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Software Innovations GmbH

# smartPLEX (XSM)
## for z/OS

**Introduction**

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# 1. Historical Situation

In the past most IBM z/OS data centres developed their own strategies and concepts for the installation and maintenance of system and application software. In many cases this was based upon the concepts of IBM. Many ISV software maintenance concepts were also used but later never integrated into the primary data centre design.

The architecture and possibilities within the z/OS environments have changed dramatically during the last decade. Unfortunately most installations have not integrated all of the new possibilities into their system design concepts.

As a result, most of today's z/OS environments are missing a simple and clear architecture. The reasons for this situation are mainly historical:

− There was no financial pressure

− Sufficient staff was available

− Changes were always planned well in advance

− High availability was not a critical issue

− The S/390 platform was the only major production environment

Unfortunately none of the above still applies today. The whole IT world has changed and the S/390 platform is only one of many production environments in a modern data centre.
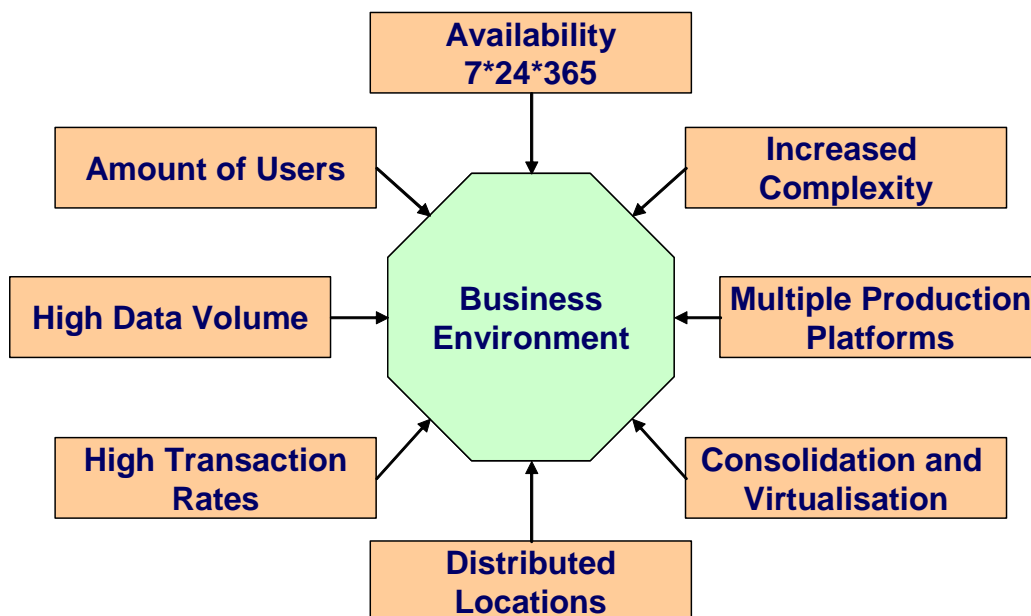


**Graphic 1: Today's Business Environment**

Financial pressure has increased dramatically. This has resulted in a lack of investment in IT infrastructure. Due to this, available technical possibilities were not implemented, as for example, the new technology was not purchased or qualified personnel was not available. In some cases the required technology was implemented without proper integration into the production environment. This approach reduced the short term investment but will dramatically increase the long term costs.

The "time to market" has also decreased tremendously. New business requirements must be implemented rapidly to handle the constantly changing market place. As a result the technology lifespan has been reduced.
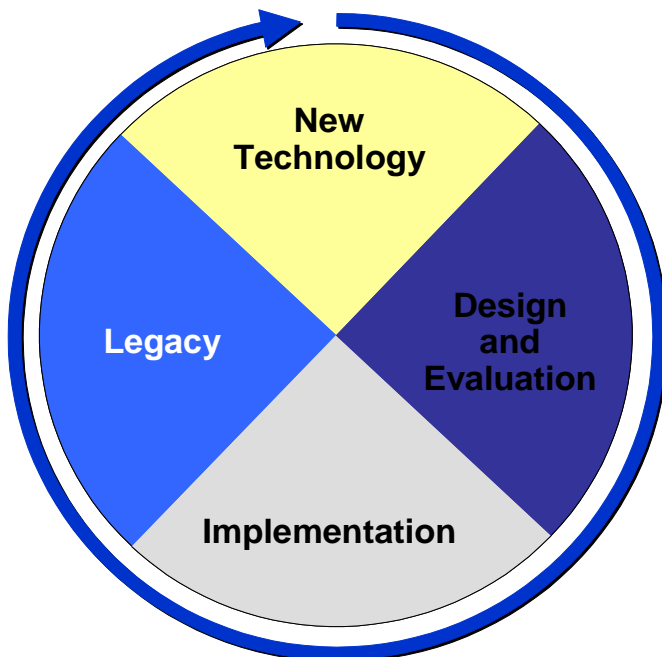


