

A Systemic Approach for an Open Internet Billing System

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Abstract

Paper bills are now the primary channel of communication between companies and their customers. However, their potential for personalization is limited, and they are not interactive. If a customer wants to react to something in his paper bill – for example, to make a customer service inquiry or to order a new service – he must make a telephone call. Internet Billing promises far more than a new and inexpensive way to deliver billing information. Industry experts predict that Internet Billing will fundamentally change the way companies interact with their customers. Eventually, the Internet Bill will be an interactive entry to a host of additional services including customer self-care, automated sales one-to-one marketing. The Internet Bill will become the gateway through which customers and companies have electronic one to one dialogs.

The focus of this paper will be on the development and analysis of an Open Internet Billing System architecture using the Systemic Methodologies Problem Structure Methodology (PSM), Metasystem for Decision Making and Total System Intervention (TSI). Systemic Analysis considers the problem situations as systems, makes a thorough analysis on these situations and defines them in a very accurate way. The methodologies of this analysis concentrate on the human factor that is evolving in those systems and they are a very valuable tool helping us to understand and define the system functions. The results taken from the analysis give the chance for improvement, better control and error tracking in the system's structure.

Keywords :

Internet Billing, E-Services, PSM, Metasystems, TSI, Quality Improvement

1. Introduction

The concept of electronic billing is not new. Since the advent of the Internet, a small number of consumers have been using this electronic medium to pay bills online after receiving standard paper invoices via regular Postal Service. What is new in the electronic billing arena is the concept of electronic bill presentment. With electronic bill presentment, companies that send bills (billers) post consumers' statements to the Internet, enabling consumers to view the statements and make electronic payments.

The majority of consumers and billers have been slow to embrace electronic bill presentment and payment. Reasons include the scarcity of bills posted on the Internet, limited knowledge on the part of consumers, confusion over the seeming complexities of the process, and security concerns. All this is poised to change, however, thanks to innovative new technology and heightened awareness on the part of consumers, billers, and financial institutions. The statistics not only illustrate how prevalent electronic commerce will become in just a few years but, more importantly, they demonstrate how increasing numbers of consumers will begin to consider the Internet an essential financial tool, rather than just a place to send and receive e-mail.

Internet bill presentment and payment (IBPP) offers a powerful new opportunity for a business to strategically use its billing processes to sharpen its competitive edge in the Net Economy. Many corporations are currently evaluating or implementing IBPP solutions, especially firms in the financial services, telecommunications, and utilities sectors where bills number in the hundreds of thousands to

millions each month. These companies are leveraging IBPP to enhance customer care, target their marketing programs more accurately, and cross-sell products and services, while simultaneously reducing costs. With an IBPP system, customers can view, store, and pay bills using their Web browser or personal financial management software. More sophisticated IBPP systems will soon enable customers — particularly business customers — to analyze, dispute, and recalculate their bills prior to payment.

The question for large billers today is not whether to present bills over the Internet, but how to do it [3]. IBPP solution models are still evolving, but most observers agree that bill presentment must be integrated with bill payment to successfully attract customers. The service must be more convenient than and save time over existing billing and payment methods. A bill can be presented directly from a biller's Web site, or consolidated with other companies' bills and presented via an Internet consumer service provider or portal. The challenge is to ensure a sufficient volume of customers to justify the system's cost and leverage its dynamic marketing opportunities.

Focus of this paper, is to present a flexible, secure and reliable Open Internet Billing System using Systemic Methodologies. We also propose, how enterprises who establish such Internet Billing Systems, should function in order to have continuous Quality Improvement using again Systemic Methodologies. The methodologies concentrate on the human factor that is evolving in those systems and they are a very valuable tool helping us to understand and define the system functions. In the next section we present the benefits of an Internet Billing System for consumers, billers and financial institutions. In the 3rd section we use the Problem Structure Methodology to illustrate the function and workflows of the most common electronic billing models. We propose, in the 4th section, how an enterprise that establishes Internet Billing systems should operate in order to implement the right billing model in each case, using the Total Systems Intervention (TSI) methodology. We also propose in the 5th section the use of Metasystems in Decision Making and SAST Methodologies on the staff of Internet Billing Manufacturers in order to improve the quality of the systems that are being created.

2. Benefits of Internet Billing

The statistics not only illustrate how prevalent electronic commerce will become in just a few years but, more importantly, they demonstrate how increasing numbers of consumers will begin to consider the Internet an essential financial tool, rather than just a place to send and receive e-mail. As Internet continues to evolve, electronic billing will emerge as a leading-edge technology that consumers, billers, and financial institutions are expected to adopt eagerly ([2], [4], [5]). However, these three segments have profoundly different reasons for embracing electronic billing technology.

Consumers:

Convenience. Studies show that consumers spend an average of five to 10 minutes processing each paper bill. This includes retrieval, sorting, opening, analyzing, paying, conciling, mailing, and filing. Depending on the number of bills received by a consumer, this process can take up to two daunting hours on a monthly basis.

