



SAP's Reference Architecture LSA++

Agenda

Review of the Layered Scalable Architecture

From LSA to LSA++: Streamline Core Layers

From LSA to LSA++: Enhance Virtualization Layer

LSA++: Agile Data Mart & BW Workspace Layer

LSA++: Open Operational Data Store Layer

Determining the Advantages of SAP BW on SAP HANA

Determining the Enhancements of LSA++ with SAP HANA



Layer Architecture of Data Warehouse (LSA)

The Layered Scalable Architecture (LSA) is SAP's reference architecture and best practices how to build an EDW with BW. The structured layered is set of model or construction guidelines to base the design of the data warehouse. The layered scalable architecture was formulated by SAP to design the SAP business warehouse. Its purpose is to provide an Efficient and effective storage, Querying, analysis and data access solution.

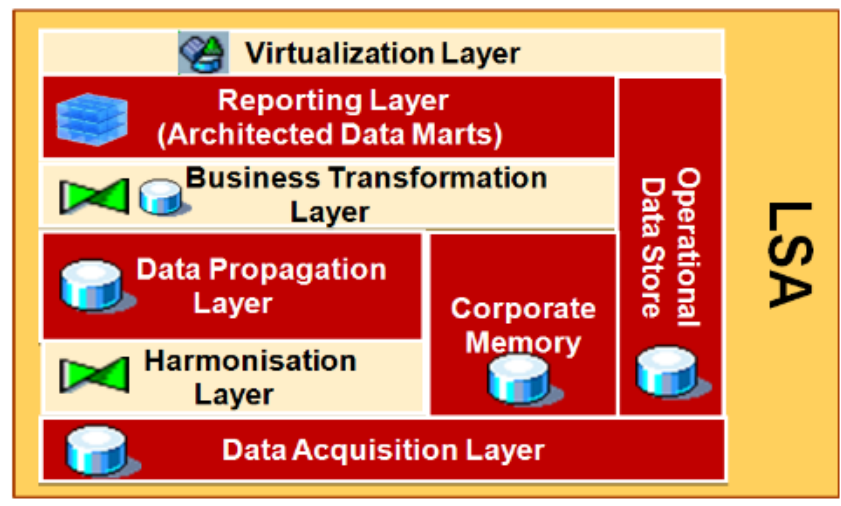
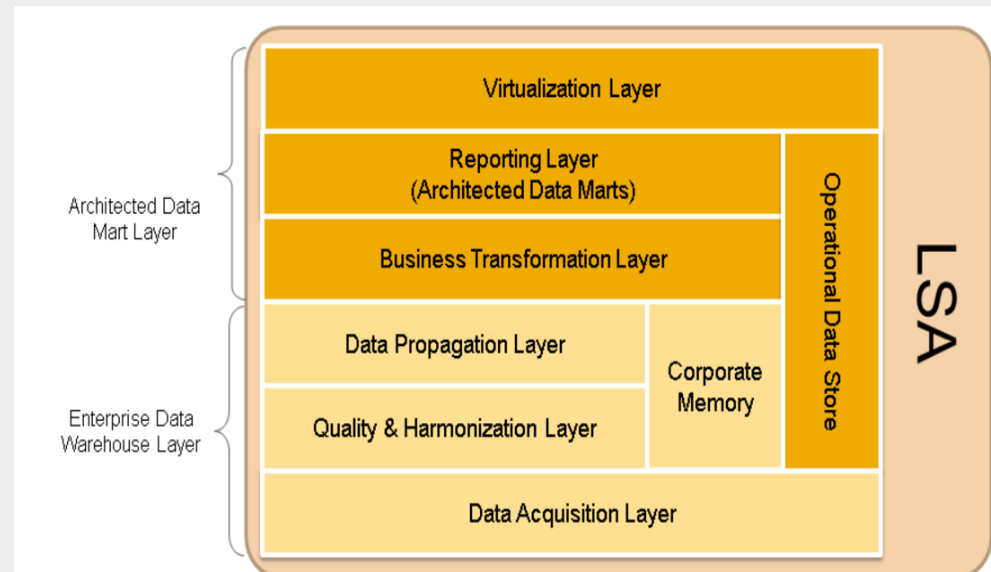
The layers are structured according to business processes there fore offers integrated business ware house solution. The reference layers in the LSA architectures are grouped in to below :

Architecture Data Mart layer:

Data transformation Layer
Reporting Layer /Virtual Layer

Enterprise data warehouse Layer:

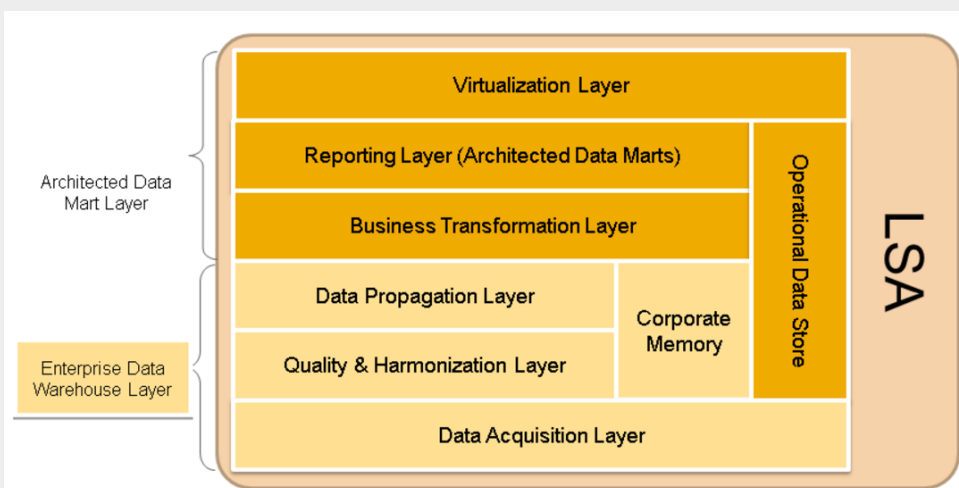
Data Acquisition layer
Corporate Memory Layer:
 Quality Hormanisation Layer
 Data propagation layer



Enterprise Data Warehouse Layer



The Enterprise Data Warehouse layer consists of the data acquisition layer, the quality and harmonization layer, the data propagation layer and the corporate memory.



