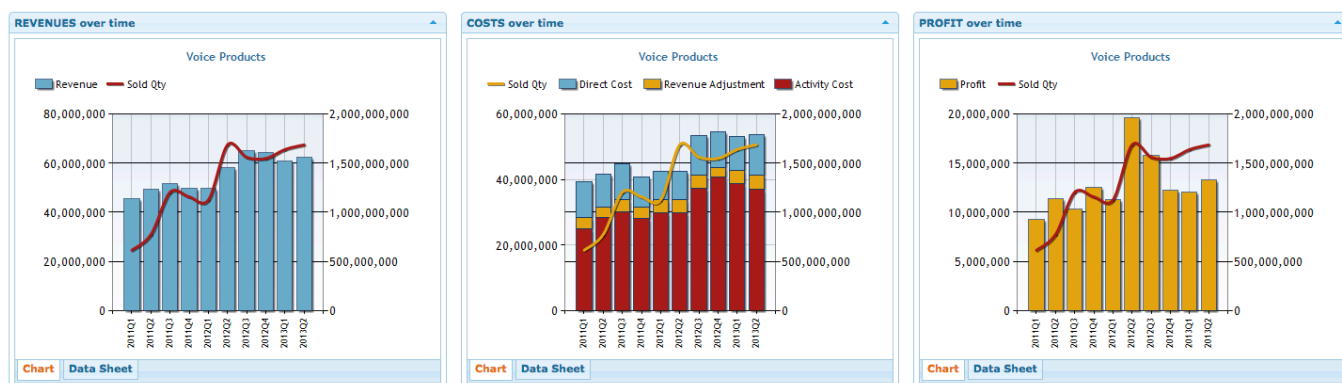


Exhibit 26: Time-dependent results: Voice outgoing to other mobile operators [Source: Investaura]

## V. Conclusion and further development

In this final section, we review a number of areas where the telecoms service provider model could be expanded further. Three key topics are discussed here:

- the level of detail in the **activity model** undertaken in Phase 3;
- the level of detail in the **telecoms network** model of Phase 4;
- the **cost and profitability KPIs** generated by the ABC system in Phase 5.

About 80 activities were identified in Phase 3, which we believe is a reasonable number for modelling purposes, although the number of activities could be increased further to about 100-120 to derive a finer model. In order to generate more accurate cost results, it would also be necessary to review each activity one by one and revisit the activity driver(s). We believe that too many activities are allocated to 'common costs' and that some activities could be transferred (mapped) to other activities using *Activity transfer*. This would generate more precise costing results.

The telecoms network model in Phase 4 has been captured in a fairly crude manner. Indeed, we only use 12 Resources (used as network segments) and 7 Activities (used as service elements). There is considerable scope to expand the network modelling here, for example by using about 50-80 resources and 20-30 service elements. This would result in a more accurate model, not only for the voice and connectivity (internet access) services, but also the content-related and VAS services. As discussed in Phase 4, a prerequisite would be to have access to disaggregated cost data, which should be available in the accounting system of the telecoms service provider. Alternatively, we might have to go back to individual transaction data and supplier contracts.

Finally, we would like to emphasise that the costing KPIs should be defined with great caution. The main service costing measures used in the telecoms industry are LRIC (Long-Run Incremental Costs) and FAC (Fully Allocated Costs), with  $LRIC < FAC$ . The issue here is that even those KPIs are not defined in a fully standardised manner. For example, the LRIC results depend on the 'size of the increment' on one hand, and on whether all common costs are excluded on the other hand. Even the FAC results, while including common costs, might exclude some costs treated as 'sunk' or 'the cost of inefficiencies'.