Easy. Conversely, electronic billing offers consumers an easier way to access, manage, and process bills — with little more than a mouse click. With electronic billing, bill payment is easy, fast, and efficient. Moreover, personal financial management software, such as Intuit's Quicken and Microsoft Money, offers an excellent tie-in with electronic billing for managing personal budgets, conducting business with discount brokerages, and tracking investment accounts online. Finally, electronic billing carries no cost for postage and, potentially, no charge for conducting transactions.

Billers:

Low Cost. The most obvious appeal of electronic billing for billers is cost. Electronic billing promises to significantly reduce or eliminate costs for paper and postage. Additionally, billers anticipate savings in payment processing and remittance of bills. With paper bills, payment processing and remittance are time-consuming endeavors that require handling thousands of envelopes and checks each day. Electronic billing, however, enables money to be exchanged electronically, thereby eliminating the most laborious aspects of bill processing.

Increased Functionality and Time Savings. From a customer service perspective, billers will embrace electronic billing to differentiate themselves from their competitors by providing high-end customers with increased functionality and time savings. This is especially true in the high technology arena, where billers want to be perceived as forward thinking, technologically savvy companies. Similarly, billers realize that making the bill payment process easier and faster for the average consumer enhances the perception of good customer service.

New Marketing Strategy. With electronic billing, a consumer's entire billing account record, historical and current, is stored in a database. This data can be downloaded and analyzed to determine demographic information, buying patterns, consumer preferences, and other information of potential use in marketing. An added bonus is that electronic billing can enable billers to track how many and what types of consumers access electronic inserts and banner ads. This capability can provide billers with even more detailed marketing information for targeting consumers and increasing revenues.

Financial Institutions:

Maintaining Market Share. Keeping abreast of the latest developments in electronic billing technology is critical to the financial industry. Banks have always “owned” consumers in the arena of bill payment; indeed, enabling consumers to pay bills has been one of their primary functions. As consumers look to new delivery channels, banks will need to find ways to maintain their market share and product differentiation. Banks face stiff competition from billers and other companies competing for electronic bill presentment and payment transactions.

Gain Customers. However, financial institutions can strengthen their relationships with customers by providing this new, technologically savvy delivery channel. Through electronic billing, banks increase marketing opportunities while decreasing processing costs and associated errors. Other benefits include the potential for greater transaction volume, competitive advantages, and new sources of revenue. Finally, banks can post their own bills and statements online, thereby receiving payments more quickly and eliminating postage and handling expenses.

Quality Improvement. Banks stand to streamline their internal operations and increase their value to customers by adding such state-of-the-art services as online banking and bill presentment and payment. To provide these services, financial institutions can either compete against or partner with high technology companies looking for a piece of the electronic billing pie.

3. Illustrating Electronic Billing Models using PSM

Despite its widespread appeal, the implementation of electronic bill presentment and payment is fairly complex. In the paper statement world, all bills circulate through the regular Postal Service and are delivered in mailboxes. Electronic billing lacks a standard method of distribution. In fact, several organizations are competing to act as the “post office” for these bills. Naturally, all of these digital post offices require data in different formats using different software. There are currently three options, commonly called the “models” of electronic billing: the Direct Model, the Consolidator Models and the Invited Pull Model ([2], [7]). Each model requires different formatting, a different infrastructure and software and gives the biller varying degrees of control. Each model is described and defined below using the Problem Structuring Methodology (PSM) of Systemic Analysis.

PSM methodology is used, in order to illustrate and define better the models' structure. Namely, Subsystems and Individuals that are participating in the models are being represented as well as their *relations* (communications) and workflows. A code number follows every subsystem or individual that is being presented in Figures in the description below, as well their possible communications with other subsystems or individuals. In the models' PSM Representations, Figures, communications are shown with arrows and their kind is shown using letters, as defined in [1].

Direct Model. In the Direct Model, the customer deals only with billers. That is, there is no "consolidator," as there is with the other models, only billers and customers [2].

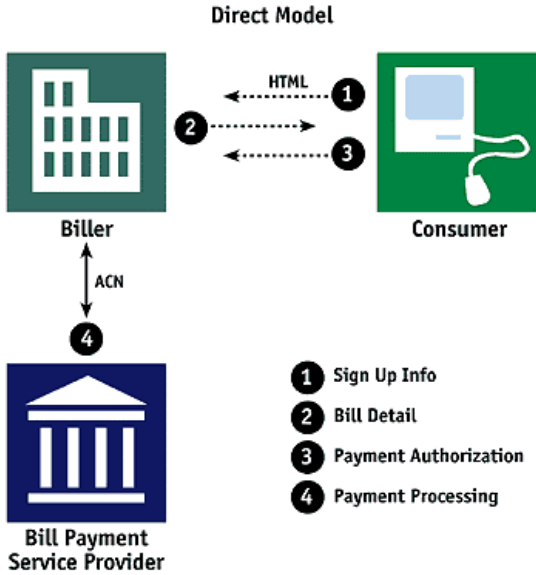


Figure 1. Direct Mode. (source: <http://www.justintime.se-com.com/whitepaper>)