Data Acquisition Layer

The data acquisition layer takes the data from the source and distributes it in the BW system. This layer allows you fill all targets independently of each other, and even at different times.

Quality and Harmonization Layer

In the quality and harmonization layer, the data is transformed, standardized and stored in Data Store objects.

The level of transformation required here depends on how different the sources are that the data comes from. No transformations are performed here that affect the business logic.

Data Propagation Layer:

The data propagation layer is used for the applications. This should happen as quickly as possible, which is why you have the option of semantic partitioning in this layer. The data is stored and consolidated in Data Store objects. The data propagation layer provides a basis for further distribution and reuse of data.

Corporate Memory

The Corporate Memory is filled independently of the update into the architected data marts. It contains the complete history of the loaded data. It is used as a source for reconstructions without the need to access the sources again.



Architected Data Mart Layer

The Architected Data Mart layer consists of the Business Transformation layer, the Reporting layer and the Virtualization layer.

Business Transformation Layer

In the Business Transformation layer, the data is transformed based on business logic. The data in the previous layer (Data Propagation layer) should not be transformed based on business logic, to ensure that the data can be used again

Reporting Layer

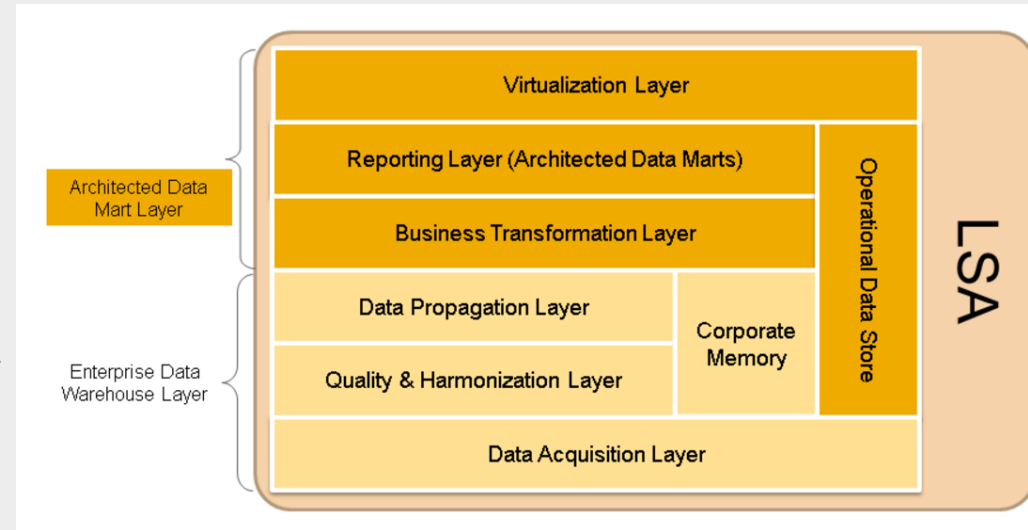
The Reporting layer contains the objects that are used to perform queries for analysis. This layer is modeled mainly using InfoCubes

