Telecommunications Revenue Assurance
Implementing a Solution

More on Revenue Assurance

By Jo Mills

It is common for telecommunications service providers who do not have effective revenue assurance tools to lose from 5% to 15% of total revenues. A one-time audit and overhaul of processes will provide rapid payback by identifying major leaks, but as systems and processes evolve following the audit, new leaks will appear.

This paper discusses the elements of a permanent reactive and proactive revenue assurance solution and an approach to implement it. It touches on secondary benefits from such a solution in providing invaluable input to product development, sales, supplier management and network technology evolution.

Introduction

During the 1990's, the focus was on growth. Carriers were throwing new technology into the network, improvising systems and procedures and introducing untried products in a race to keep up with competition and market demand. In the process, they introduced many new points of revenue leakage.

In today's more constrained industry there is greater emphasis on cost containment. Carriers around the world are paying increasing attention to revenue assurance. Hard numbers are difficult to come by and there are wide variations between carriers, but the most conservative estimates are that on average a carrier will fail to collect at least 5% of revenue due. In some cases, losses are much higher. The payback on systematic revenue assurance programs is always high.

Even a one-time audit will provide many benefits, identifying recoverable revenue and plugging gaps. An audit that focuses on just one area, such as retail billing, interconnect settlements or service provisioning will have value in itself. But the greatest benefits will come from an institutionalized revenue assurance program covering all aspects of business operations from sales through to collection of payments. The program will prevent or plug leakages, eliminate unwarranted payments and will incidentally provide invaluable business planning information.

Implementing a comprehensive revenue assurance program is a major undertaking and will take time. The implementation approach, discussed later in this report, should focus on first identifying and addressing the areas with the highest payback. Then the scope can be progressively expanded to include secondary areas.

Revenue assurance should concentrate on identifying and correcting root causes of revenue leakage. A carrier must not neglect recovery of unbilled revenue, but it is not realistic to expect to more than 25% recovery of revenues lost in the past. The emphasis must be on reducing ongoing revenue leaks. Even on this basis, cost justification should be no problem.

It is not easy to quantify one of the largest benefits of a revenue assurance solution. The analysis and instrumentation for revenue assurance provides valuable information on all aspects of business operations, helping the carrier eliminate inefficiencies and focus investment on maximizing profitability.

Causes of Revenue Leakage

There are many potential causes of revenue leakage. This section outlines some of the more common causes to illustrate the extent of the problem.

Provisioning

Weaknesses in the provisioning process may cause revenue loss through delays in service activation, activation of features that the customer did not order, delays in removing cancelled service, failure to implement international call blocking and so on.

Audits between the features on the switch and the features recorded in the billing system typically show a 5% - 7% discrepancy, but higher levels are common.

Incomplete Records

The records used to bill customers for non-recurring and recurring charges, such as service activation charges, recurring service feature charges and rental charges for data circuits, may be incomplete. The customer receives the services free.

Trouble Tickets / Repair

Carriers often see trouble management and repair as a problem for Network Operations separate from customer care and billing. But trouble management can cause revenue leaks. Examples:

- A customer calls to complain that a service feature is not working. The repair person finds that it is not active, and quickly corrects the “problem”. But the customer did not order the feature and is not paying for it.

- A customer complains that their phone service is not working.

The repair person finds the problem is with a customer-owned handset. But the customer is not billed for the repair visit.

Customer Refunds Customers may find that it is easy to get refunds by calling up and complaining about billing accuracy or quality of service. The personnel handling complaints must have access to information that lets them detect fraudulent patterns.

Call Detail Records Switch hardware or configuration problems may cause inaccurate call details records to be generated, or may result in no call detail record being generated for a chargeable call. Problems with mediation software may result in similar problems. The 24 hours = 0 problem is classic.

Transactions such as unmatched call details may be diverted into a recycling file, and eventually be purged without ever having been billed.

Late-Arriving Transactions Records may arrive after the statutory period beyond which they become un-billable. In Europe, the operator cannot bill for charges more than three months after they were incurred.

Interconnect Charges & Credits Interconnect charges and credits represent a large part of any carrier's cash flow in a competitive market. Weaknesses in the interconnect charge calculation and reconciliation tools can result in massive loss of revenue for call terminations and overpayment of charges for call placement.

Rating & Discounting Errors in configuration of rating and discounting software, bugs in the software and errors in manually applied discounts can cause large loss of revenue. Customers will quickly point out cases where incorrect rates are resulting in excess charges. They are less likely to notify the operator when the reverse applies.

Special billing routines for large customers are a common source of serious loss of revenue. When large amounts are involved, small errors are magnified.

The list above gives cases where the operator directly loses billable revenue. Some other "soft" causes of revenue loss include weaknesses in:

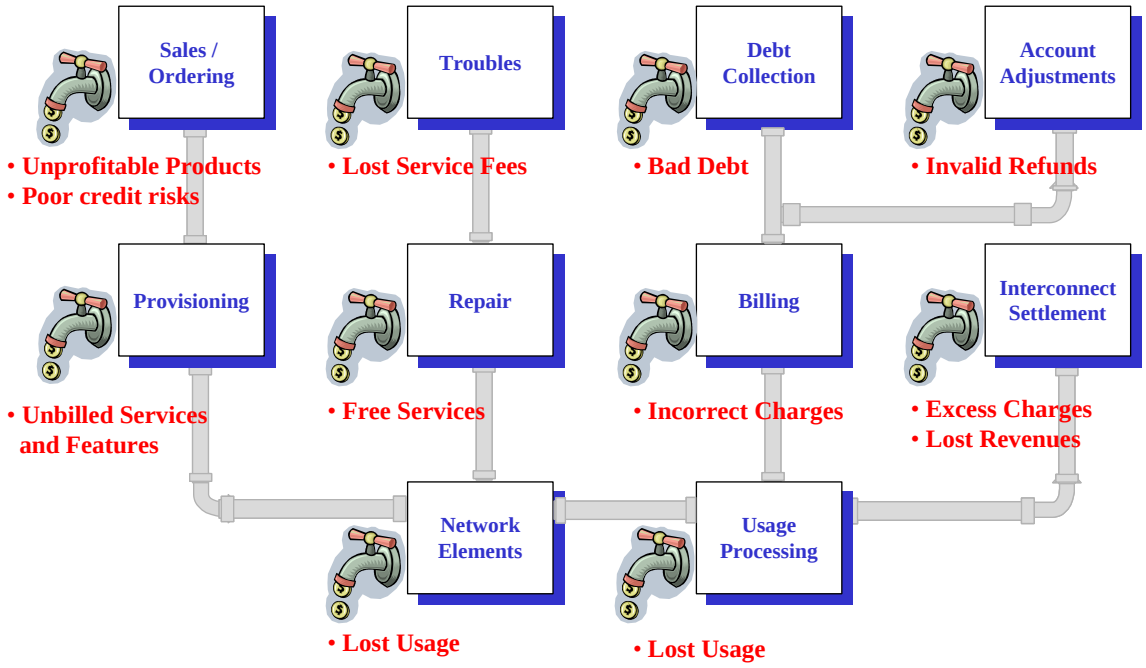
Credit Assessment Inaccurate credit assessment may result in excessive debt write-off later in the cycle.