This model is depicted in Figure 1. Note that all interactions between billers and the customer use HTTP, a standard internet protocol. The numbers identify a typical sequence of events. (1). The customer (*III*) begins by signing up with help of his PC (1*S*) at each biller Web site to receive and pay bills. 2. Later, billers send detailed bills to the customer. (3). To authorize bill payment (2*S*), the customer presses the "pay" button on each bill. Finally, (4) billers (22*S*) send payment transactions (222*S*) to bill-payment providers (221*S*), who (5) execute the movement of funds through the banking system and (6) notify the billers that they have done so. Billers post this information to their accounts receivable systems. Workflows in this model are apparently good, therefore in Figure 2. there are arrows marked with C and G meaning good communications as defined in [1].

This model enables a biller to establish a direct dialog with customers, so it does serve biller needs. However, it does not provide the consolidation that household and small business customers demand.

It should be noted, though, that this model can work well for medium and large business customers. Recall that these customers care less about consolidation than the smaller customers. So, billers should make sure that their Internet billing approach enables them to implement the Direct Model for their medium and large business customers eventually, even if they are not doing this at the outset. The Individuals and Subsystems of the Model are shown in Tables, according the Semantics of Systemic Analysis [1].

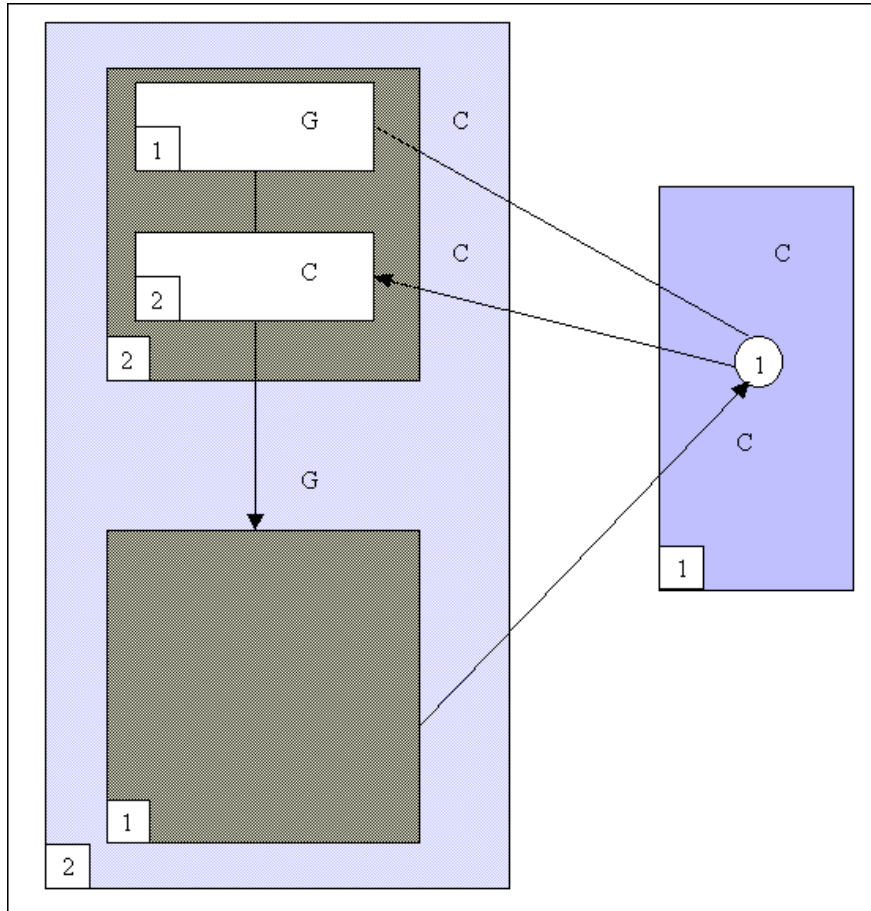


Figure 2. Applying PSM in Direct Model

Table 1. Subsystems and Individuals of the System's Catalog

<u>Type of Coding</u>	<u>Individuals</u>
11I	Consumer
<u>Type of Coding</u>	<u>Subsystems</u>
1S	Consumer's PC
2S	Electronic Payment
21S	Internet Billing Service
22S	Billers
221S	Billing Department
222S	Electronic Transactions Department

Table 2. Communications' Matrix

			1	2	3	4	5	6	7
			1	4	5	6	1	2	3
1	11I	{1}						C	C
2	1S	[4]							
3	2S	[5]							
4	21S	[6]	C						
5	22S	[1]							G
6	221S	[2]	C						
7	222S	[3]	C					G	

Thick Consolidator Model. In the Thick Consolidator Model, the biller sends all Internet billing information to a third party, i.e., a consolidator. The consolidator is the single point of interface for the customer [2].