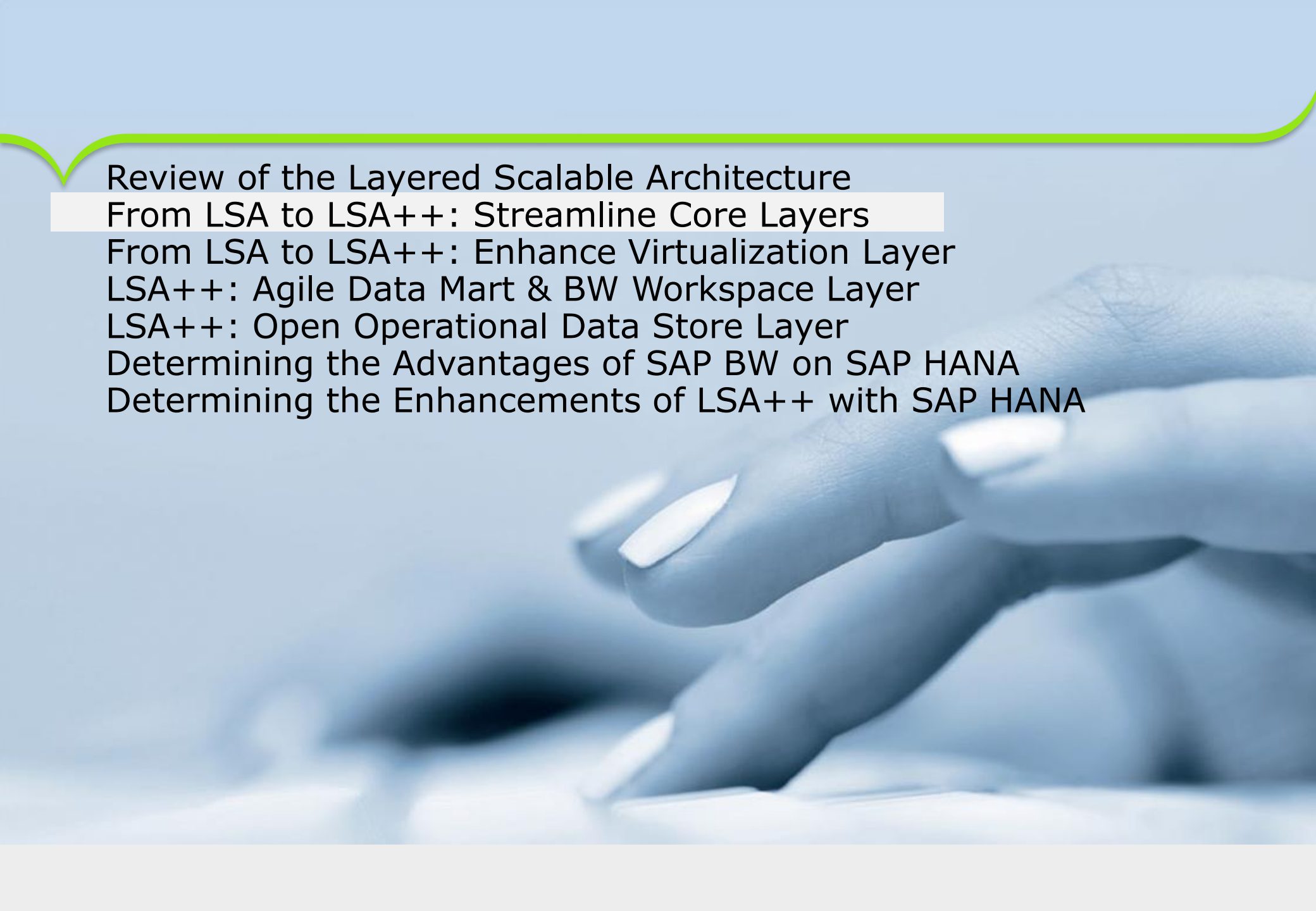
Virtualization Layer

Queries should always be defined on a MultiProvider for reasons of flexibility. These queries form the Virtualization layer.

Operational Data Store

The Operational Data Store supports operative data analysis. Data can be updated to an operational data store, on a continual basis or in short intervals, and then read for operative analysis. You can also forward the data from the Operational Data Store layer to the data warehouse layer at set times. This means that the data is stored in different levels of granularity. For example, whereas the Operational Data Store layer contains all the changes to the data, only the day-end status is stored in the data warehouse layer.





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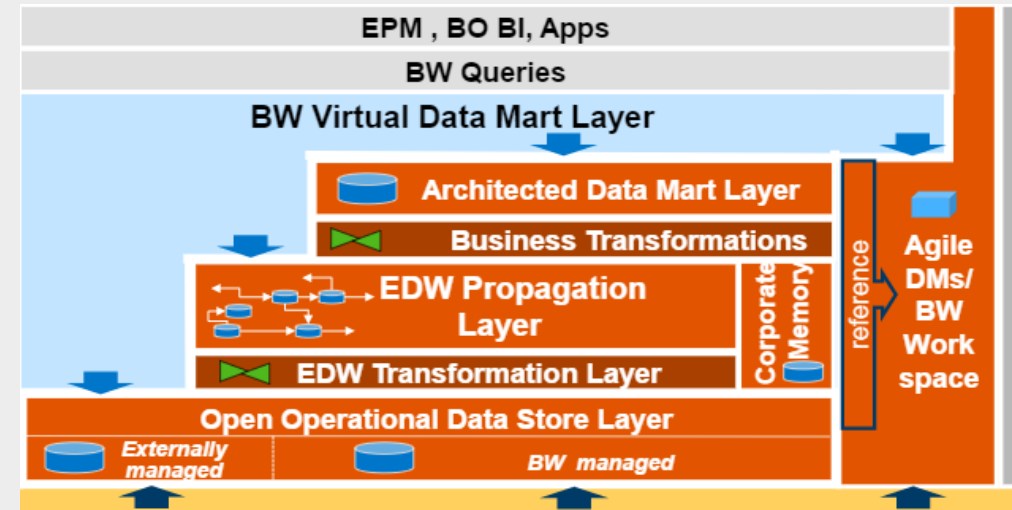
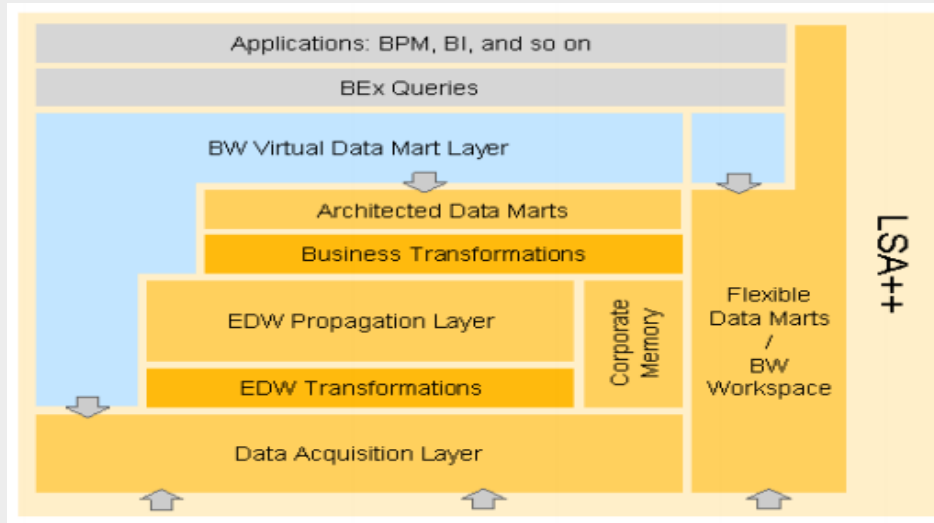
LSA++: Agile Data Mart & BW Workspace Layer

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Move from LSA to LSA++: Streamlining Core Layers



You have migrated your SAP BW system to SAP HANA. Now you want to find out the recommended steps to improve your LSA and move to the SAP HANA-optimized version of this framework, LSA++.