Treatment / Failure to properly manage accounts receivables or to apply effective collection/treatment process may result in major losses

Collections	from write-off of bad debt. These losses can be reduced through careful monitoring of overdue accounts to detect a customers' financial problems early on.
Fraud	A major subject in itself. Customers or employees may defraud the operator, obtaining service free of charge or obtaining payments from the operator for goods and services that were never in fact supplied.
Product Profitability Analysis	Lack of data about the underlying costs of products, including cost structures in different geographical areas and different demographic segments, can lead to major loss of revenue.
Sales Targeting	Service representatives need training and information to ensure that they propose the optimum products to maximize revenues based on customer location and demographic profiles.
Network Outages	Excessive network outages may have a revenue impact far exceeded the cost of renovation. Outages may be localized and recurrent, indicating underlying physical or procedural problems. Analysis tools are required to identify the patterns that indicate these underlying problems.

These "soft" areas are outside the scope of this paper. However, information gathered for revenue assurance purposes will provide insight into areas where credit verification, debt collection and fraud detection procedures can be improved.

Instrumentation installed for revenue assurances purposes will also assist in calculating the profitability of different territories, demographic markets and product lines, and will provide insight into the business case for network upgrades. The revenue assurance team should review the solution with the departments responsible for these functions to ensure that all potential synergies are exploited.



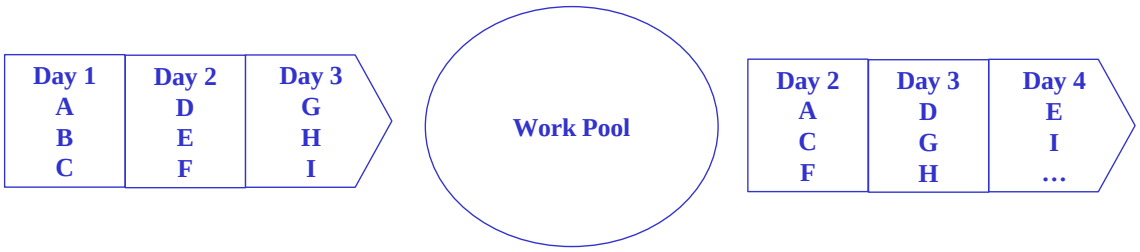
Tracking Issues

A naive view of the revenue assurance problem is that the basic requirement is to track each revenue-generating transaction from origin through to receipt of the corresponding payment. If every transaction can be tracked from start to end, there can be no leakage. Unfortunately a number of factors make end-to-end transaction tracking impossible in many cases. These include the work pool issue, splitting and filtering, identifier changes, automatic transactions and calculations.

Work Pool Issue

There will be many points in the provisioning, repair and billing flows where transactions are placed in a work pool, and leave that pool in a different sequence from the sequence in which they entered it.

In the provisioning and repair work flows, orders or tickets may be held up while they wait for available facilities, materiel or technicians with the required skills. Orders may simply be held until close to their due date. In the billing flow, a batch of call detail records generated by the switch will be distributed over invoices issued anywhere from one day to six weeks later.



In the diagram above, what happened to transaction B? Has it been permanently lost or is it just being held back for some legitimate reason?

Splitting & Filtering

As transactions flow through the system, a single input to a process may generate several outputs or none at all. Or several inputs may generate one output. For example, a data circuit order may generate a number of work orders to connect facilities at the A and B ends of the circuit and at the intermediate network locations. A voice installation order may or may not generate a field visit depending on whether facilities are in place. Two trouble tickets may be matched, creating a single repair order.

In these situations, there is no ready way of determining whether the absence of an output transaction corresponding to the input transaction is legitimate or represents leakage. If several outputs are generated from one input, there is no ready way to tell that all outputs have been generated and none lost.

Identifier Changes

Many transactions do not preserve a common identifier as they flow through the process. A customer service order number may be translated into a work order number. A rental telephone set may have one identifier for materiel tracking purposes and an unrelated identifier for billing purposes. It is often impossible to match these identifiers – and there may be no good business reason to do so.

Automatic Transactions

A service order for a voice feature such as call waiting or calling line identification may not result in an immediate billing charge, but instead will cause the billing system to generate a charge for the feature each month. Short of replicating the ordering and billing flows and logic, there is no ready way to confirm that all such charges are being correctly generated.

Calculations

Usage charges are usually subject to standard rating based on origin, destination, duration and time of day or day of week. They are then subject to discounting rules that depend

on the customer class and billing plan. With corporate VPN arrangements, usage below a certain threshold may not generate any individual charges at all. If a usage record fails to generate an invoice item, this may or may not be legitimate.