The most prominent examples of the model come from MSFDC and Check Free. Both of these companies implement a proprietary interface between the biller and the customer. This approach is shown in Figure 3.

The sequence of events is as follows. (1). The customer (*11I*) begins by signing up to receive and pay bills from multiple billers at the consolidator's Web site. (2). The consolidator (*22S*) sends sign-up information to every biller (*21S*) for which the customer has signed up. When the customer's bill cycle comes up at each biller, (3) that biller will send bill detail information (i.e., the entire content of the bill) to the consolidator. Then, the customer logs on to the consolidator Web site, views a list of his bills, and requests detailed bills. (4). The consolidator serves detailed bills to the customer at the customer's request. The customer can select one or multiple bills to pay, and then (5) send a payment authorization for those bills to the consolidator. (6). The consolidator executes a payment processing session with a bill-payment provider (*222S*). Once the consolidator receives positive notification from the bill-payment service that the payment (*2S*) has been processed, it sends payment notification to the biller. Finally, the biller posts this information to its accounts receivable system (*23S*). Workflows in this model are also good. Good communications are shown with arrows marked with C and G in Figure 4.

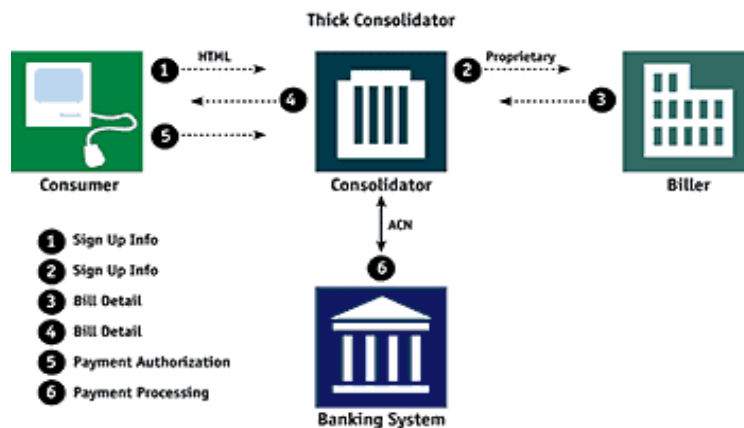


Figure 3. Thick Consolidator Model (source: MSFDC and CheckFree)