The Impact of SAP HANA on LSA :

One of the most important aspects of in-memory technology is in the paradigm shift that states that data-intensive business logic will be pushed down to be calculated by the database instead of the application server. In SAP BW, this in-memory programming paradigm has been followed by the BW Accelerator (BWA) for several years, and this principle has been taken over by SAP HANA . It has a considerable impact on SAP BW and on the Layered Scalable Architecture (LSA). While the key principles remain the same, SAP HANA provides additional modeling options for streamlining your enterprise data warehouse architecture. This flexibility is represented by SAP in the updated reference architecture, LSA powered by SAP HANA, or in short, LSA++.

Move from LSA to LSA++:Streamlining Core Layers



Migrate to SAP HANA-Optimized Objects

The first step is to migrate to SAP HANA-optimized objects and processing.

1. Migrate to HANA-optimized objects and processing

- Convert InfoCubes (incl. SPOs on InfoCubes).
- Cleanse ProcessChains and remove obsolete process types.
- Make sure Delta-Merge is triggered properly.
- Review „Query processing mode“.
- Review „Active/Non-active“ setting for write-opt. DSOs (classic).

2. Streamline your EDW

3. Introduce new layers

The second step is to streamline the EDW core layers.

1. Migrate to HANA-optimized objects and processes

2. Streamline your EDW

- Reduce numbers of persistent InfoProviders, esp. InfoCubes

3. Introduce new layers

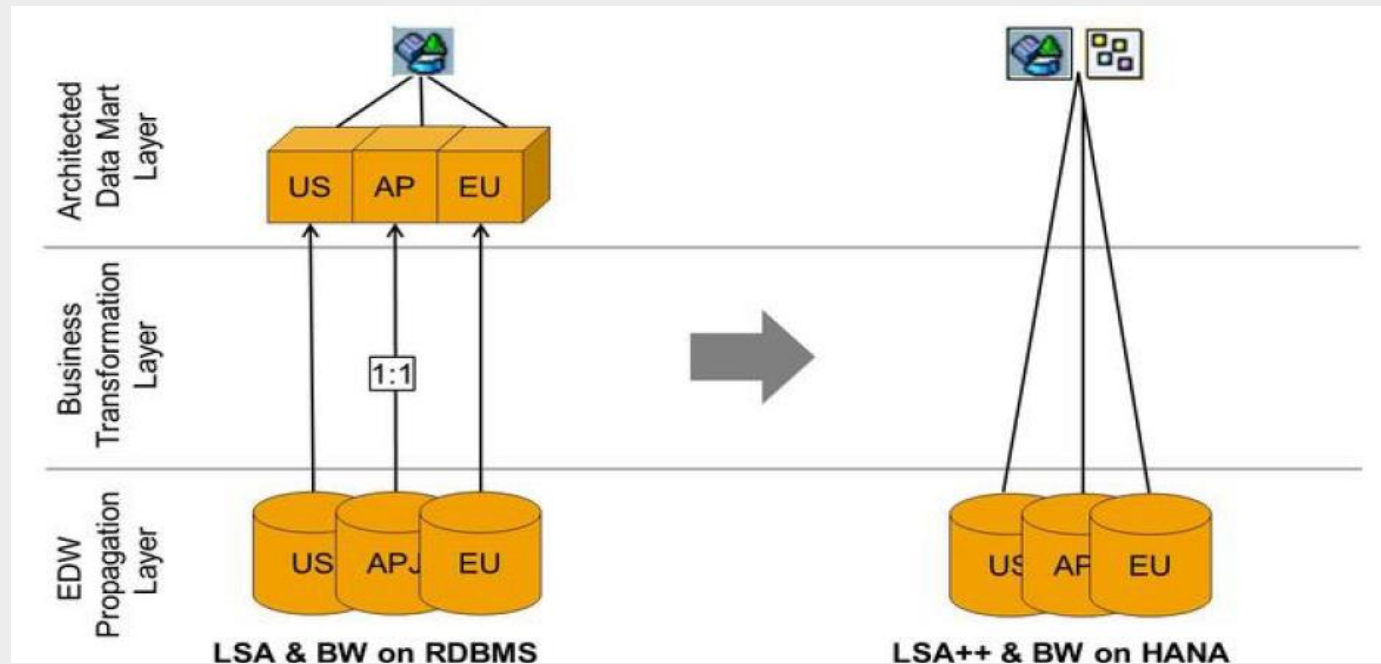
Streamlining the EDW core means that you check how necessary it is to keep the layers in a persistent way in your Enterprise Data Warehouse architecture. In some cases, it may be possible to replace a persistent layer with a virtual layer, thus saving data volume, load performance, and costs.