**Graphic 2: Reduced Technology Lifespan**

Availability and security must also be guaranteed in order to cope with new client environments such as the internet. This requires, for example, a single integrated role-based security concept covering authentication, confidentiality, data integrity and non-repudiation.

Last but not least, qualified affordable staff for the S/390 platform is a rare commodity. This situation is not going to improve in the foreseeable future. The aim must be to use the available resources for important activities which will increase the value of the IT to the business. In most organisations the IT is purely a supporting process and not part of the core business. The IT must be service orientated and not just a "necessary evil".

IT infrastructure is nowadays purely a commodity and must be treated as a "simple" production process (i.e. "factory"). Efficiency, quality and cost are the most important factors in the IT. If these goals are not reached, then possibilities such as outsourcing are very likely. Every investment must result in a positive return and reduce the total cost of ownership.

# 2. smartPLEX

smartPLEX was developed to address and resolve the problems found in IBM z/OS environments. smartPLEX is an integral part of the improvIT Data Centre Framework.
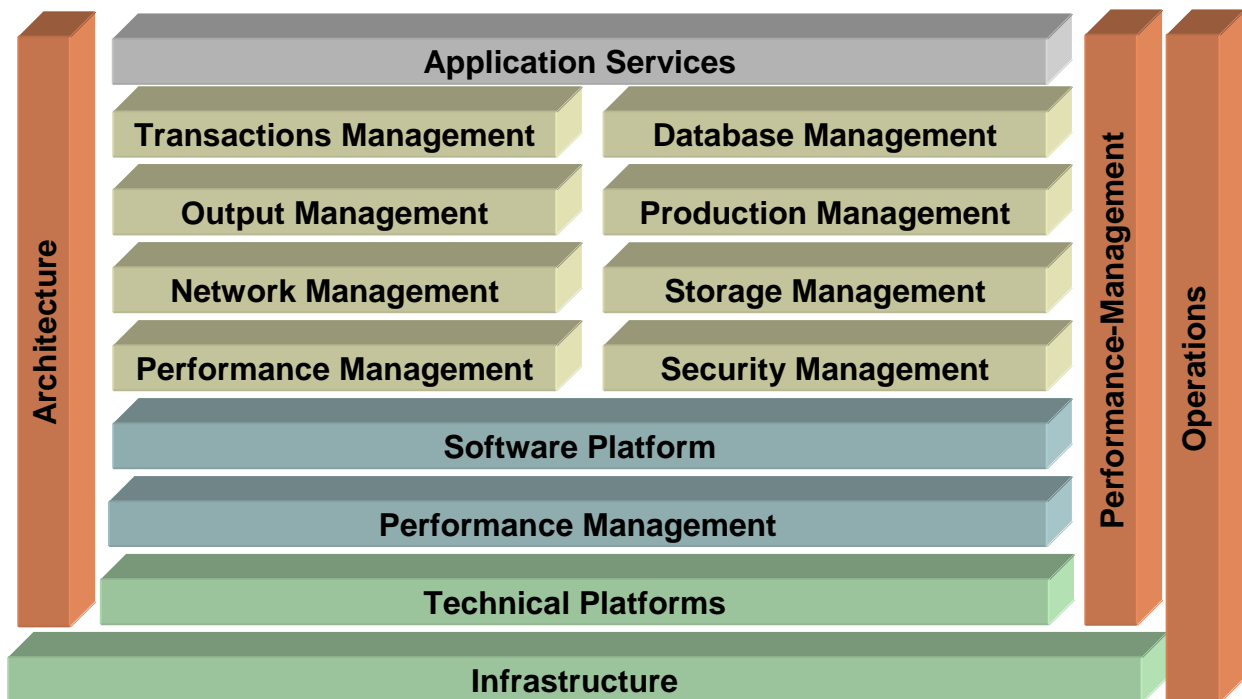


**Graphic 3: improvIT Data Centre Framework**

smartPLEX is, however, not just a piece of software. It offers a highly integrated and automated system architecture, with a set of installation, maintenance and administration concepts, covering aspects such as storage management and security.