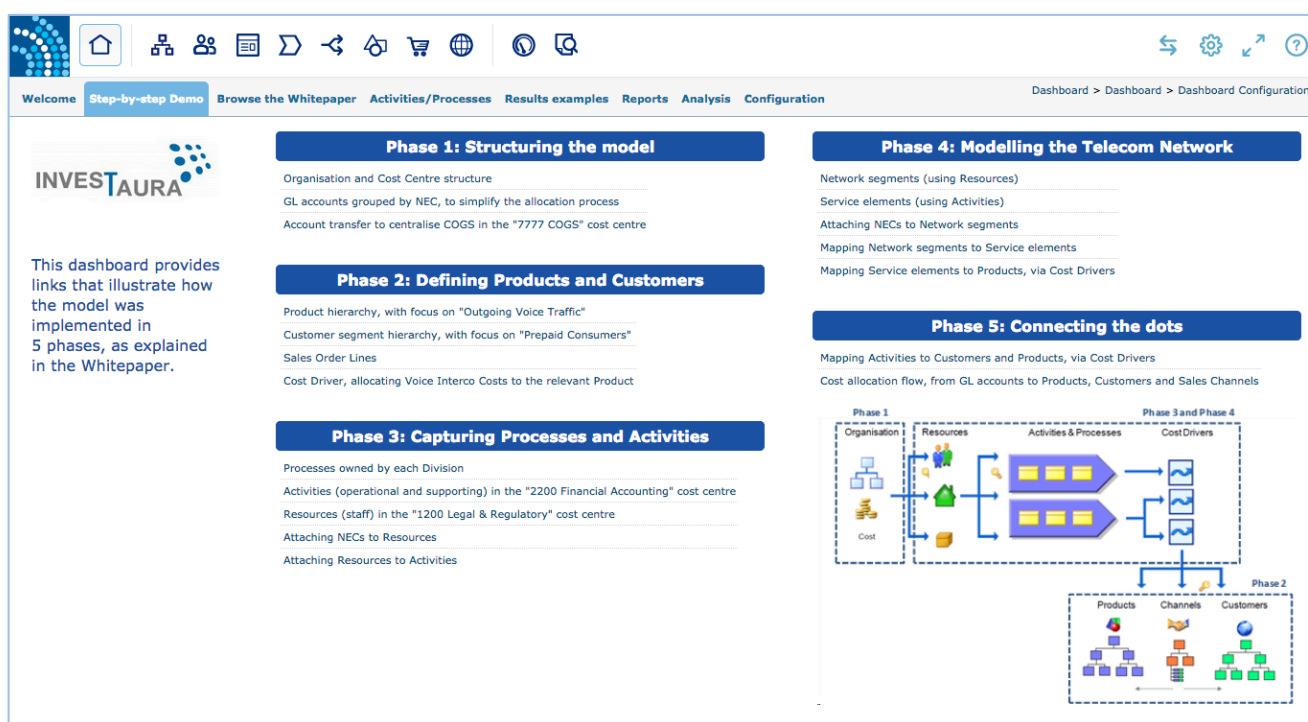
In addition to the distinction between LRIC and FAC and their exact definition, there will also be two different (but consistent) sets of results, depending on the usage of those results that the telecoms service provider intend to make:



- There will be a set of result for **internal, managerial accounting purposes**. The objective of those results is to help the management understand the source of profitability (and loss) in the business, and to take action to improve business performance. A second objective is to provide inputs to the marketing team so that products are priced in a manner that does not create systematic, long-term imbalances in the business, such as when 20% of the products generate 70% of the profit and durably subsidises the remaining 80% of the products.
- The other set of results will be generated for **regulatory accounting purposes** and cover in particular all regulated services. The LRIC and FAC results calculated for regulatory costing purposes have to use a 'regulatory approved' definition, e.g. some costs might be excluded.

We hope that reading this white paper has been useful and insightful for you. We covered a lot of ground, including costing methodologies, the Prodacapo software platform (see also Annex A), as well as the eTOM business process framework for telcos (see Annex B).

The telecoms service provider model exposed in this white paper is a fully functioning model that can be used as a starting point in a service provider implementation. The demonstration model is accessible on the Internet using a standard web browser, as shown in the following exhibit. Feel free to contact Investaura at [enquiries@investaura.de](mailto:enquiries@investaura.de) and request a password if you would like to get access to the model online.