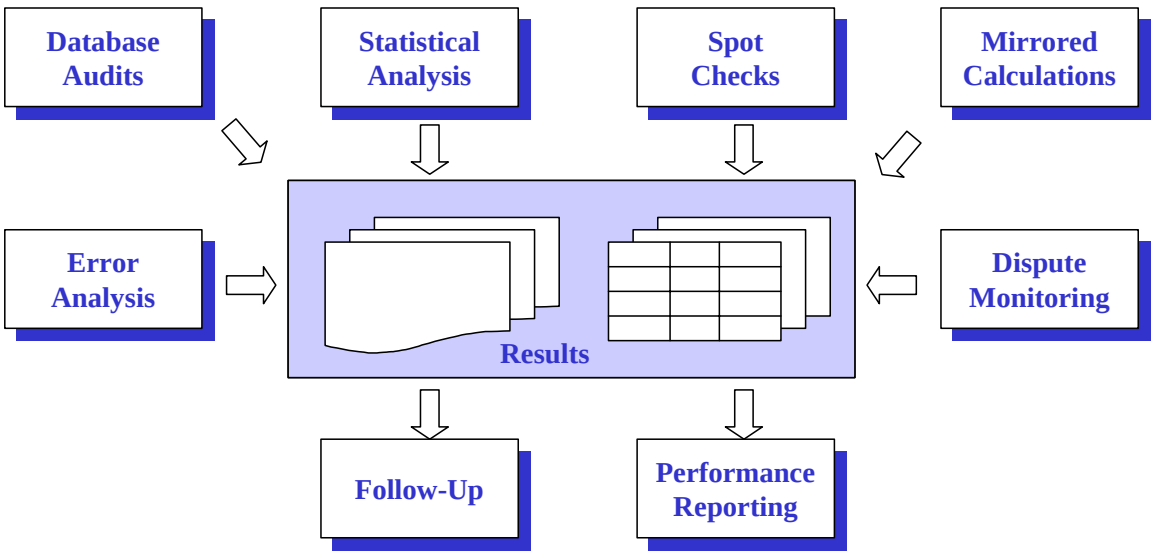
Conclusions

The revenue assurance problem is not simply one of tracking transactions from start to end. In many cases this is not practical. The next section will describe alternative ways of identifying and preventing revenue leakage, including database audits, mirrored calculations, statistical analysis and spot checks.

Solution Outline

Every carrier has a different mix of network technology, products and services, procedures and computer systems, but there is great similarity between carriers in terms of their internal functions and the revenue assurance issues they must address. Overall, the solutions are also the same.

This section describes the typical components of a revenue assurance solution for a telecommunications carrier.

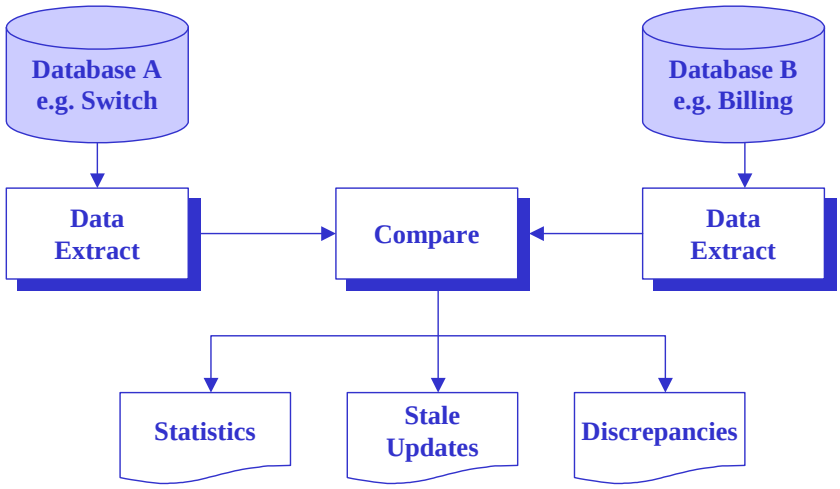


Database Audits

Database audits compare the data managed by different operational systems and by the network elements, and identify discrepancies. The operator should run database audits

routinely, perhaps once per month or once per quarter. The diagram on the next page shows a typical (simplified) audit process.

In this diagram, programs extract relevant data from two different sources. The two sets of data are then matched, producing statistics and reports on discrepancies. Because of processing delays, it is common for databases to be out of synch. However, the audits will show up revenue assurance problems in two ways:



1. Stale Updates — If, for example, a customer service is active in the switch but does not yet show in the billing system, the discrepancy may be simply due to an update delay. But if the service has been active for three months, it indicates a lost billing update.

1. Gap Creep — If, over time, the rate at which records are being added to or removed from one database does not match the rate at which corresponding records are being added to or removed from a matching database, it indicates a systemic problem.

Database audits have value independent of revenue assurance in providing a statistical view of the operator's business for planning purposes.

Database audits are essential, but may not be easy to build. One common problem is that the keys used to identify records are not compatible. Complex algorithms may be needed to match records for audit purposes. The databases may also have different scopes. One database may hold all current and pending customers while another holds only current and historical voice customers. Many problems will be encountered.

But the fact that it is difficult to build perfect database audit programs should not be seen as an obstacle to doing anything at all. It is better to throw together a rough audit program, then to refine it. Some results are better than none. Matching algorithms can

be refined. Legitimate discrepancies can be filtered out. A trial and error approach will in itself yield valuable insights into the business processes and potential causes of revenue leakage.

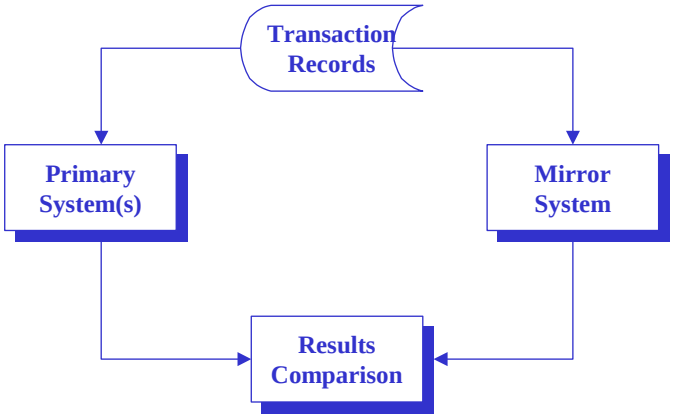
When the causes of database audit discrepancies are not clear, the revenue assurance group should lead a root cause analysis to identify the cause of the problem.

Root Cause Analysis: There are weighty books on this subject, but the essence of the approach is contained in two maxims: *Ask "why?" three times* and *Processes cause problems, not people*.

For example, if clerks are incorrectly entering billing information, the problem is not that the clerks are making errors. Why are they making errors? Are they lacking training or tools? Are they poorly motivated? Why is that? A root cause analysis is not complete until it has identified the fundamental source of problems in the process and has identified corrective actions. Fixing the symptoms will not cure the problem.

Mirrored Calculations

An excellent method of checking the billing system is to implement another system that performs the main calculations in parallel.



The mirror system does not have to include the full functionality of the billing system's charge calculation routines. For example, it may be difficult for it to replicate "friends and family" discount plans. But it should at minimum be able to replicate the base rating calculation and produce results for use as a sanity check on the primary prepaid and postpaid billing systems.

Preferably the mirror system takes the usage data from the closest point possible to the switch, so it can audit the full rating chain.

