Card payment systems, particularly those originating from the infrastructures of Anglo-American banks, generally require extensive adaptation work before they can be used in the banking systems which have been developed in Europe. The flexibility required for integration is missing, particularly for the extension of account maintenance, because of the requirements of national legislation and the use of facilities which are specified centrally.

Card management systems are autonomous and homogenous in principal but not open

Card management systems are logically supposed to cover all the functionalities associated with the card as a product. This begins with the production and administration of the product itself and is extended to cover the processing of payment transactions generated by the use of the card, the maintenance of the account and the settlement of all posted payment transactions. The precondition for such functionalities is a complete software and system environment for a payment and posting system such as that which already exists in every banking system today. This is the only way in which a card management system can be run independently and autonomously. This functionality also forms the basis for the so-called "processors" who specialize in providing this service on an autonomous basis. At the same time, however, this also requires a large number of widely varying data interfaces to the banking systems, in which the customer – in this case the card holder – is managed within the core operations of the bank. This is the framework that has become established to date within the banking environment that has developed in Europe, and differs to the system operated where card management itself forms *the* original core banking service.

Card management is not yet integrated in banking systems

Card management is today offered as one of the services provided by banks – but in many cases it is not always the most important one. This may go some way to explaining why the functionalities for a card management system have not been integrated in most European banking systems since their establishment at the same level of intensity as in countries where the card payment mentality actually originated. At the same time, however, it should also be borne in mind that at the time the European banking systems were established, and they are still in use today, card payment infrastructure was not accorded this level of importance. The banking world has concentrated instead on a debit card which is strictly tied to a current account, with the diversity of card products and associated account maintenance options not given the same level of importance in in-house banking systems.

Card management systems often lead to double processing

Over recent years banks have been giving increasing consideration to offering bank customers much wider product services, homogeneously integrated as far as possible in the in-house infrastructure. Card management, however, frequently remains independent because of a separate processing infrastructure. Contributory accounting units are set up, customer bases are held on a double basis, data communications synchronize suspense account balances and ensure that processing work which is required by law is carried out. Credit interest in dedicated posting machines does not necessarily lead to simplified handling of the bank's customers. German banking law provisions require that each bank has to have a system of comprehensive synchronization of operative account balances. It is not possible to link card account payment flows to automated clearing systems because the card accounts cannot be addressed.

PSX[2] makes card management an integrated bank service

Card business is an original area of banking business and interest in offering bank customers all products in a *single* environment is growing. However, banks will understandably have little interest in adding a second posting system with its own account maintenance system, invoicing generation and master data management to the software system already integrated – but this is unavoidable if a card management system in its conventional form is used. Card management systems form a unit consisting of many components, most of which are already available in a banking system anyway, such as account maintenance in all its forms, the management of master customer data, the production of account statements in paper form or electronic form via the Internet, integration in accordance with German banking law, direct debit mechanisms, etc., which are all perfectly covered by the banking system. Implementing a card management system in a banking environment is highly complex because it is associated with an integrated strategy, which generally runs contrary to the German credit system. In countries where infrastructures have been developed on the basis of historically different legislation the banking systems that have developed are also different and there is a different attitude to the way in which bank customers are to be treated. And since card management systems have seldom been designed on a partial or modular basis, their functionalities are not capable of adaptation separately from one another.

PSX[2] supports existing banking systems for issuing processing

Integrative card management with PSX[2] forms an extension to the banking system by providing the auxiliary systems and facilities required for the card payment systems in a form which is open for the user-defined design of the products and the processing of associated payment transactions. In most cases the banking system will only be lacking the following systems and facilities, which can be supplied by the PSX[2] components:

- A certified link for accepting the payment flows from worldwide card payment systems (e.g. MasterCard, VISA, JCB).

- A settlement system for the daily payment of the transaction purchases by transaction suppliers.

- The means of charging back unauthorized transaction debits to the card customer.

- A component for card product design and card production and the management of both.

- A component for the pricing of product features and associated postings.

- The means of influencing the authorization of card payment transactions.

Modern banking systems meet the requirements of account management for card management systems

Modern banking systems already have the bookkeeping and accounting components required for card management. As long as these can be configured or adapted as required, there is no need for either contributory accounting units or separate account maintenance systems, statements, data synchronization required in accordance with German banking law, or anything else.