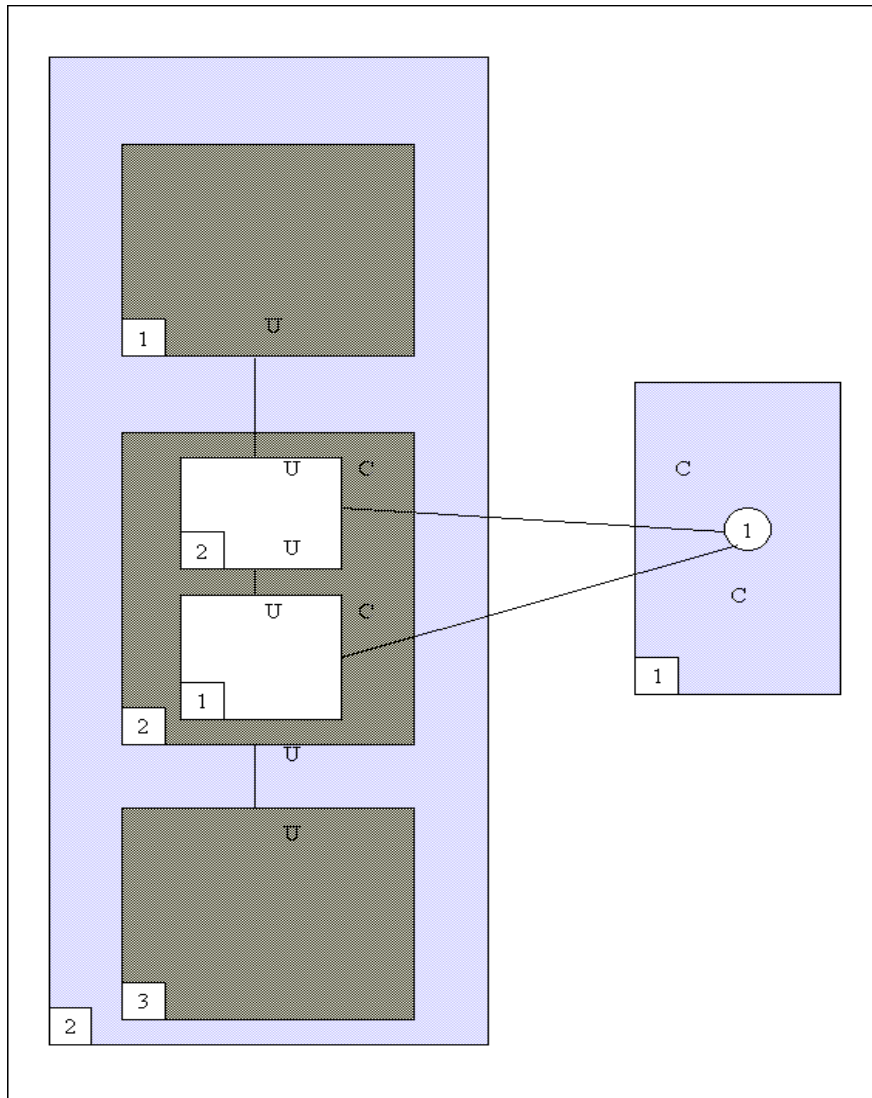


Figure 4. Applying PSM in Thick consolidator Model

Table 3. Subsystems and Individuals of the System's Catalog

<u>Type of Coding</u>	<u>Individuals</u>
11I	Consumer
<u>Type of Coding</u>	<u>Subsystems</u>
1S	Consumer's PC
2S	Electronic Payment
21S	Billers
22S	Consolidator
221S	Billing Department
222S	Bill Collector Server
23S	Banking System

Table 4. Communications' Matrix

			1	2	3	4	5	6	7	8
			1	4	5	6	7	1	2	3
1	11I	{1}						C	C	
2	1S	[4]								
3	2S	[5]								
4	21S	[6]							U	
5	22S	[7]								
6	221S	[1]	C						U	U
7	222S	[2]	C			U		U		
8	23S	[3]						U		

Thin Consolidator Model. In the Thin Consolidator Model, the biller sends only a bill summary to the consolidator. The consolidator sends this summary to the customer as part of a bill list. However, direct interaction between biller and customer is still maintained: when a customer requests a detailed bill, he retrieves this real time, directly from the biller [2].

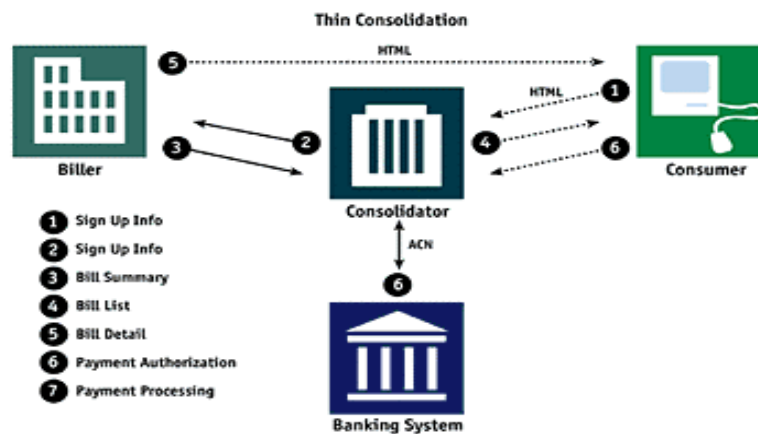


Figure 5. Thin Consolidator Model

(source: <http://www.justintime.se-com.com/whitepaper>)

Thus, this model can be thought of as a hybrid of the Direct and Thick Consolidator models. Figure 5 shows the most common implementation of this model. This particular implementation is the Open Internet Billing Model. The sequence of events is as follows. (1). The customer (11I) begins by signing up to receive and pay bills from multiple billers (21S) at the consolidator's Web site. (2). The consolidator (22S) sends sign-up information to every biller for which the customer has signed up. When the customer's bill cycle comes up at each biller, (3) that biller will send a bill summary file to the consolidator. Then, the customer logs from his computer (1S) on to the consolidator to see his Internet bills, and (4) he is presented with a bill list, which includes biller, amount due, and date due. The customer can then click on entries on the bill list, which prompts (5) an individual biller to serve its detailed bill to the customer. The customer can select one or multiple bills to pay, and then (6) send a payment authorization for those bills to the consolidator. The consolidator executes a payment processing session (2S) with a bill-payment provider. Once the consolidator receives positive notification from the bill-payment service (222S) that the payment has been processed, it sends payment notification to the biller. Finally, the biller posts this information to its accounts receivable system (23S).