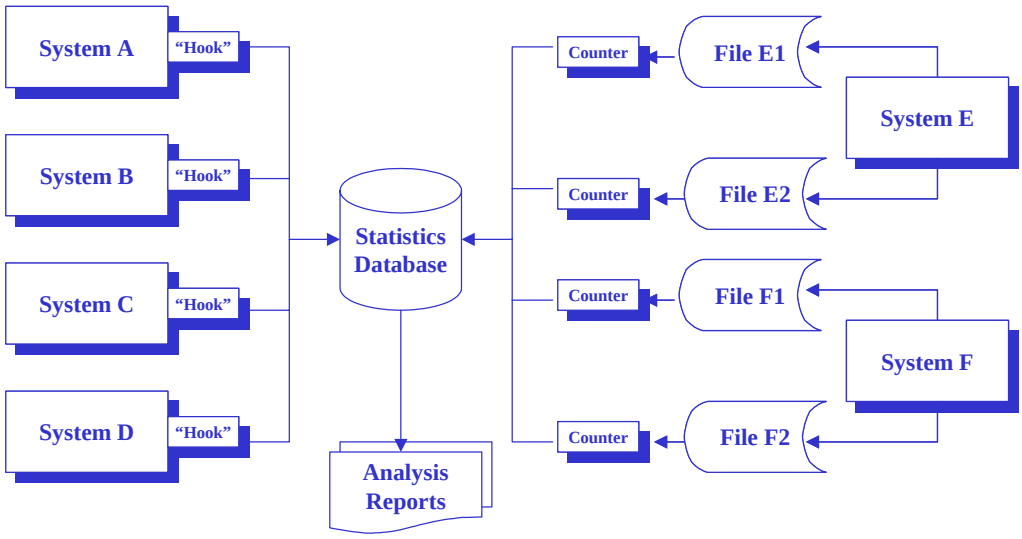
It is usually sufficient to compare results manually. When there is no ready explanation for mirrored calculation discrepancies, the revenue assurance group should lead a root cause analysis to identify the cause of the problem.

Statistical Analysis

It is usually not difficult to either modify systems to accumulate control totals as they run, writing these statistics at the end of each run, or to write small programs that scan through intermediate transaction files generating statistics. As a rule of thumb, count anything that is easy to count, even if the value for revenue assurance is not immediately apparent. Low-level statistics (e.g. number of calls for a given distance band from a given switch) are more useful than high-level statistics. They make it easier to zero on in the area where leakage is occurring.

Network Statistics: The network includes a number of useful sources of statistical information. Switches produce operational measurements or peg counts that can be used to cross-check call detail records and meter readings. Network monitoring equipment also generates data on usage volumes. Network quality measurements should correlate to levels of quality complaints from customers.

The statistics all go into a central database with a simple and flexible structure. A single table holding statistic origin, name, date, cycle number and amount will be enough to start with. Analysis programs can then run against the database.



Statistics can provide a basic check that the number of records produced by one process matches the number of records fed into a downstream process. This will catch computer operational errors: dropped or duplicate file processing, or failure to process a replacement file after a re-run.

More interesting uses for statistics include correlation, trend analysis and detection of anomalies. For example, one would expect that the weekly number of calls and the ratio of long distance calls to local calls in a given city or neighborhood would be relatively stable, although there may be slow shifts over time. A sudden change in the volumes or ratios may indicate a revenue assurance problem. A discrepancy between the ratios reported by the switch and the ratios reported by the billing system would certainly be a cause for concern.

When there is no obvious explanation of a statistical anomaly, the revenue assurance group should lead a root cause analysis to identify the cause of the problem. Even where the anomaly turns out to be legitimate, this type of analysis can provide invaluable insights into the business. The analysis programs can be refined if needed to filter out legitimate anomalies.

As soon as statistics are available from any system, they can be fed into the database and initial analysis programs developed. As more information comes available, the database will become increasingly valuable. But the key to success is to produce early results and quickly build up interest and support for extensions.

Once again, count anything that is easy to count, even if the use is not immediately obvious. The database should certainly not be limited to purely financial data. Better to have too much data than not enough.

Error Analysis

When a target system rejects data from a mechanized source there is a process problem. One system or the other is not functioning correctly, either because of logic errors, because of synchronization failures or because of incorrect configuration. If the switch reports a call but the billing system has no record of the originating number, there may well be a revenue leakage problem.

The revenue assurance group should continuously monitor error and recycling files. Simple mechanized tools may be required to help their analysis.

Some errors will be predictable, due to processing cycle delays, and will disappear when the rejected records are recycled. When there is no ready explanation of the cause of rejected transactions, the revenue assurance group should lead a root cause analysis to identify the cause of the problem.

Spot-Checks

The carrier should institutionalize spot checks – sending trial transactions into the system, tracking them and manually verifying all calculations.

There are specialized tools that can generate calls for different types of test account, recording call details independent of the switch. The testers can then compare the final invoices to the data recorded on the trial calls to check whether usage records were in fact generated and processed correctly, including correct rating and discounting.

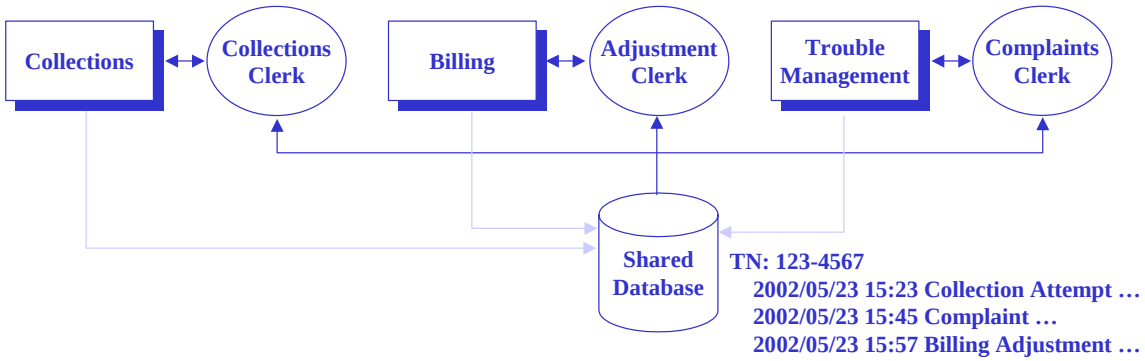
Before the carrier launches a new product, live trials should be undertaken using test accounts, and data related to the product checked from end to end. The checks are to confirm that the product can be correctly provisioned and that bills for the product can be produced accurately in a variety of scenarios. The revenue assurance group should be well-placed to conduct these tests. They will have an overview of the total information flow, they will have no stake in proving that the product is ready, and they will be experienced in running spot checks. A product is not ready for launch until the delivery and billing processes are free of potential revenue leaks.