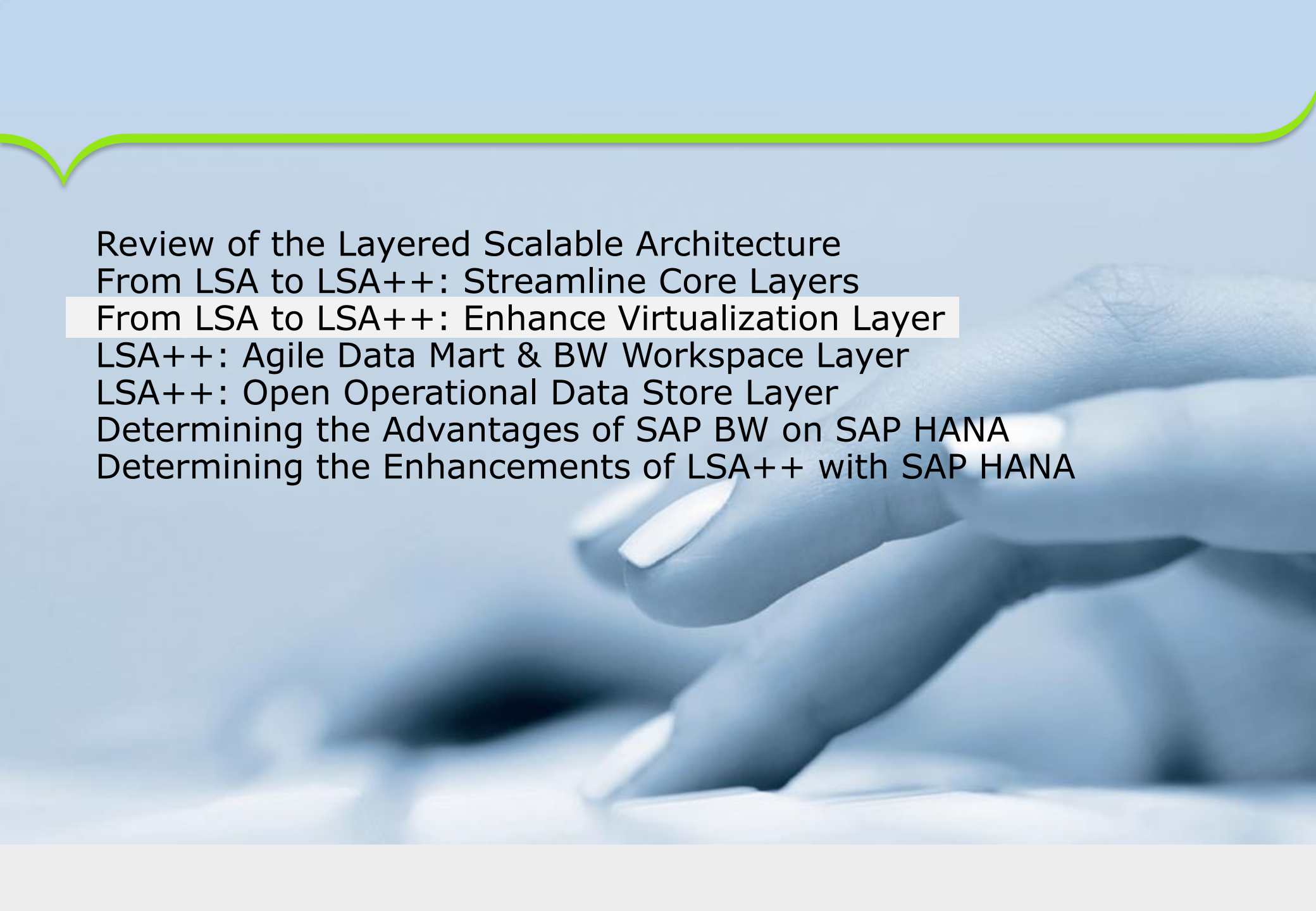
Move from LSA to LSA++:Streamlining Core Layers



Streamlined EDW: Query on granular data :

In LSA++, reporting on the Data Propagation Layer is allowed. However, this is not a valid option in classical LSA. InfoCubes as pure accelerators for the same source layer data but in a different data model (star schema rather than flat table) is an obsolete concept with SAP HANA. In SAP BW/4HANA, reporting on DataStore Objects (regardless of size and type) can be carried out without disadvantages.





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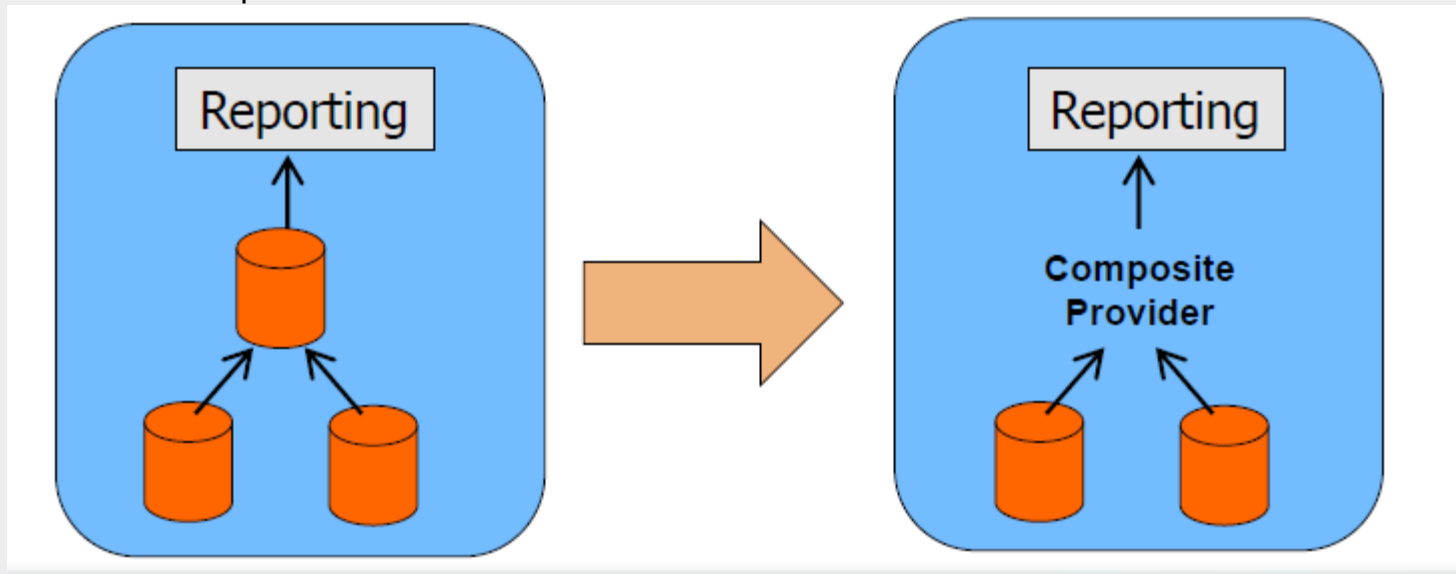
Move from LSA to LSA++: Enhance Virtualization Layer