On the assumption that the banking system has a functional modularity, the following functionalities will be able to be used more effectively and already form an integral part of a central processing system which can also be used effectively for card management:
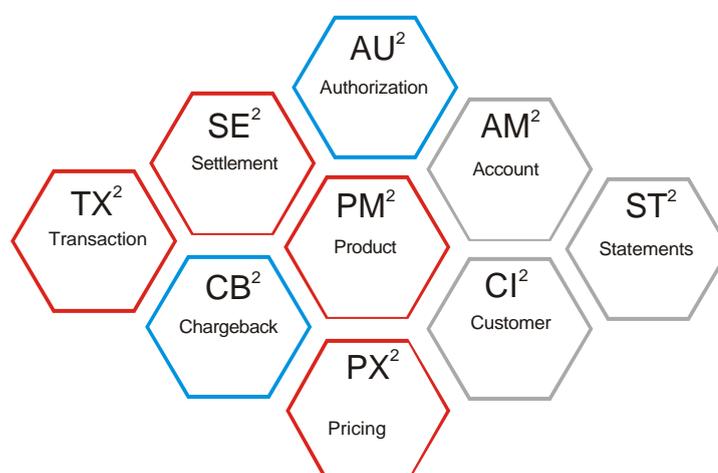
- Posting and account maintenance with credit balance interest and loan interest in diverse alternatives

- Production of account statements and access to accounts in every existing form

- Administration of customer addresses and master data

- Facilities for notifications required under German banking law

- General bookkeeping department

- Taking account of central declarations of non-liability for interest discount tax

- Reporting and archiving facilities

- Use of in-house cashpoint infrastructures

- And many more.

PSX[2] can be implemented either on a partial, adaptive basis or as a complete system

The development of PSX[2] represents a new generation of functional components for a (card-based) payment system. The main considerations here are:

- Payment system functions that in technical terms are depicted on a modular and autonomous basis

- Individual integration in existing bank applications

- Implementation which is scaleable and independent of the target platform

- Separation of the addressability of the card and the account

- Client capability for national and international regulations and currencies

PSX[2] provides an extension to your **banking system** to enable it to be linked to international payment systems, is compatible with systems from our **partner eps**, or performs the card management function fully autonomously with all components.

AU[2]
Authorization

SE[2]
Settlement

AM[2]
Account

TX[2]
Transaction

PM[2]
Product

ST[2]
Statements

CB[2]
Chargeback

CI[2]
Customer

PX[2]
Pricing

PSX^2 supports additive components where there is no predefined functionality in existing banking systems.

LD^2	XD^2	RP^2	FT^2	SI^2	IB^2
Letter Distribution	External Data	Reporting	Funds-Transfer DTA	Statistics	Invoicing Billing

A hexagon component is defined as an autonomous and demarcatable organizational and technical unit of a functionality required for the card management system.

TX^2 – Transaction

For communication with the international networks of the card payment systems for the receipt and return transfer of payment transactions (compliance interface). Completion of the administrative tasks associated with a monetary transaction, and the archiving of those tasks. Monitoring measures for the consistent and correct receipt of payment data. Provision of payment transactions for further processing. Reporting and running of ledgers for receipt values.

SE^2 – Settlement

Settlement of a transaction purchase with the card payment system. Further calculation with or without the calculation of advance financing subject to interest for other affiliated institutes. Audit-proof verification of sums accruing daily in dependency on settlement dates with the card customers. Support of a 3-level method of settlement by means of *primary*, *secondary* and *tertiary settlement*.

PM^2 – Product

Definition and administration of the card product. Specification of product features and the handling and processing of the monetary transactions generated by the product. Assignment of an account link and the type of payment flow handling required for the purpose. Implementation of card embossing and other services required for the product.

PX^2 – Pricing

Periodic or one-off charging for product features, quantity-based product use, or service provision for the card holder or a bank customer. Staggered pricing system with credit entries and historic verifications of charges. Possibility of allocating debit and credit entries to different accounts.

CB^2 – Chargeback

Chargebacks in card management are subject to regulated agreements. The are completed in accordance with the relevant regulations and processed in bookkeeping terms between the card system, settlement and customer account. Authorizations and deadlines are monitored automatically and the card holder is kept informed of all activities in writing.