The screenshot displays the Prodacapo web browser interface. The top navigation bar includes links for Welcome, Step-by-step Demo, Browse the Whitepaper, Activities/Processes, Results examples, Reports, Analysis, and Configuration. The main content area is divided into five phases:

- Phase 1: Structuring the model**
  - Organisation and Cost Centre structure
  - GL accounts grouped by NEC, to simplify the allocation process
  - Account transfer to centralise COGS in the "7777 COGS" cost centre
- Phase 2: Defining Products and Customers**
  - Product hierarchy, with focus on "Outgoing Voice Traffic"
  - Customer segment hierarchy, with focus on "Prepaid Consumers"
  - Sales Order Lines
  - Cost Driver, allocating Voice Interco Costs to the relevant Product
- Phase 3: Capturing Processes and Activities**
  - Processes owned by each Division
  - Activities (operational and supporting) in the "2200 Financial Accounting" cost centre
  - Resources (staff) in the "1200 Legal & Regulatory" cost centre
  - Attaching NECs to Resources
  - Attaching Resources to Activities
- Phase 4: Modelling the Telecom Network**
  - Network segments (using Resources)
  - Service elements (using Activities)
  - Attaching NECs to Network segments
  - Mapping Network segments to Service elements
  - Mapping Service elements to Products, via Cost Drivers
- Phase 5: Connecting the dots**
  - Mapping Activities to Customers and Products, via Cost Drivers
  - Cost allocation flow, from GL accounts to Products, Customers and Sales Channels

A diagram at the bottom right illustrates the flow from Phase 1 (Organisation) through Resources, Activities & Processes, and Cost Drivers to Phase 2 (Products, Channels, Customers). It also shows the mapping from Phase 3 and Phase 4 to Phase 2.

Exhibit 27: Access to the Prodacapo telecoms service provider model via a web browser [Source: Investaura]

## Annex A: the Prodacapo objects

This annex provides a brief overview of the objects (and icons) used in a Prodacapo costing model, so that the reader can better understand their role, the functionality available in the system, as well as the exhibits presented in the main body of the white paper.



**Organisation:** define the organisation units and the cost centre structure. Typically, there is a single cost centre per organisation unit.



**Organisation Cost:** define the GL accounts and so-called Natural Expense Categories (NECs), used to group cost accounts that should be allocated together using the same logic. The main benefit of NECs is that the costing model can be built faster.



**Account Transfer (*mapping object*):** transfer GL cost accounts (or NECs) from one cost centre to another or multiple other cost centre(s), using Account Transfer Drivers to implement the mapping.



**Trace Account (*mapping object*):** map GL cost accounts (or NECs) to one or multiple Resources.



**Resource:** used to group / attached costs that belong together from a cost allocation point of view, There are 3 types of resources: staff, equipment/facilities, others (e.g. third party costs). Resources (costs) are then allocated to activities in the next step.



**Trace Resource (*mapping object*):** used to map Resources (costs) to one or multiple activities, using % for the split.



**Activity:** activities are used to capture what people do within the organisation i.e. how resources are 'consumed' in the business. Prodacapo distinguishes between various types of activities e.g. operational activities, support activities, internal project related activities etc.



**Activity Transfer (*mapping object*):** it is possible to transfer the costs of activities (e.g. support activities) to other activities within the same organisation unit or to activities in other units.



**Process:** this is the *Process Designer* that can help identify the key business process in the company, and activities undertaken to support these business processes. Note that using the Process Designer is optional in Prodacapo i.e. it is not mandatory to use it for costing purposes.



**Cost Driver (*mapping object*):** this is used to map Activities (and their costs) to Products, Customers, or Sales (channels), which are the ultimate objects for cost and profitability analysis.



**Product:** used to capture the products and services sold to end-customers, as well as their quantities.



**Customer:** used to capture customer segments or individual customers, as well as their volumes and attributes.



**Sales:** used to connect customers to products i.e. the 'Sales' object provides a mapping of what customers buy. 'Sales' is also used to capture revenues relating to customer purchases. The revenues are then allocated automatically to products and customers. Note that 'Sales' can also be used to capture various sales channels (e.g. direct, wholesale, franchise etc).

## Annex B: the eTOM business process framework

The eTOM business process framework is the de-facto standard for the telecoms industry and Release 16.5 is the result of more than 20 years of work by the TM Forum members (<https://www.tmforum.org/>).

Prodacapo's industry-specific solution for telecoms service providers includes the eTOM's business process framework up to Level 2 (with 116 processes) and Level 3 (with about 350 processes). Level 2 is reproduced in the following exhibit.