The degree to which the concepts must be used is very variable. smartPLEX is a very flexible framework. However, the benefit increases tremendously the more the concepts are used.

The benefit can be further increased by using other unique tools such as eXtended Productivity Facility (XPF) or eXtended Recovery System (XRS) to reduce the workload and improve the system availability. XPF, for example, allows a maintenance free TSO/ISPF environment while XRS offers a complete backup and recovery management solution for IBM DFDSS.

Some of the advantages of smartPLEX**:**

− **Design**:

- An integrated system design for all IBM and ISV software running under z/OS

- A flexible design framework covering aspects such as z/OS, network, security, storage, output and automation

- A "fully shared" hardware environment

- Separate system maintenance and runtime environments
- Standardised naming conventions
- Single Point of Control and Administration
- Scalability in a parallel sysplex environment

– **Implementation**:
- Standardised software installation tools and procedures
- Automated installation of z/OS software products
- Installation support for other IBM and ISV software
- Automated generation of a single volume emergency system
- Support for the easy installation of software maintenance

– **Benefits**:
- Ready-to-IPL systems
- Reduction of system downtime for maintenance
- Coexistence of multiple software releases within the same system environment
- On the fly software changes
- Improved automation possibilities due to standardisation
- Error reduction due to less changes being required and the use of automation
- Reduced workload for system maintenance and administration
- Availability of system staff for important activities
- Reduced total cost of ownership (TCO)
- Protection of existing investments

# 3. smartPLEX Concepts

This chapter will explain the basic technical concepts behind smartPLEX. It is only a high level overview, designed to show some of the interesting aspects related to the base z/OS system design. Concepts covering other subjects such as network design, security and storage management are not discussed here.

## 3.1. LPAR Design

In order to achieve a stable production environment we recommend the separation of development and test from the production system(s).
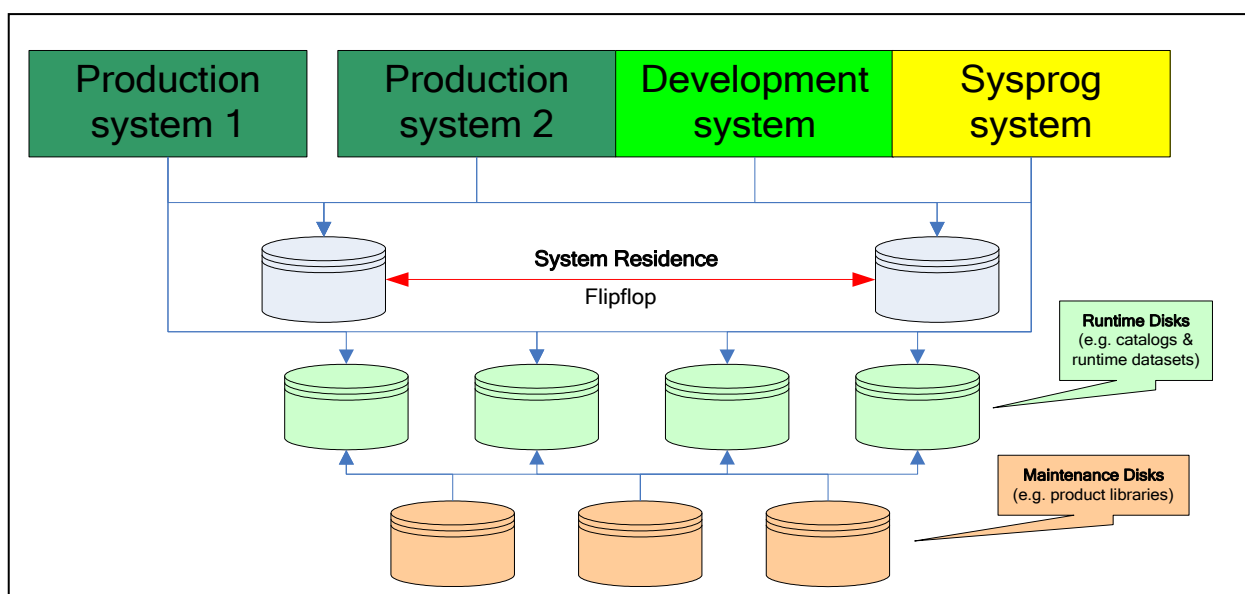