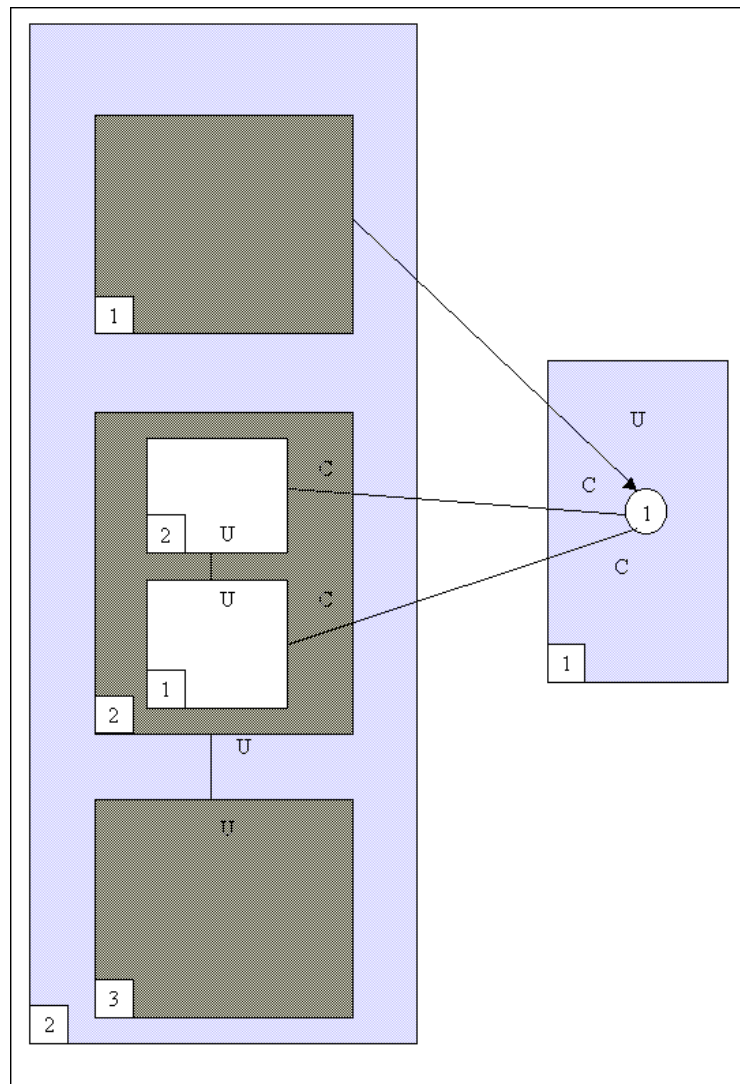


Figure 6. PSM in Thin consolidator Model

Table 5. Subsystems and Individuals of the System's Catalog

<u>Type of Coding</u>	<u>Individuals</u>
11I	Consumer
<u>Type of Coding</u>	<u>Subsystems</u>
1S	Consumer's PC
2S	Electronic Payment
21S	Billers
22S	Consolidator
221S	Billing Department
222S	Billing Collector Server
23S	Banking System

Table 6. Communications' Matrix

			1	2	3	4	5	6	7	8
			1	4	5	6	7	1	2	3
1	11I	{1}					C	C		
2	1S	[4]								
3	2S	[5]								
4	21S	[6]	U							
5	22S	[7]								
6	221S	[1]	C						U	U
7	222S	[2]	C					U		
8	23S	[3]						U		

The Invited Pull Model. Sometimes referred to as the personal consolidation model, the Invited Pull model enables consumers to receive and consolidate bills directly on their desktops using an easily downloaded software application [6]. The Invited Pull approach operates through a subscription structure. The consumer indicates to his service provider, such as the phone company, that he would like to receive and pay bills electronically. Once this communication has been established with each respective biller, the consumer is able to receive multiple bills and statements in one location— on the desktop.

The Invited Pull model is not without obstacles. First, unlike either the Biller Direct or Consolidator models, this model requires that consumers download and manage a specialized client software application— something many consumers are loath to do, preferring instead to use a standard Web browser as seen in [7]. Furthermore, consumers must prompt the software to find bills. With other models, bills are readily available for viewing and payment on either the billers' or the consolidators' Web sites.

4. Establishing an Internet Billing Strategy using Total Systems Intervention

As a result of the variety of models available, different consumers will choose different methods to receive their bills. This variation can be extremely costly and complicated for billers who may want to deliver through multiple models [7].

Selecting the appropriate IBPP model poses critical challenges for billers considering IBPP. In defining their strategies, billers need to analyze their data-control policies, customer profiles, customer service objectives, and marketing goals. They need to consider resource constraints. For the high-tech industry, the real challenge is to offer IBPP products and services that balance billers' needs for security, transaction control, and control of the customer relationship with the customers' overriding need for privacy and convenience. The system must be sufficiently compelling to attract customers away from traditional billing models. We propose the use of Total Systems Intervention Philosophy (TSI) [1] in the way an enterprise that constructs Internet Billing Models functions, in order to achieve two major goals:

- Establishing the appropriate Billing Strategy for a certain case
- Evolving and Optimizing the IBPP products and models

Total Systems Intervention (TSI) represents an approach to planning, designing, “problem solving” and evaluation. The process employs a range of systems metaphors (machine, organic, cultural and political) to encourage creative thinking about the organisations and the difficult issues that managers

have to confront [1]. These metaphors are linked through a framework “system of systems methodologies”, to various systems approaches (here we are using SAST and Metasystems), so that once informed agreement is reached about which metaphors most thoroughly expose an organisation’s concerns, an appropriate systems methodology will guide “problem solving” in a way that ensures that it addresses what are found to be the main concerns of the particular organisation involved.