The revenue assurance groups should also conduct spot checks on a routine basis for the service ordering and provisioning flows for different types of product, and for the trouble ticket and complaint processes. Trial accounts should be set up and allowed to fall into arrears to check on the collection process. All aspects of business operations should be subject to random sampling and verification that there are no points of revenue leakage. This will not be a popular job, but it is essential to pro-actively identify and plug points of leakage.

Dispute Monitoring

Customer refusal to pay bills and complaints about over-billing or incorrect service provide important information about process integrity. Correcting the root causes of these problems will often also correct revenue leakage problems. Customer complaints and collection activity are often related. A customer may refuse to pay their bill because they feel they have a legitimate and unsatisfied complaint. Or a customer may make complaints to provide an excuse for not paying their bill.

In almost all communications companies, the collections, invoice adjustment and trouble management (service complaints) processes are handled by different departments, with little sharing of information. A simple shared database fed by the systems supporting these departments may have quick payback in improving effectiveness.



In a sense, all complaint, adjustment and collection activity represents revenue leakage. Customers are not satisfied with their service or are refusing to pay for it. It costs the carrier money to correct the problem or collect the receivable. Better to avoid the problem in the first place.

The collections, adjustment and complaints processes require careful monitoring, correlation and root cause analysis.

Follow up

Database audits, mirrored calculations, statistical analysis, spot checks, error analysis and dispute monitoring will all uncover anomalies. Root cause analysis of these anomalies may identify points of revenue leakage. Follow-up activities have three goals:

1. To recover lost revenue where possible by adjusting invoices.

2. To prevent continued revenue leakage by correcting records, for example by updating a customer's billing records to show the services in use or disconnecting services that are not being invoiced[1].

3. To prevent future revenue leakage by correcting the underlying problem that made the leakage possible in the first place.

The line departments will often be responsible for executing follow-up activities. Follow-up may involve significant projects to implement software and/or procedural changes. The revenue assurance group is responsible for initiating, monitoring and reporting on the success of all follow-up activities, ranging from minor invoice adjustments to major projects of several months' duration.

Performance Reporting

There are two aspects to performance reporting:

[1] The value of freeing up network resources used by unbilled services may in itself be more than sufficient to cover the cost of implementing a complete revenue assurance solution.

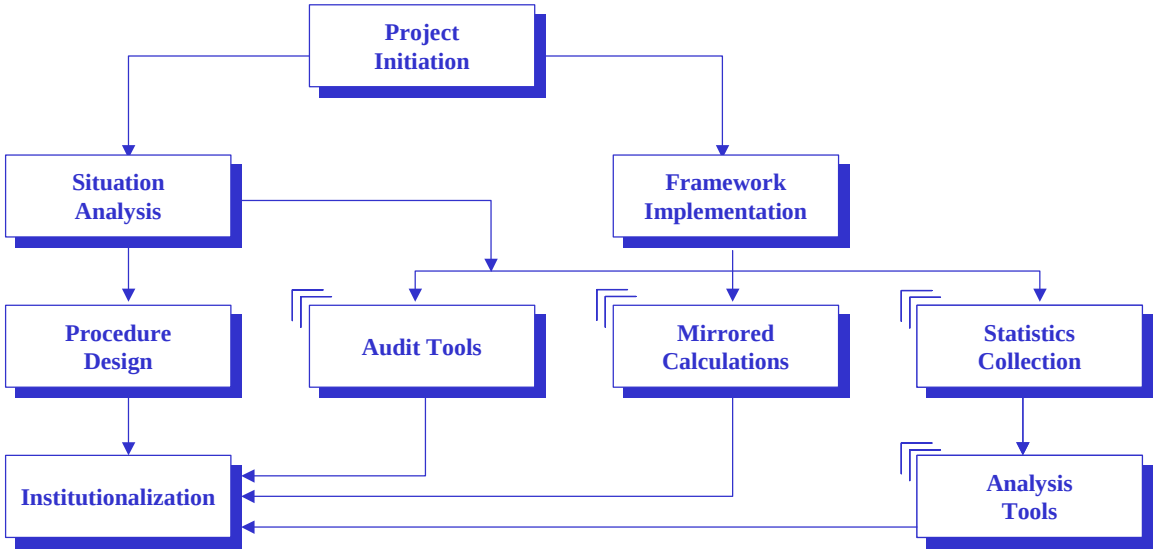
Corporate Planning The revenue assurance department will gather a wealth of statistical data on all aspects of the company's operations. The revenue assurance group should publish this information monthly for use in product planning, sales campaigns, network planning and so on.

Revenue Assurance The revenue assurance department should also publish the results of their work, outstanding follow-up actions and so on.

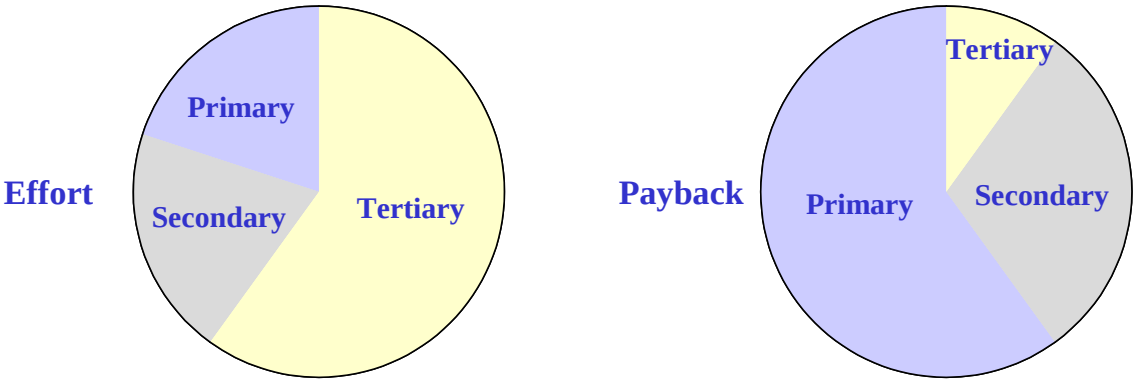
AYM Gael does not recommend exhaustive discussions over the types of published metric. It is best to start by publishing the most readily available information and then refine the output based on feedback from the recipients. There will be plenty of feedback.

Implementation Approach

The diagram below shows the main steps in implementing a revenue assurance operation.



A series pf projects will implement audit tools, mirrored calculations, statistics collection and analysis tools, prioritized based on the situation analysis. The emphasis will be on addressing the primary areas where there seems to be highest payback first, then adding coverage of secondary and tertiary areas as funding permits.