**Graphic 4: Sample System and LPAR Design**

All hardware resources in the environment are shared. There are no dedicated resources for any of the systems. The z/OS system residence (SYSRES) disks are "minidisks" and only contain the absolutely necessary files required to IPL the systems with a certain software release. All other runtime system files are located on the runtime disks. These contain all necessary runtime files for multiple software releases of z/OS and other installed software. PARMLIBs and PROCLIBs are also stored here.

The maintenance disks contain all installed software datasets. All installation and maintenance activities are performed here. System modifications and exits are applied to these datasets. Once the software is ready for the runtime environment, it is just copied to the runtime disks. Generally only the required runtime datasets are copied.

The coexistence of multiple software releases in the same environment is guaranteed by strict naming conventions. All disks are fully SMS managed except for the system residence.

## 3.2. LPAR and System Naming Conventions

LPAR names must be standardised in a multi-system environment, to avoid later problems and to simplify the maintenance process.

Furthermore, smartPLEX makes extensive use of system symbols and this requires that the above rules have been implemented.

## 3.3. Dataset Standards

All datasets are SMS managed. The runtime system datasets should be assigned a storage class with the "guaranteed space" attribute. This allows the system programmer to take specific performance requirements into consideration.

Because all disks are shared between all systems in a (parallel) sysplex, we must ensure that every system runs with the correct set of system datasets. To achieve this we must first define naming conventions and then apply these to all system datasets regardless if they are for IBM or ISV software. This also offers many other advantages e.g. during administration.

### 3.3.1. High Level Qualifier

Through standardisation, we only need to define the base high-level-qualifiers once in the installed security system. Through corresponding definitions in the storage management system, it is possible to automatically assign correct management rules.

Every time a new system dataset (maintenance or runtime) is created, it will be automatically assigned the correct security attributes and placed on the correct disks without further involvement of the administration teams.

### 3.3.2. Second Level Qualifier

This qualifier identifies the product or component and the corresponding software release. The product identifier is a unique value within the environment.

### 3.3.3. Third Level Qualifier

This qualifier contains the original DDDEF name as defined by the vendor.

### 3.3.4. Low Level Qualifier

The last qualifier describes the contents of the dataset. If this does not apply then the qualifier may be omitted. It can be used by SMS to ensure correct dataset attributes. This value should be assigned manually if not predefined.

### 3.3.5. Accessing Datasets

Real dataset names must never be referenced directly by any task. Otherwise the maintenance overhead will rise dramatically when changes are applied to the system and the chance of errors will increase.

Whenever datasets are used, they must be accessed via an alias. This can be either a non-VSAM or symbolic alias. This applies for example to started tasks, JCL, CLISTs and REXX execs. The alias names are created by smartPLEX during the installation process.

The same rule applies to all PARMLIB contents.

## 3.4. Parmlib Member Naming

smartPLEX only requires a single PARMLIB for all systems. In order to use a single shared PARMLIB, the member names are also subject to naming conventions.

## 3.5. Proclib Member Naming

We recommend the use of standardised names for all system tasks.

This makes it easier to define groups of started tasks to the security system class "STARTED". As a result only a few profiles are required for many started tasks.

## 3.6. Catalog Design

Only one system master catalog is needed. This can be used by all systems and contains only BCP, LPA and Linklist datasets. Other datasets should be distributed across various user catalogs.

The advantage of this approach is that there is no need to build a new master catalog every time a new z/OS release is installed!

## 3.7. System Maintenance

As already mentioned, it is vital for a high availability environment to differentiate between runtime and system maintenance datasets. Normally this is done by placing all release datasets on non-shared disks or the system residence. However, in a smartPLEX environment all disks are shared.

Maintenance should never be directly installed into runtime files, but instead only into the Target and Dlib datasets. After the maintenance process is complete, the affected Target datasets will be copied into new runtime datasets and the catalog alias name reassigned to the new copy.

As a result, new software releases can coexist in the same runtime environment even if they have not yet been activated.

If symbolic aliases are in use, then only the affected system symbol needs to be

changed. In this case all product release datasets must be copied.