The three phases of TSI are labelled “creativity”, “choice” and “implementation”. We shall consider these in turn, looking in each case at the task to be accomplished during that phase.

- In the creativity phase, the managers meet to discuss and determine the type of IBPP needed for a specific case according to the needs of billers and standards of the market. Terms like Consumer Convenience, Easy Access, Time Saving, Privacy, Security and Reliability are considered by the managers and specialists of the enterprise in order to create the appropriate Internet Billing Model for every case. Several models are being created and presented.
- In the choice phase, an appropriate systems-based intervention methodology (here a set of methodologies) are chosen to suit particular characteristics of the organisation’s situation as revealed by the examination conducted in the creativity phase. Here the use of SAST and Metasystems in Decision Making help the managers of the enterprise to make the right choice of the structure that suits their needs and their customers’ needs.
- In the implementation phase, systems methodologies are employed to translate the IBPP product created, its structure, and the general orientation adopted to concerns and problems, into specific proposals of change. Then we test and evaluate it, so as to verify that our choice was appropriate. All these steps are followed in a repetitive manner, till the desirable outcome is reached (Figure 7).

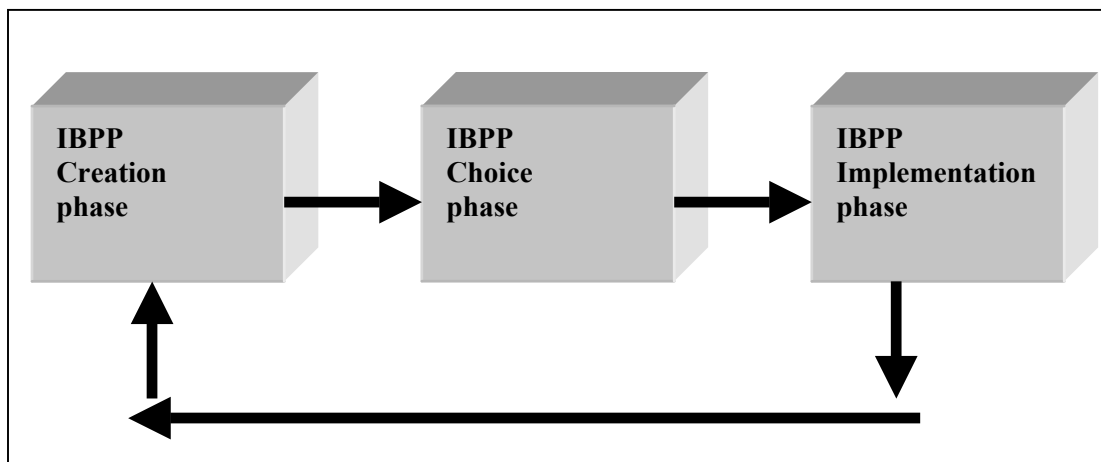


Figure 7.TSI Philosophy on IBPP Models Implementation

5. The Use of Metasystems during the Choice Phase of TSI

As mentioned in the previous chapter, during the Creation phase of the IBPP in the TSI methodology, the managers meet to discuss and determine the type of IBPP needed for a specific case according to the needs of billers and standards of the market, as well as how they can improve these models. For good decision making and the for the strategic design of how the IBPP constructing Enterprise should evolve and manufacture their models we use the Metasystem Approach in Decision Making [1].

We propose the formation of committee, composed of persons very experienced in technical security, technology and protocols matters. We call this group: ‘Strategic Alert Committee’. Administrative and financial executives also participate in this committee. This committee values all existing models for their reliability, easy access and security. Controls and values the work of the Technical Staff of the Enterprise that creates the IBPP models and consults the Staff for further activities or changes. The committee coordinates, gives directions and advise the General Manager of the Enterprise on what he should do for example on efficiency or reliability matters.

According to this approach a control system C, consists of the controlled system CS and a controller CR. The behaviour of the controlled system is affected from the environment and control activities of the controller. In this case the CS is the whole Manufacture Process of the IBPP products, while the CR are the Manager of the IBPP Enterprise and the Technical Staff of the Enterprise. There is also the concept of meta-controller MCR, who exercises meta-control to the controller. This means that he interferences and helps to the structure of the decision-making procedure. The system of MCR and CR constitute a new meta-control level. CR is the new controlled system CS’ of the meta-control level. Meta-control is the control of the control, meaning the directed change of the controller which aims to improve its control.

It is suggested, in this case, the role of MCR must be assigned to the ‘Strategic Alert Committee’ (Figure 8). The ‘Strategic Alert Committee’ should not make decisions but advise and direct the way the Managers make decisions. **Aim** of this step is that the ‘Strategic Alert Committee’ should observe the inner and outer environment of the enterprise and give directions on what the enterprise should do following or forecasting the Market and the Technology Evolutions. This way the enterprise can continuously value and improve their IBPP products.