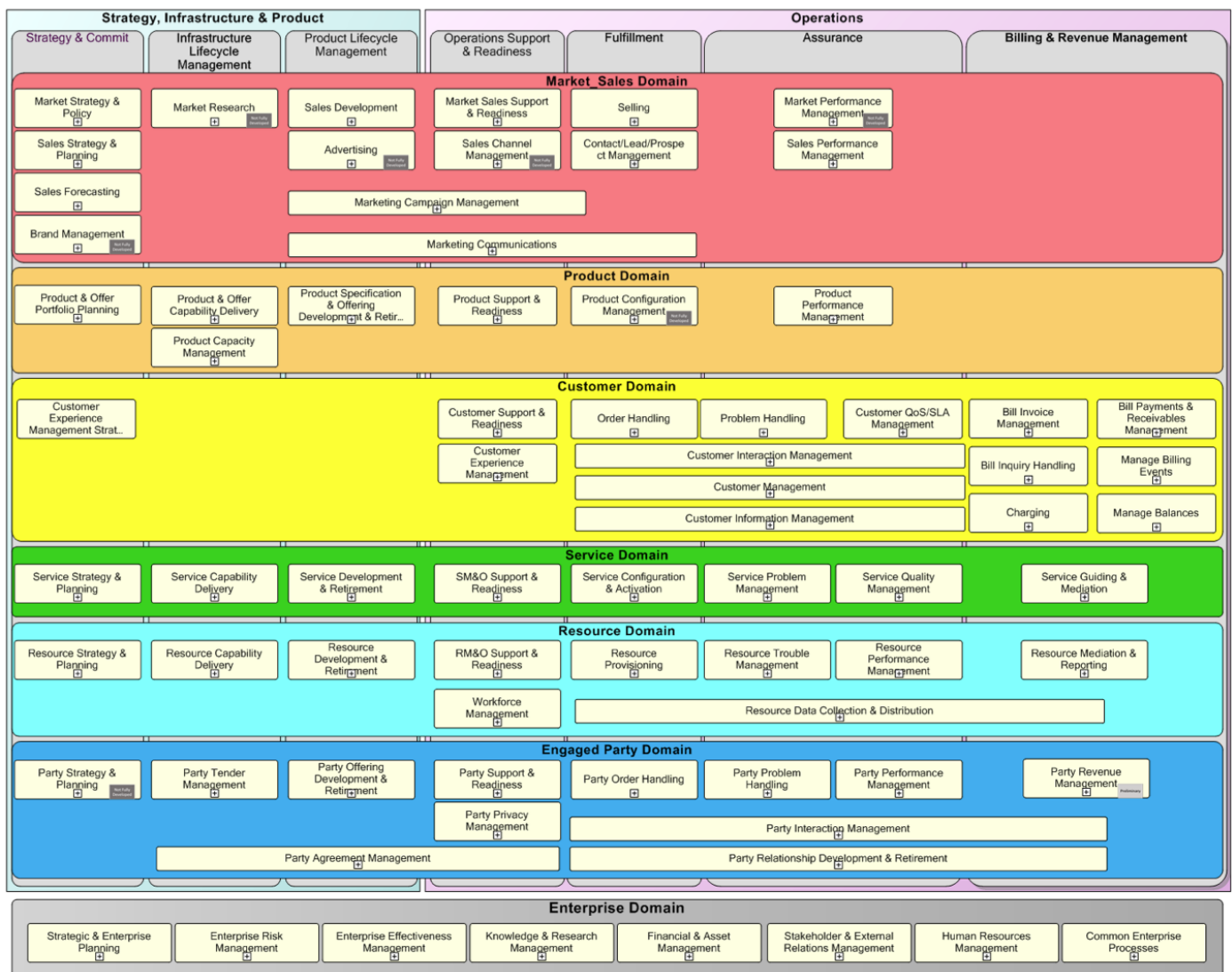


Exhibit B1: eTOM Business Process Framework Release 16.5, Level 2 [Source: TM Forum]

Note that the objective of eTOM is not to provide process *workflows*, but to define a *common process map and terminology* covering all telecoms service provider processes. A common process framework can be used as a reference model and greatly facilitate internal and external discussions, for example to identify potential gaps in the service provider business process landscape.