This process applies to all software products regardless of type or vendor. In case of non-SMP/E installed software, the only difference are the missing Dlib datasets.

# 4. Migrating to smartPLEX

There is no "standard" plan for migrating an existing z/OS environment to a smartPLEX architecture. Too many different factors influence the used approach e.g.:

– Which smartPLEX design components are being implemented

– How many different systems and LPARs have to be migrated

– Which IBM and ISV software products are in use

– What other tools are available for and after migration

– Are other optimisation activities taking place e.g.:

  • Redesign network, security or storage concepts

  • System management concepts

  • Cost reduction through software optimisation

– How much time is available

– Protection of existing investments

A specific migration strategy must be developed for each customer situation. This contains technical, planning and business aspects.

# 5.  Installation Prerequisites

## 5.1.  Hardware

– Approximately 5000 cylinders (3390) disk space are needed for the installation of an IBM z/OS SystemPac or ServerPac into the maintenance environment. The exact amount depends on the ordered software

– In most cases one 3390-2 disk will be sufficient for each sysres volume

– The amount of space required for the datasets in the runtime environment depends on which software components are used. Generally only required files are copied from the maintenance to runtime environment

## 5.2.  IBM Software

– ServerPac or SystemPac for z/OS

– ServerPac Installation Dialog

– TSO/E

– ISPF/PDF

– SMP/E

## 5.3.  eXtended Common Services

The following **improvIT Software Innovations** software is required:

– eXtended Common Services (XCS)

XCS is the common runtime environment for all **improvIT Software Innovations** products. It does not need to be licensed separately.

## 5.4.  smartPLEX

The smartPLEX software (XSM) consists of five runtime datasets (ISPF dialog components and loadlibs).

All files are delivered in TSO transmit format. To install smartPLEX, just transfer the xmit files in binary mode to your host system and extract them using the TSO receive command.

If required, the installation may also be performed using SMPE.

## 5.5. smartPLEX Licence Key

You will need a license key to use smartPLEX. This key is supplied by **improvIT Software Innovations**. You must "zap" the key into the smartPLEX licence module.

## 5.6. smartPLEX Runtime Datasets

At least one partitioned dataset must be allocated prior to using smartPLEX. It contains the defined user options and generated installation jobs.

# 6. z/OS Installation using smartPLEX

The smartPLEX software product (XSM) enhances the implemented concepts by simplifying the software installation process. The smartPLEX concepts can be implemented without using the smartPLEX dialogs. However, many possible advantages available in a standardised z/OS system design are lost.

smartPLEX offers a very fast, controlled and automated method of installing z/OS using the site system design rules. Fewer errors are likely to occur due to automation. smartPLEX can also be used when applying maintenance. As a result smartPLEX offers a substantial advantage over manual system installation and maintenance. It is, so to speak, the "icing on the cake".

smartPLEX does not directly perform any changes in your system. smartPLEX only generates jobs which can be used to perform all required tasks. The system programmer remains in full control and decides when and how the necessary steps are performed.

## 6.1. Basic smartPLEX Definitions

When installing z/OS with smartPLEX for the first time, some basic definitions must be made in the security and storage management systems. These reflect the new dataset naming conventions.

## 6.2. smartPLEX Repository

smartPLEX has a meta-description for each IBM z/OS release. The site defined options are merged with the meta-data in the repository to build a user dependant z/OS system. The smartPLEX repository contains all base components belonging to a specific z/OS release.

Other site dependant components are not contained in the base repository. It is however possible to add these into a smartPLEX user repository. These are then also processed automatically.

## 6.3. z/OS Installation Overview

To install z/OS using smartPLEX perform the following steps:

- Upgrade the CustomPac installation dialog and receive the order
- Use the smartPLEX dialog to control the installation and activation process
- IPL

# 6.4. smartPLEX Dialog

smartPLEX contains a very powerful but simple to use ISPF dialog. Most aspects of the installation can be changed using to options dialog. The following sample screenshots show some of the features.