Packaged Solutions

With the growth of awareness of the critical nature of revenue assurance to a carrier's financial health, many vendors have developed generic services or software to address the problem. They include:

Consultants / Integrators	The main integrators have all adapted their generic models to meet specific telecom needs.
CC&B Vendors	All the major Customer Care and Billing system vendors provide some mix of revenue assurance products and services.
Mediation Vendors	The vendors of usage mediation software have almost all extended their products to include revenue assurance tools, usually focused on usage analysis.
Specialists	Many smaller companies provide a mix of consulting services and tools.

All these vendors provide attractive sales material and promise large and rapid returns. Although their claims may be exaggerated, they should not be dismissed out of hand. Almost any revenue assurance project will provide good payback. However, AYM Gael considers that before selecting any vendor the carrier should consider the following:

1. Most of the effort in a revenue assurance project will consist of building many small software building blocks to gather and correlate information from the existing operational systems, files and databases. The best people to do this work are the people who maintain these systems at present.

2. Although there are useful analysis tools, they will require extensive configuration or customization to match the carrier's business environment, the available information and the unique coding schemes used by the carrier. Simple SQL reports from the base information may give most of the benefits that more elaborate tools provide. The carrier should not rule out using analysis tools, but should treat claims for their benefits with some skepticism.

3. Given the broad scope of a revenue assurance project, there will be benefit to using neutral external consultants to provide overall coordination and direction. The consultants must have solid telecom revenue assurance experience. But no matter how knowledgeable the consultants are, employees who understand the unique local operational environment must do much of the detailed analysis.

4. Ongoing revenue assurance will be the responsibility of an internal department, and the nucleus of the staff for this department must be involved in the revenue assurance project from day one.

Bottom line is that there are no miracle tools, and no external consultant can do the whole job for the carrier. The carrier's internal staff must do the bulk of the work, with assistance and coordination as needed, particularly at the front end, from outside consultants with deep understanding of the industry and the problem domain.

Project Organization

A revenue assurance operation touches on almost all aspects of the carrier's business, directly or indirectly affecting many different departments. Minor software changes will be required to many operational computer systems, competing with other high-priority enhancement requests. Implementation of the revenue assurance processes will depend on obtaining buy-in and ongoing cooperation from many different groups.

The project must include full-time or part-time participants from the main departments affected, so the organization will depend to some extent on the carrier's existing departmental structure. This report provides a baseline organization assuming that only three main departments are involved:

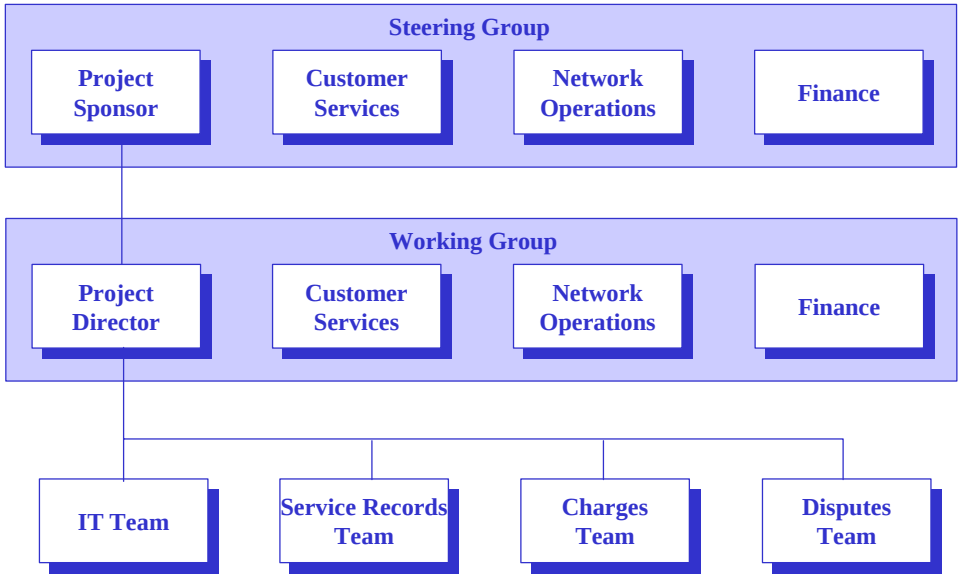
Customer Service Handles sales, ordering, account inquiries and complaints

Network Operations Handles provisioning, repair and central office equipment

Finance Handles billing, collections, settlements and financial reporting

In practice, the division of responsibilities may be different. For example, there may be a case for separate representatives for consumer and major accounts customer service, or for voice and data network operations if different groups handle these functions.

The diagram below shows a simple baseline project structure:



Steering Group Chaired by the project sponsor, the steering group meets monthly to review overall project status, to set priorities and to resolve policy issues. It includes representatives from the major affected departments.

Working Group

Chaired by the project director, the working group meets weekly to review detailed project status and to resolve issues escalated by the implementation teams. It includes representatives from the major affected departments.

Implementation Teams

Each implementation team is responsible for a specific aspect of the solution, led by a project manager who reports to the project director. Team composition will include people permanently assigned to the revenue assurance group, expert consultants and people on loan from affected departments.

The IT team handles all computer-related aspects including hardware, operational systems changes, infrastructure and reporting and analysis tools.

The other three teams are organized by major process flow, rather than by department. This is to ensure that full attention is paid to interdepartmental boundary issues, often the most common source of leakage.

These teams are responsible for mapping the process flows and identifying database audits, mirrored calculations, statistics, error analysis and spot-check requirements and for developing ongoing revenue assurance procedures.

- The Service Records team is responsible for all processes that maintain or change information about customers and their services, including sales, ordering, provisioning, network and billing system records.

- The Charges team is responsible for all processes that generate and / or calculate charges, deliver invoices and handle payments, including both retail billing and interconnect settlement from switch to payment.

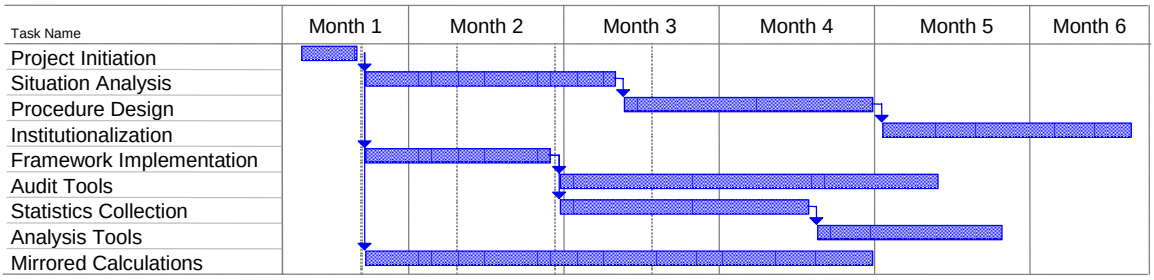
- The Disputes team is responsible for the complaints, adjustments and collections, and for identifying discrepancies, potential synergies and ongoing monitoring processes in these areas.