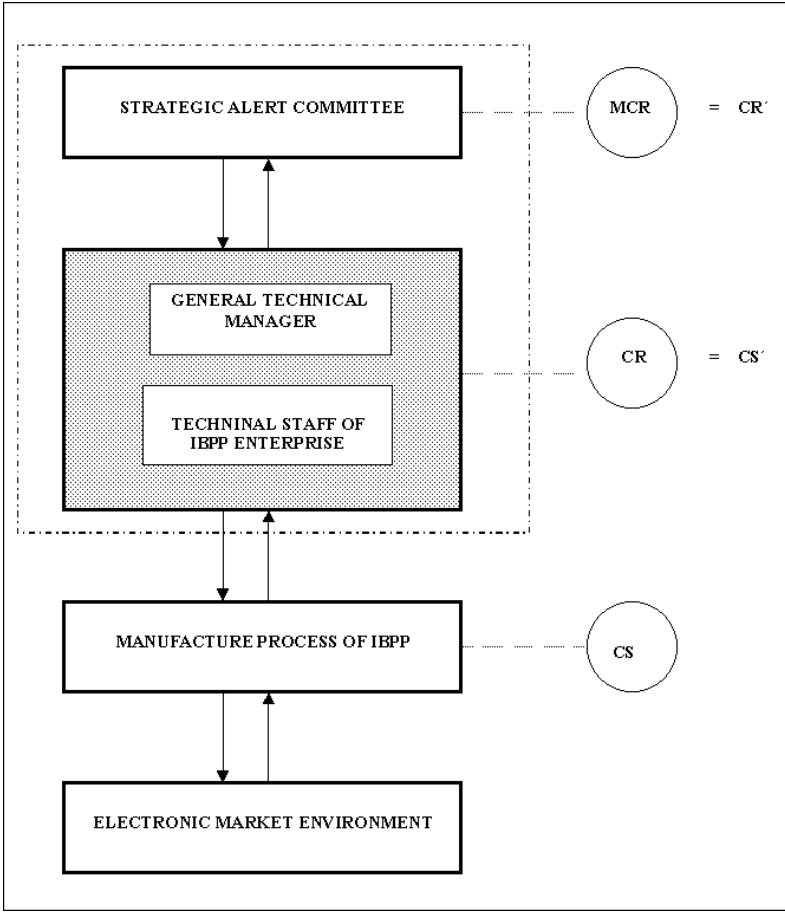


Figure 8. Metasystems in Decision Making

6. The Use of SAST among the Technical Staff of the IBPP Enterprise

In order to achieve the continuous improvement of the Internet Billing models and to make a successful strategic design on what IBPP policy should be used, SAST systemic methodology is proposed [1].

SAST is a dialectical methodology that achieves composition through arguments among its participants. SAST methodology has four stages:

- Formation of groups.
- Assumption formation.
- Dialectical conversation.
- Composition.

In this methodology, the participants will be the members of the Technical Staff of the Enterprise. The first phase of SAST is the Formation of groups. The groups that will participate are the General Manager, the project leaders, the programmers, the systems analysts, cryptography and the security experts. The existence of a systemic analyst who will coordinate and overview the whole application of SAST is also proposed. Aims during the process should be:

- Strategic design of the IBPP policies
- Continuous Improvement of Internet Billing Products
- Evaluation of the process of the project

During the discussion all groups present their strategies and they accept questions from the other groups, which they have to answer. After this conversation, each group should think about the adjustment of their assumption as long as there is a progress on the strategy. The new strategy should be born by the old ones and be even better than them.

SAST is a dialectical methodology and such methodologies cannot always give the desirable results. Good faith from all the participants is the key element for the goals achievement of SAST. The principles and the philosophy of SAST are the only guarantee for their success. However the use of these systemic methodologies has given results in similar problems at the past [1].

7. Conclusions

This paper focuses on the benefits that can be gained through Internet Billing Presentment and Payment (IBPP). PSM Systemic methodology was used in order to analyse and define the main Internet Billing Models. SAST, Metasystem for Decision Making and Total System Intervention (TSI) methodologies are being used to establish optimal Internet Billing Strategies and to reassure continuous improvement of IBPP products. The methodologies concentrate on the human factor that is evolving in those systems and they are a very valuable tool helping us to understand and define the system functions. The results taken give the chance for improvement, better control and error tracking in the system's structure.

Through Internet billing, billers can streamline their processes, enabling more convenient communications with customers while reducing errors and the cost of the payment processing and bill delivery operations. A higher level of process integration can also be achieved ,creating a more dynamic and flexible environment. In the long run this improves service quality ,reliability and ease

of payment, which together will improve competitive positioning while facilitating better customer service.

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