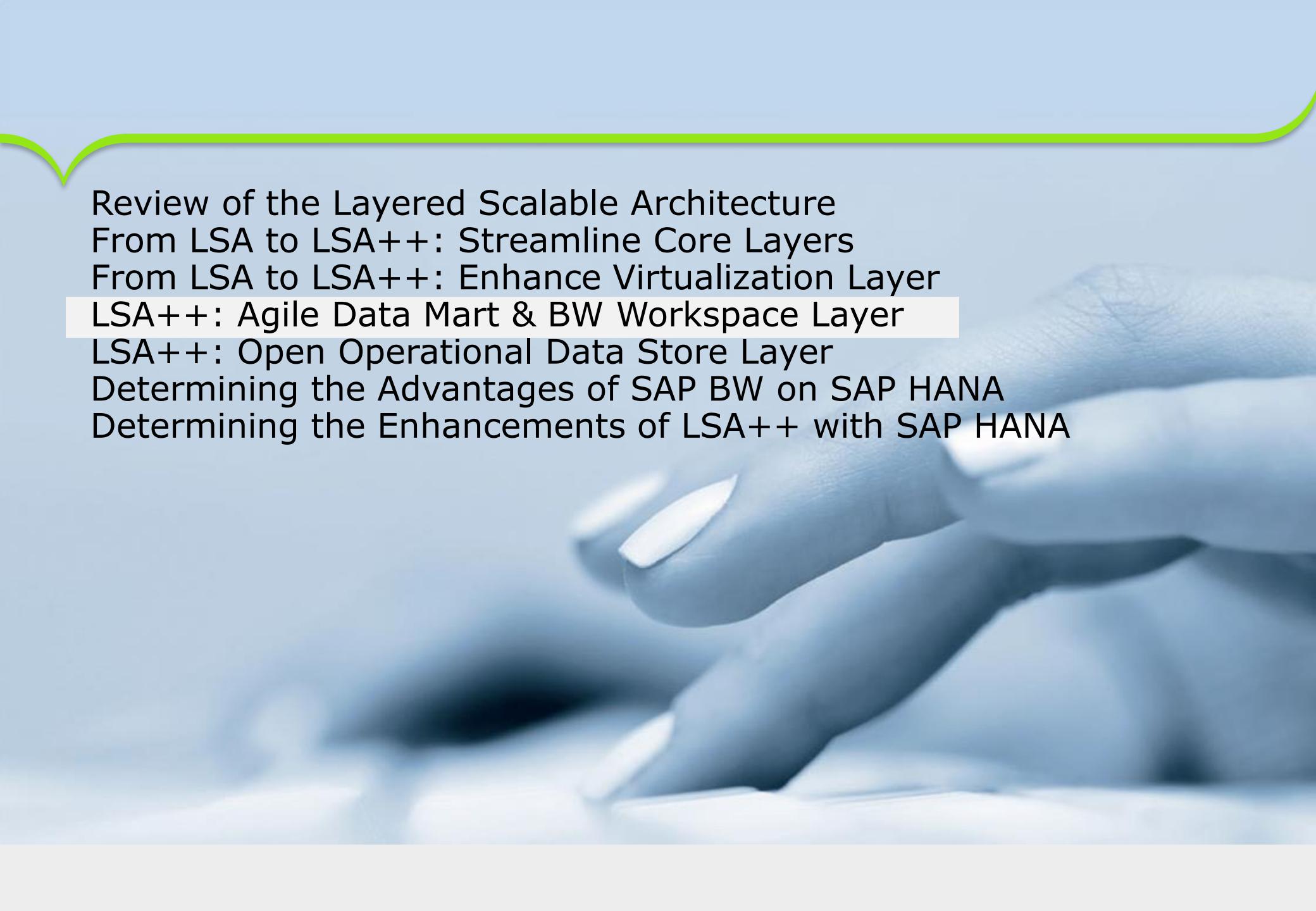
Streamlined EDW - Virtual Data Mart Layer

Scenario: Multiple Data Store Objects need to be Joined into a single Infoproviders.
UNION in Multiproviders doesn't correspond to reporting requirements.