If an external consultant is involved, their expert staff would normally be placed in "shadowing" roles in this organization structure, working in close partnership with the corresponding project director and project managers. There is considerable value in seeding the project organization with experienced subject experts, but AYM Gael would strongly recommend that the bulk of the team members come from the carrier's internal organization.

Typical Timeline

Implementing a revenue assurance operation is an ongoing process. The first objective is to establish basic processes and supporting software to monitor the most vulnerable areas. Following that, an ongoing series of projects will extend coverage and adapt to changes in the business.

The timeline for the initial implementation will depend on availability of project resources and competing initiatives may affect it. The sample timeline for the initial launch given below is therefore for illustration purposes only. The situation analysis phase will develop a more realistic timeline.



In this illustrative timeline initial operations start about five months after project start. The critical path is defined by the time taken to ramp up the project team, conduct the initial situation analysis focusing on quick hit opportunities, design the initial set of procedures and commence operations.

Project Initiation

The project initiation phase establishes the scope, framework and preliminary schedule and resource plan for the project, brings the key players on board, prepares a preliminary business case for approval for work to start and prepares a change management plan.

At the end of this phase the carrier will have staffed up for the situation analysis and framework implementation phases, with a budget and detailed project plan for these phases. If the carrier has approved a mirrored calculation solution, the project team for implementing this solution and initial schedule will also be in place.

A preliminary schedule and budgetary estimates for implementing the primary and secondary waves of the revenue assurance solution will also be provided at this stage.

It is critical to get key influencers in the major affected departments on board during this phase. There may be emotional resistance to implementing a set of processes for monitoring people's work and reporting problems. As stated earlier, it is important to emphasize that the purpose is not to audit individuals but to look for ways to improve the process. However, some individuals are bound to feel threatened. The change management plan should attempt to address these natural concerns.

Each steering committee meeting and each working committee meeting should include a generous time allocation for discussing change management. With some carriers, contract and labor union issues have become a serious impediment to plugging revenue leaks. If the project is presented positively to the affected departments and employees and their concerns are addressed the return will be far higher than if the project is treated as a purely technical implementation.

Situation Analysis

In the situation analysis phase, typically lasting about six weeks, the objectives are to

- Develop an overall map of the business processes and related computer applications, and the information flows. Annotate the map with risk areas where there is revenue leakage potential (see section 0)

- Derive initial metrics with which to quantify the carrier's operations and compare them to industry norms. The team may need one-off software to derive metrics, and may use sampling techniques to measure the quality of critical paths in the information flow. There is no accurate information on industry norms, but a qualified consultant will be able to provide representative figures.

- Based on these metrics and industry experience, identify the primary areas where the highest return on investment is likely, and the secondary and tertiary areas. The higher the revenue volumes and the higher the risk, the higher the score.

  Categorization may be difficult. The most practical way to distinguish between primary, secondary and tertiary priorities may be to rank the problem areas, roughly estimate the effort needed to address each of the first twenty or so problems, then arbitrarily assign them to primary, secondary or tertiary based on the available budget for the first two implementation phases. Perhaps the top five will get into the primary class, the next ten will get into the secondary class and the remainder will fall into the tertiary class for later consideration.

- Develop a schedule and resource plan for procedure design, audit tools and statistics collection and analysis tools to address the primary risk areas.

Procedure Design

In this phase, the teams define and design the revenue assurance procedures. Operational procedures are required for database audits, collection of statistics and mirrored calculations. Manual procedures must be defined for:

- Statistical analysis and reporting

- Spot checks: different procedures for different types of spot check

- Error analysis
- Dispute monitoring
- Follow-up initiation and tracking

Representatives of the affected line departments must be involved in procedure definition, must approve the procedures and must be committed to supporting them.

Framework Implementation

This phase, starting as soon as the executives have funded the project, establishes the technical framework for the revenue assurance project. It includes staffing, hardware and system software acquisition, database configuration, tools selection and installation, technical standards definition and development of model subroutines and programs for statistical extracts, load and reporting.

Statistics Collection

The team will initiate a series of projects to collect statistics to support revenue assurance in the primary risk areas. Although the revenue assurance team will fund and coordinate these projects, they will normally farm out the work to the IT groups responsible for each of the source systems.

As stated earlier, the emphasis should be on gathering the low-hanging fruit. All information is useful, but any information is better than no information. If it is possible to acquire some statistics at relatively low cost and others will take longer, the team should split up the projects so they can achieve at least some of the deliverables as early as possible.

Analysis Tools

To be meaningful, statistics must be filtered, correlated and analyzed to detect trends and anomalies.

Filtering ensures that when a task is re-run, statistics from the re-run replace the statistics from the earlier run.

Correlation includes matching statistics from different processes that should correspond exactly. For example, a record count out of a mediation run should exactly match the record count from the billing run that processed the mediation output file. Correlation also includes deriving ratios between different statistics, where anomalies may indicate revenue leakages. The correlation processes may raise alarms.

Analysis typically looks at ongoing trends, looking for sudden shifts in daily statistics. Anomalies like this should also raise alarms.

The statistics will depend on the carrier's local procedures, and will only be meaningful in terms of the carrier's business model. Filtering, correlation and analysis will often be best done be specialized software tailored to the local environment.

However, it is worth investigating mechanized tools in this area. Artificial Intelligence is a term that has fallen out of favor, but some of the AI concepts remain valid. There are tools that perform large numbers of random correlations, measure the stability of the correlations and report discrepancies. Through a blind number-crunching approach they may find hidden but highly suggestive relationships between apparently unrelated bits of information. Perhaps a particular class of customer has exceptionally high long-distance calling volumes and also has exceptionally high dispute volumes. Root cause analysis may uncover new ways to save revenue.

Audit Tools

Database audit tools, comparing information from different sources, will require custom development on a case-by-case basis. As with collection of statistics, it will often be best to break down database audit projects into sub-projects. Crude comparisons will provide useful information, and can be refined later. For example, it may be relatively easy to match single-line accounts, but much harder to match multi-line accounts. If this is the case, the first version of the audit program should focus on reporting discrepancies in single line accounts, and a later refinement can handle the multi-line problem.

As with statistics, any information is better than no information.