While it would be beyond the scope of this white paper to describe the eTOM framework in detail, we provide a brief overview of the level 0, 1, 2 and 3 below, and then illustrate how the eTOM framework has been implemented within Prodacapo.

- ✓ **Level 0:** At the top-level, the eTOM Business Process Framework has three process domains, as visible in the previous exhibit: **'Strategy, Infrastructure and Product (SIP)'** in the upper left side, covering planning and lifecycle management; **'Operations'** in the upper right side, covering the core day-to-day, high-volume operational activities; **'Enterprise Management'** at the bottom, covering the support functions.
- ✓ **Level 1** breaks down the 'SIP' and 'Operations' domains in vertical and horizontal groupings in a matrix approach.
  - The horizontal groupings include, from top to bottom: the **Market & Sales** domain; the **Product** domain; the **Customer** domain; the **Service** domain; the **Resource** domain and the **Engaged Party** domain (suppliers and partners). Each horizontal domain is supported by the domain immediately below.
  - Vertically, there are seven end-to-end process groupings: three within SIP, with **Strategy & Commit**, **Infrastructure Lifecycle management** and **Product Lifecycle Management**; and four within Operations with **Operations and Support Readiness (OSR)**, **Fulfilment**, **Assurance**, and **Billing (FAB)**.
- ✓ **At Level 2**, there are 116 core process groups that can be combined together to deliver service streams and end-to-end processes for external and internal customers.
- ✓ **Finally, Level 3** breaks down the Level 2 process groups and provides further detail of about 350 individual processes. Level 3 could further be broken down into sub-processes and activities (Level 4 and 5).

The following exhibits show how the Level 0, 1, 2 and 3 have been captured in Prodacapo using the *Process Designer*.