LSA: BW transformation and updating (overwrite of DSO)

LSA++: Composite Provider





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Overview of Workspace

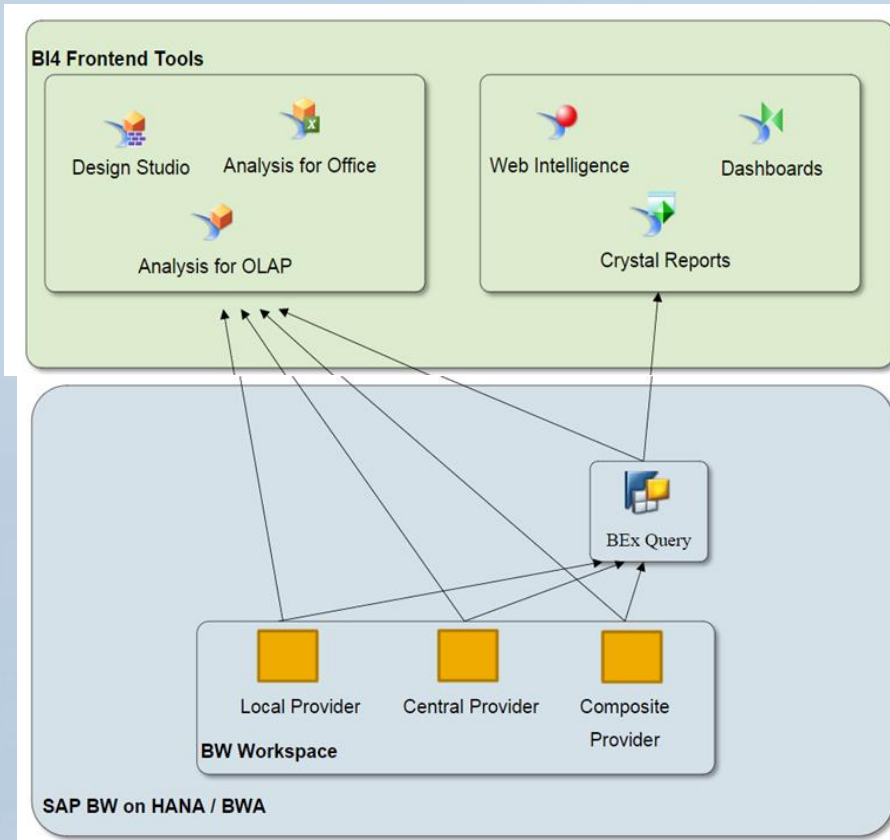
1. A BW Workspace is a dedicated area in SAPBW, where new models can be created based on central BW and local data (e.g. flat files). SAP BW Workspaces are available with SAP BW 7.3 SP 5 and higher. BW Workspace helps technically savvy business people to be allowed to develop their own data marts that can be changed on-the-fly without IT support.

There are three different types of providers in a BW Workspace:

1. **Local Provider** : A local provider represents local data that has been uploaded directly into a BW Workspace
1. **Central Provider** : Central provider is an InfoProvider from your SAP BW System. In a BW System with BWA, you can only select Info Providers that have a BWA Index. Notice that there is no data being replicated from an InfoProvider when you set it as Central Provider, it means only that the InfoProvider is exposed to the Workspace.
2. **Composite Provider** : A composite Provider allows you to join data from a local provider with a central provider. Starting with SAP BW 7.4 the relevance of Composite Providers has increased as a composite provider now allows you to combine data from SAP HANA and SAP BW. As an example, you could leverage a composite provider in order to join (or Union) data from a SAP BW Multiprovider and a HANA Table.

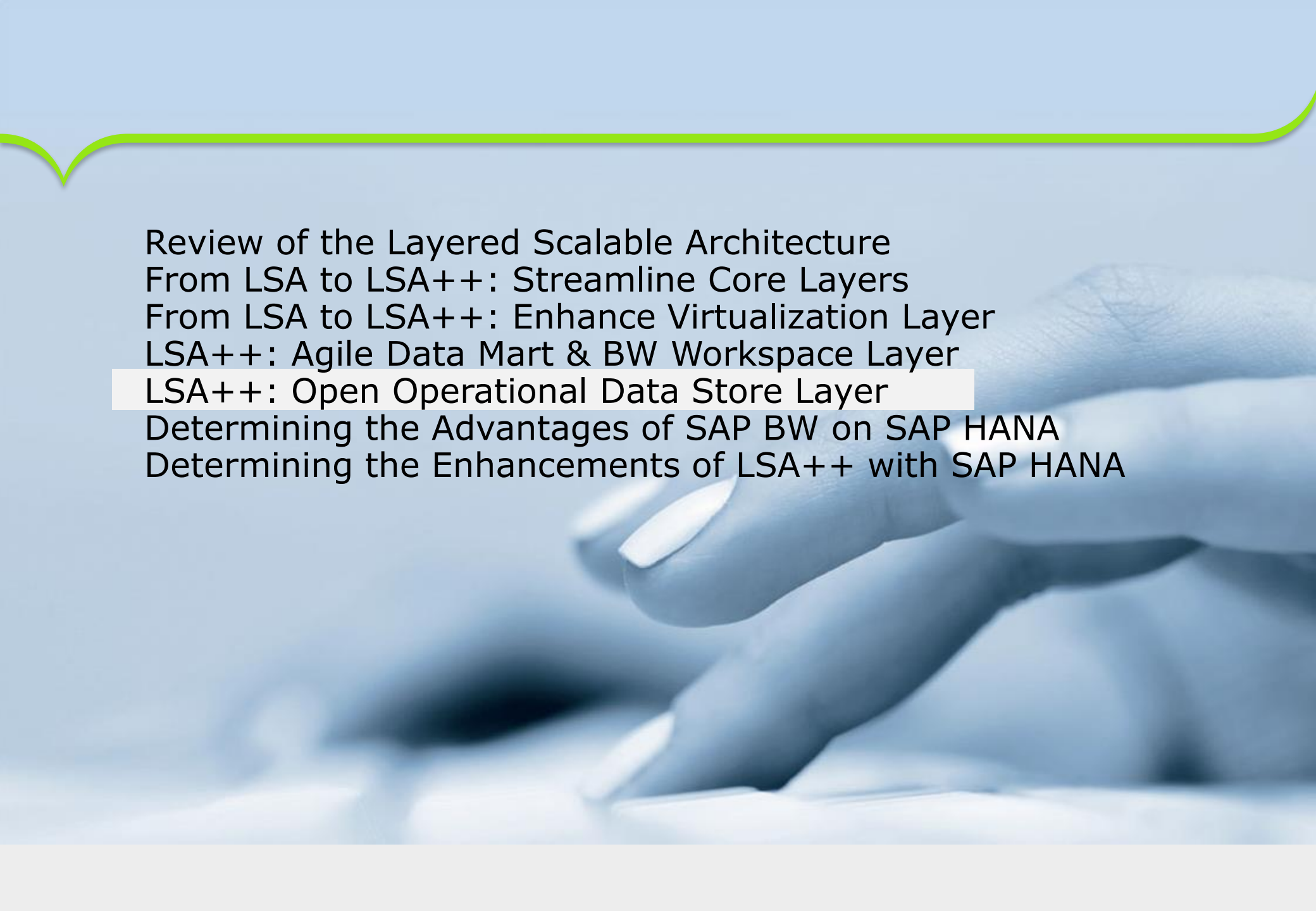
A new authorization object S_RS_WSPAC has been introduced for working with BW Workspaces. Data in BW Workspaces is saved in a HANA Analytical Index or in a BWA Index. Data in a HANA Analytical Index is stored on column store in SAP HANA.