## 6.4.1. smartPLEX Primary Option Menu

This dialog is initially shown and allows the user to specify the required processing:

```
 Menu
--------------------------------------------------------------------------
                    smartPLEX VNNN  Primary Option Menu
Command ===>

                                                      Userid - GZU
                                                      Prefix - **NONE**


  Base information:

    Client Id:           ZS1C0

    z/OS Release:        1C0

    Parameter Dataset: SYS4.ZS1C0.XSMWORK


  Processing:

    Generate:            S          (z/OS  <C>opy Profiles,
                                           <S>ystem Software Installation,
                                           <E>mergency SysRes,
                                           <M>aintenance,
                                           <D>ata Set Copy Utility)
```

**Screen 1: smartPLEX Primary Option Menu**

## 6.4.2. smartPLEX Base Primary Option Menu

This dialog is used to control the installation of a new IBM z/OS system:

```
 Menu
--------------------------------------------------------------------------------
                 XSM Vnnn Base Primary Options Menu (zOS 1C0)
Option ===>

                                                      Userid - GZU
                                                      Prefix - **NONE**
                                                      Expert - N

    Target:

       Client: ZS1C0     Parameter Dataset: SYS4.ZS1C0.XSMWORK
       zOS Rel.: 1C0

    Possible Actions:      (<G>enerate, <V>iew, <B>ypass)
                                                           More:      +
   _  (V)      Define site options
   _  (G,B)    Modify IBM System/Server-Pac table
   _  (G,V)    Install site system modifications & create SMPE procedure
      (G,V)    Merge site SMPE with smartPLEX control information
      (G,V,B)  Vary new SysRes offline
      (G,V)    Initialise the new SysRes
      (G,V,B)  Vary new SysRes online
      (G,V)    Create a job to copy the new release datasets to the new SysRes
      (G,V)    Create a job to copy the new system datasets to the system pool
      (G,V)    Handle USS files
      (V,B)    View the space required on each volume
      (G,V)    Generate/Check/Edit important Parmlib and Proclib members
      (G,V)    Generate TSO/ISPF Logon procedure & ISPF application panel
      (V)      Access the job to activate the new SysRes datasets
      (V,B)    Access the job to activate the new system datasets (old style)
      (V)      Access the job to activate the new system datasets (new style)
      (G,V)    Generate the job to backup the new runtime environment
```

**Screen 2: smartPLEX Base Primary Option Menu**

## 6.4.3. smartPLEX z/OS Installation Options

This dialog shows an extract of the available z/OS installation options:

```
  Menu
-------------------------------------------------------------------------------
                   smartPLEX VNNN   Installation Options
Option ===>

                                                       Userid - GZU
                                                       Prefix - **NONE**

 Verify entered options now:    Y
                                                          More:    - +

   Target SysRes:
     Volser:                      SRA2C2
     Device number:               10C2
     Device type:                 3390
     Temporary HLQ:               SYS0
     Non-SMS Storage Class:       NONSMS
     IPL Text Source datasets:    SMPT.MVS1C0.SAMPLIB(IPLRECS)
                                  SMPT.MVS1C0.SAMPLIB(IEAIPL00)

   Parmlib:
     XSM-Name:                    IT10
     XSM-Clone:                   10
     Global member suffix:        00
```

```
   Dataset HLQ's for:
     Base MVS-BCP:                 SYS1
     IPL & UACC=None:              SYS2
     IPL & UACC=None & APF:        SYS2APF
     IPL & UACC=Read:              SYS3
     IPL & UACC=Read & APF:        SYS3APF
     Common system:               SYS4
     Special system:              SYS5
     Special system & APF:        SYS5APF

   Dataset MLQ:
     Suffix:                       1C0

   Dataset LLQ's for:
     LPA:                          LPALIB
     LLA & Non-APF:                LINKLIB
     LLA & APF:                    LINKAPF
     Loadlibs & Non-APF:           LOAD
     Loadlibs & APF:               LOADAPF
     Help:                         HELP
     Clist:                        CLIST
     Rexx Execs:                   EXEC
     ISPF Panels:                  PANELS
     ISPF Messages:                MSGS
     ISPF Skeletons:               SKELS
     ISPF Tables:                  TABLES
     Maclibs:                      MACLIB
     Samplibs:                     SAMPLIB
```

**Screen 3: smartPLEX z/OS Installation Options**

# 7.	Contact

For further information regarding smartPLEX (XSM) please contact:


**improvIT Software Innovations GmbH**

Große Elbstraße 141 a

D-22767 Hamburg

Germany


Telephone:	+49 (0)40 540 90 29 - 7

Fax:		+49 (0)40 540 90 29 - 9

Email:		Contact@improvIT-Software-Innovations.de

Web:		www.improvIT-Software-Innovations.de