Institutionalization

With procedures designed and the initial mechanized tools available, the permanent revenue assurance employees are trained and operations commence. Different specialists will handle different areas, such as usage error monitoring and follow-up, dispute / collections monitoring and statistics analysis.

The carrier should implement the new procedures very carefully. Change management will have been addressed throughout the project, but the strongest reaction will come from the affected line department workers at the point when they start to see their results are being checked and their mistakes analyzed, and to realize that some of the transactions they handle may be bogus, test transactions designed to measure the process.

Again, it is essential to emphasize that the goal is to look for process improvements to improve the financial health and competitive position of their company. The goal is not to look for non-performing individuals or to eliminate job functions.

Conclusions

Introduction of a comprehensive revenue assurance solution is a large undertaking, touching many aspects of the carrier's operations. It is a large job, but may be phased in to capture the main benefits as soon as possible. And the benefits may be very large indeed, ranging from 5% to 15% of total revenue.

Each project is unique. There is no generic, one size fits all solution. The revenue assurance solution for a carrier must be carefully tailored to their unique operational configuration. External consultants can help by bringing experience from other projects and providing objective opinions in controversial areas. But internal employees must do the bulk of the work, and the bulk of the software cost will be for changes to existing internal systems.

One of the most important factors in ensuring that the project is successful is early and ongoing involvement from all affected departments, and careful change management. If managed carefully, a revenue assurance project will not just increase revenue. It will promote a broader and deeper awareness of overall business processes, and will provide invaluable input to business planning.

Appendix – Commonly Asked Questions

Q. *If a one-shot audit gains many of the benefits, why go to the cost of building a permanent solution?*

A. Several reasons:

1. A lot of the work in building a permanent solution is the same as for a one-shot audit. Once the analysis has been done, the database audit programs written and the statistics collection software has been built, there is relatively low incremental cost to re-running the software and processes again and again.

2. An audit between the switch and the billing system will detect unbilled services and features, which can be corrected. But until the underlying problem has been fixed, fresh audits will continue to find additional unbilled services and features. It takes time to fix the underlying problems, and in the meantime systematic audits are needed to detect and recover revenue leaks.

3. The world does not stay still. New products, new network technology and new business approaches all introduce new potential revenue leaks. A permanent solution will detect and stop these leaks before they cause serious loss.

Q. *Why not focus on one area, such as billing, and then look at other areas later?*

A. Revenue leakage often occurs at process boundaries. A holistic approach is the only way to detect these leakages. Ordering and Provisioning may be working well, Repair is working well. Billing is working well. Treatment is working well. But millions of dollars are being lost in the cracks between these processes.

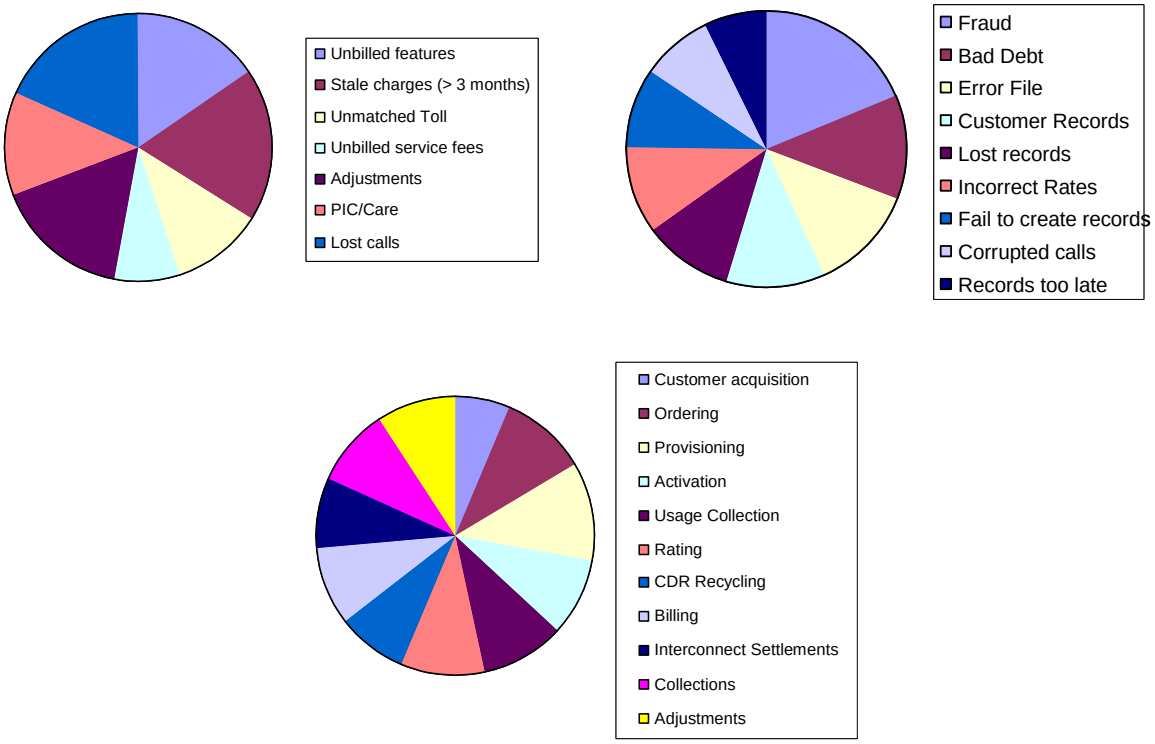
Q. *What are the top areas where revenue is normally lost? Why not focus on them?*

A. It is difficult to get hard numbers. Carriers are understandably reluctant to publish quantitative information on revenue loss. A number of surveys have been conducted by consulting firms, with results published on the internet, but results are distorted by the way the questions were asked.

For example, a survey asking how many correspondents feel they are experiencing revenue loss in each of eight areas will give an indication of where losses are most commonly known to occur, but will not show how large the losses are, and will not give any information on areas nine and ten.

The pie charts shown below are typical of survey results. At most, they indicate that revenue losses appear to be spread fairly evenly over different areas of the business and different categories of loss.

The numbers for a given carrier are unlikely to conform to the average. Each carrier has unique issues. The most that can be confidently asserted is that there will be large areas of revenue loss, and they are likely to be found anywhere.



Q. *If all the detailed work is done by in-house employees, why hire a consultant?*

A. A consultant will be able to supply people who have worked in this area for other carriers. They will be able to jump-start the process, giving informed and neutral advice on areas to be investigated, the approach and the techniques: what works and what does not work. Their main contribution will be at the front end of the project. Once the framework has been defined and the project has gained momentum, the carrier's internal employees should be able to carry it through to completion.