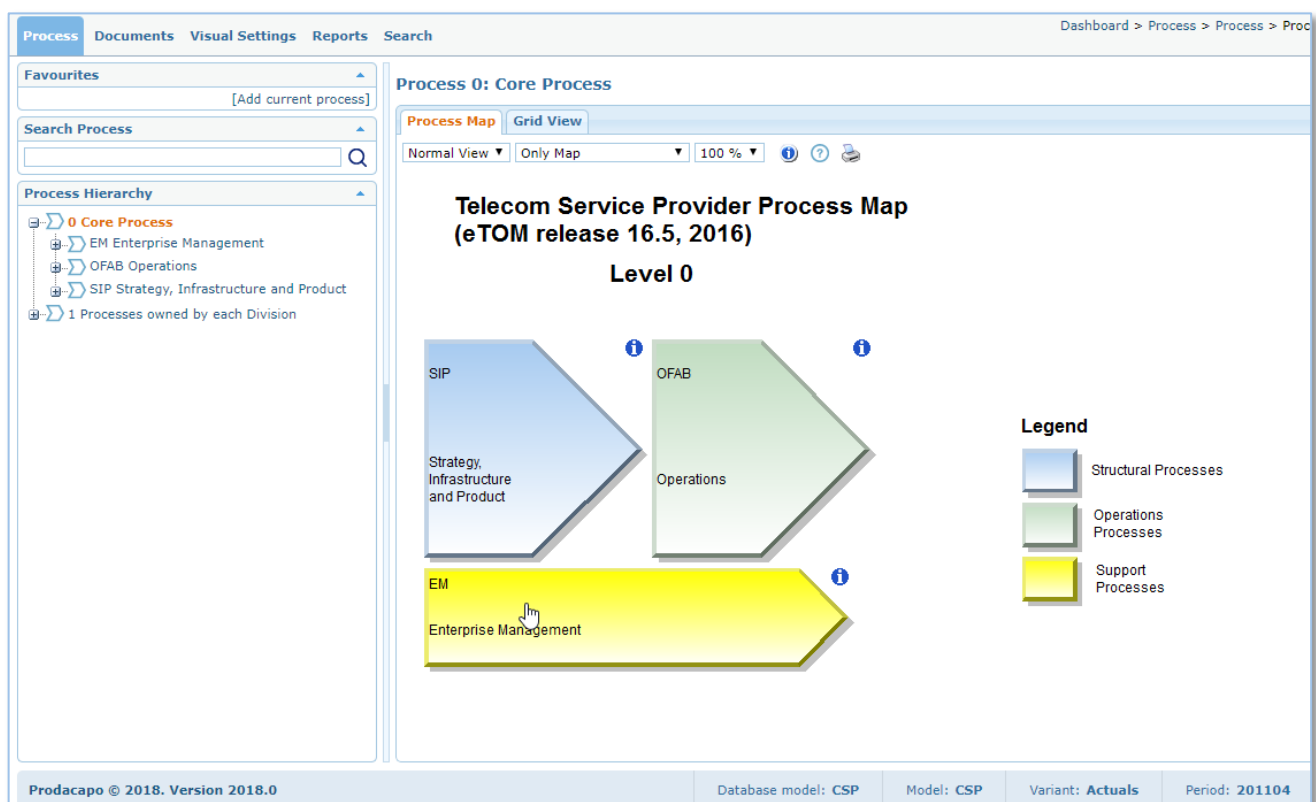


Exhibit B2: eTOM Level 0 replicated in Prodacapo [Source: Investaura, TM Forum]



Exhibit B3: eTOM SIP domain at Level 1 and Level 2 [Source: Investaura, TM Forum]

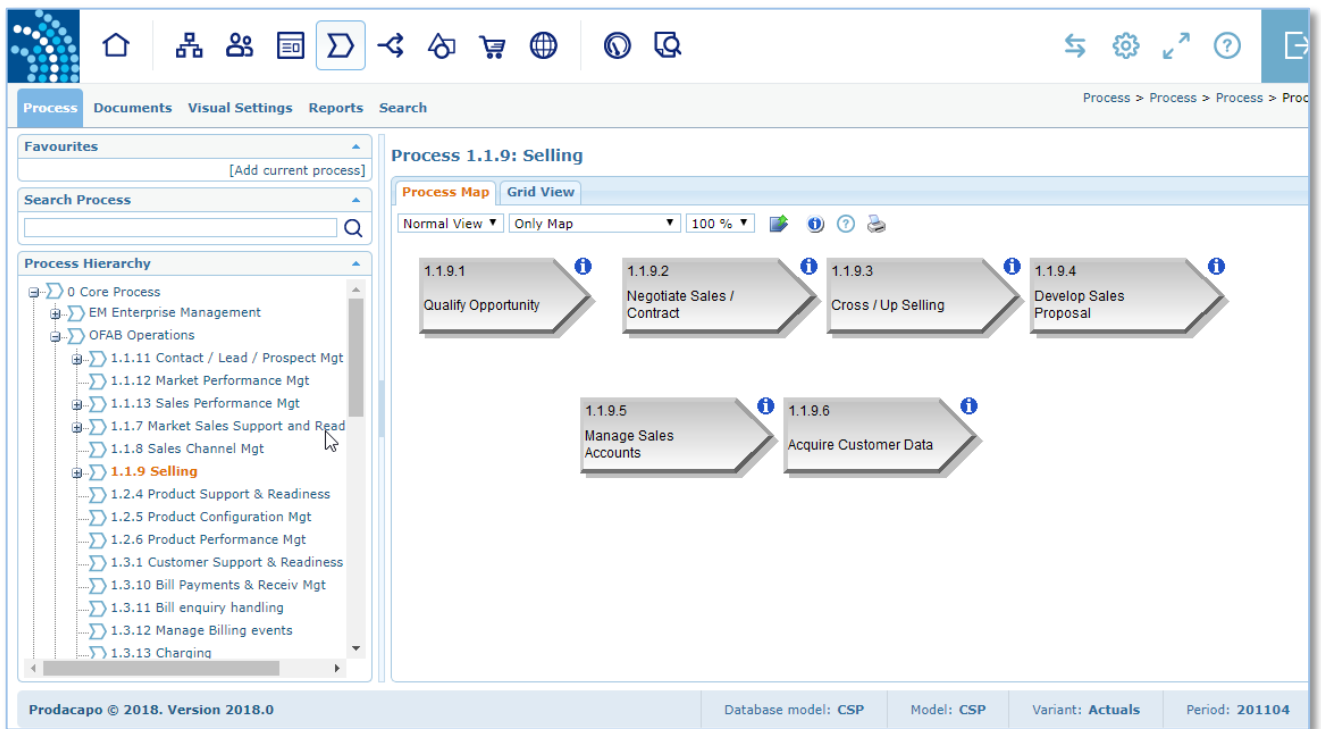


Exhibit B4: eTOM Level 3: Breakdown of the Level 2 'Selling' process (number 1.1.9) into sub-processes [Source: Investaura, TM Forum]