AU^2 – Authorization

Each payment transaction with a card is authorized and is monitored for each card holder either on a periodic or daily basis with reference to up-to-date card and account limits. The authorization process is checked on the basis of ad-hoc configurable rules to

enable action to be taken in case of known or identifiable irregularities (fraud). Where authorization is given this leads to a comparison with incoming transactions for limit control.

AM[2] – Account

A posting system which meets the requirements of account administration for different products. Account administration which takes account of German banking law requirements and permits the production of reports for different types of account (e.g. current account, credit account, savings account, suspense account). Periodic settlement, link to local and national clearing systems and to the general ledger of the institution. Access for the bank customer with the type of secure access typically offered by banks and link to bank systems for the issuing of account statements.

CI[2] – Customer

The master data for each bank customer is used for contacting the card holder for sending cards or bills by post or for diverse addressabilities. They contain the central storage of personal details and interdependencies in hierarchical connection within family-based or company-based assignment.

ST[2] – Statements

Card account invoices or statements support product-related special features where there is a requirement for the preparation of verifications which are related to each other (details in company invoices, verification of an original and a copy invoice in dependency on the payor). Controllability also impacts on addressability and layout design with detailed verifications. Invoices or statements are issued either on paper and then dispatched and/or made available for viewing by means of Internet browser.

LD[2] – Letter Distribution

Advertising material, changes to contracts or product information can be sent either in the form of in-house letters or printed as supplementary text on card account statements or included as enclosures with statements. The selective controllability of this information according to customer groups, products or product features is a key functionality of "card business" to make it attractive for the bank customer and to increase card use.

XD[2] – External Data

PSX[2] requires, among other things, data communication with other *external* systems. For PSX[2] data which are updated internally on a periodic basis or which are required to be sent to external sources, a single standard interface is used. The special feature of this interface is its data and code conversion and the fact that it accounts for heterogeneous file structures, systems and functionalities.

RP[2] – Reporting

Preparation of verifications which audit-compatible. Reports on paper, processing data for the external preparation of layouts, archiving of reporting data in accordance with statutory archiving periods. Flexible controllability permits the specification of diverse final destinations of the processing records according to a 3-level classification, the production of copies of reports, or the diversion of reports to other final destinations.

`FT`[2] **– Funds Transfer**

Receipt or transfer of monetary values from/to other banking systems, with full accounting control. Time-controlled processing rules, with information links in conformity with German banking law. Formatting of data structures to meet the requirements of standard data communications formats.

`SI`[2] **– Statistics**

Support of marketing activities for product design on the basis of historic information gathered over several years. Preparation of concise management reports on the actual use of the products. Production of comparisons for person groups and regional customer segments.

`IB`[2] **– Invoicing / Billing**

The invoicing of services to third parties is based on the client-based determination of quantities in respect of events and activities. This requires the provision of services capable of verification by means of data elements and which can be invoiced at periodic intervals on the basis of item numbers. Diverse calculation modalities, based on static and variable quantities, can be used for invoicing on the basis of prices per unit, minimum prices, graduated price calculations or flat-rate charges, with or without value added tax and electronic direct debit.

The meaning of a **PSX**[2] hexagon

Each component of PSX[2] is presented as a hexagon which has no contact with any of the other hexagons. This means that the described functionality assigned to the hexagon is delivered autonomously and in full – without any direct dependency on any of the other components – at this point only. A hexagon represents a number of programs which have their own system of communicating with each other within the hexagon in order to deliver the service or function.

This form of functional autonomy ensures that each of the functionalities is portable to different platforms and also guarantees that they are easily implemented in existing software systems. The precondition for this is that there must be a guaranteed supply of information to the hexagon and that the results from the hexagon are capable of being used by others. This form of external communication is provided by an API defined for each hexagon.

A hexagon's function has a results-based dependency on other functions. The function is triggered by time-controlled or event-triggered activities.

Within each hexagon the data for the described function is managed wholly exclusively in that hexagon. Access to information from other hexagons is managed exclusively by means of API. Each hexagon is responsible for the management of the data for its functionality. None of the programs within a hexagon have direct access to the data of another hexagon.

Technical requirements for PSX²

Data management is by means of DB2
The program languages are COBOL and C
Interactive dialogs are implemented in CICS/TS and Websphere
Data communication is by means of XML structures, MQ, tables or seq. files

The system is implemented in z/OS, Linux, AIX and UNIX