At Level 3, each process is described individually in Prodacapo as per Release 16.5 of the eTOM Business Process Framework.



## References

Confraria, J.; Noronha, J.; Vala, R. and Amante, A. (2001) On the use of LRIC models in price regulation. Instituto das Comunicações de Portugal.

*Available: <http://userpage.fu-berlin.de/~jmueller/its/conf/dub01/papers/confraria.pdf>*

Deloitte. (May 2012). Developments in European Regulatory Reporting. A Report for BT.

*Available: [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0022/55327/deloitte.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0022/55327/deloitte.pdf)*

Franklin, S.L., Fr. and Pizzolato, N.D. (2013) Pricing and Costing Practices in Telecommunications: the Brazilian Experience and Challenges. Brazilian Journal of Operations & Production Management, Volume 10, Number 1, pp. 7-24.

*Available: [https://bjopm.emnuvens.com.br/bjopm/article/viewFile/V10N1A1/pdf\\_60](https://bjopm.emnuvens.com.br/bjopm/article/viewFile/V10N1A1/pdf_60)*

Incyte Consulting. (2017) Development of cost model and pricing framework for wholesale and retail telecommunications services in Malawi.

*Available: <http://www.macra.org.mw/wp-content/uploads/2014/09/Development-of-cost-models-and-pricing-framework-for-wholesale-and-retail-telecommunications-services-in-Malawi.pdf>*

ITU. (March 2009) Regulatory Accounting Guide. Telecommunication Development Bureau.

*Available: [https://www.itu.int/ITU-D/finance/Studies/Regulatory\\_accounting\\_guide-final1.1.pdf](https://www.itu.int/ITU-D/finance/Studies/Regulatory_accounting_guide-final1.1.pdf)*

Ofcom. (2013) Cost Orientation Review.

*Available: [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0018/63261/cost\\_orientation.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0018/63261/cost_orientation.pdf)*

Telecommunications Regulatory Authority, Bahrain. (October 2011) Development, implementation and use of bottom-up fixed and mobile network cost models in the Kingdom of Bahrain. Position paper. Ref: MCD/10/11/144.

*Available: <http://www.tra.org.bh/media/document/MCD1011144PositionPaperonBU-LRICcostmodels.pdf>*

Telecommunications Regulatory Authority, Oman. (November 2013) Development of Bottom-Up LRIC Models in the Sultanate of Oman. Public consultation on the methodology for BULRIC modelling.

*Available: <https://www.tra.gov.om/pdf/pcdevelopmentofbulricmodelsv.2.pdf>*

Telecommunications Regulatory Authority, Oman. (April 2014) Development of Bottom-Up LRIC Models in the Sultanate of Oman. Position Statement.

*Available: <https://www.tra.gov.om/pdf/axon-consulting-consolidated-comments-on-bulric-and-posit.pdf>*

Telecommunications Regulatory Authority, Oman. (February 2015) Accounting Separation Guidelines. Draft for Consultation.

*Available: <https://www.tra.gov.om/pdf/draft-accounting-separation-guidelines.pdf>*

Telecommunications Regulatory Authority, Oman. (August 2015) Consultation on draft Accounting Separation Regulation and draft Accounting Separation Guidelines. Position Statement.

*Available: <https://www.tra.gov.om/pdf/position-statement-as-regulation-and-guidelines-final.pdf>*

Wall Communications Inc. (October 2012) A Study of Wholesale Costing Methodologies in Selected Countries. Prepared for the Canadian Radio-television and Telecommunications Commission ("CRTC").

*Available: <https://www.crtc.gc.ca/eng/publications/reports/rp121002.pdf>*