Leverage BW Workspace In BI4



Access to HANA Analysis Processes(new in SAP BW 7.4) with target defined as analytical index, can be accessed the same way as described above for providers in a Workspace, as this HANA Analysis Processes(HAP)and Providers from BW Workspaces are both saved as analytical indexes

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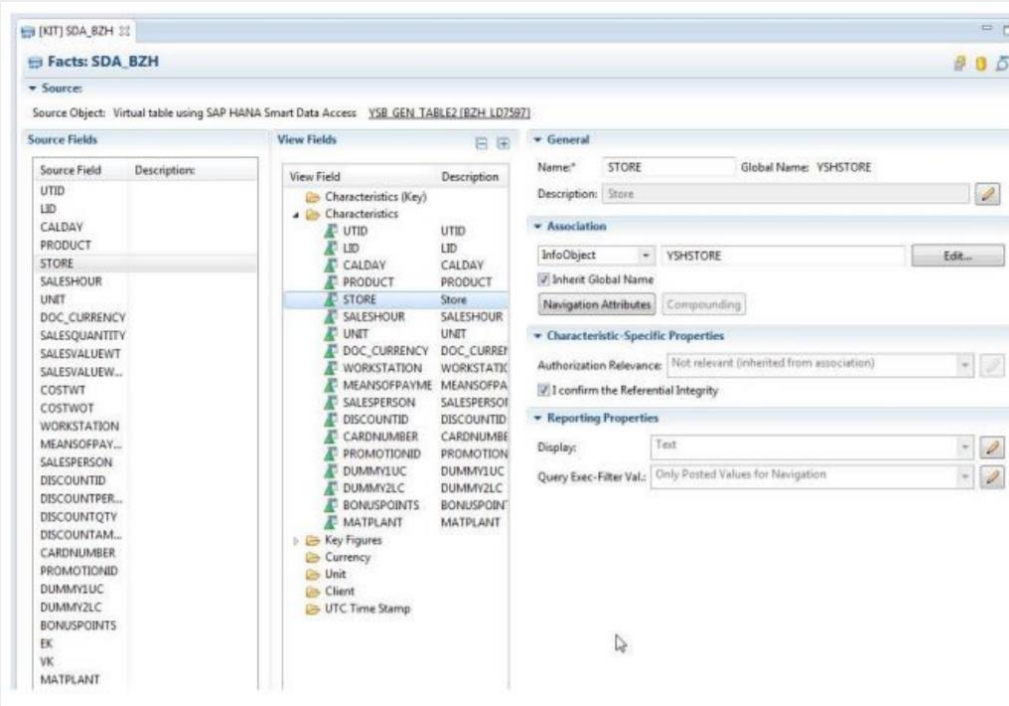


Open ODS View– Overview

- New object introduced with SAP BW On HANA SP5/SP6. OpenODS layer allows an evolutionary integration of external data sources into the EDW core data model without the need to adjust queries or authorizations modeled on top of an OpenODSView
- It provides flexibility of field based modeling in SAP BW, thus eliminating the need to have Info objects as building block for all BW objects. However link to Info object is also possible.
- The Open ODS view does not have separate storage for transaction data or master data.
- Open ODS view is considerably more flexible and helps in agile development in SAP BW as data from it can be directly consumed in BEX queries.
- Open ODS view becomes the new acquisition layer in LSA++ architecture.
- **Key Restrictions**
 - Open ODS views are available if the BW system is running on the SAP HANA database.
 - Open ODS views cannot be defined for hierarchies.



Overview of Open ODS(contd..)



BW EDW Services

- Open ODS Layer as source for persistent EDW providers
- Open ODS Layer Provider as virtual part of the EDW

BW Operational Data Services

- Real time replication into BW - SLT
- Immediate querying on any delivered data – no staging into EDW necessary (Operational BI)
- Data Modeling

BW Integration Services

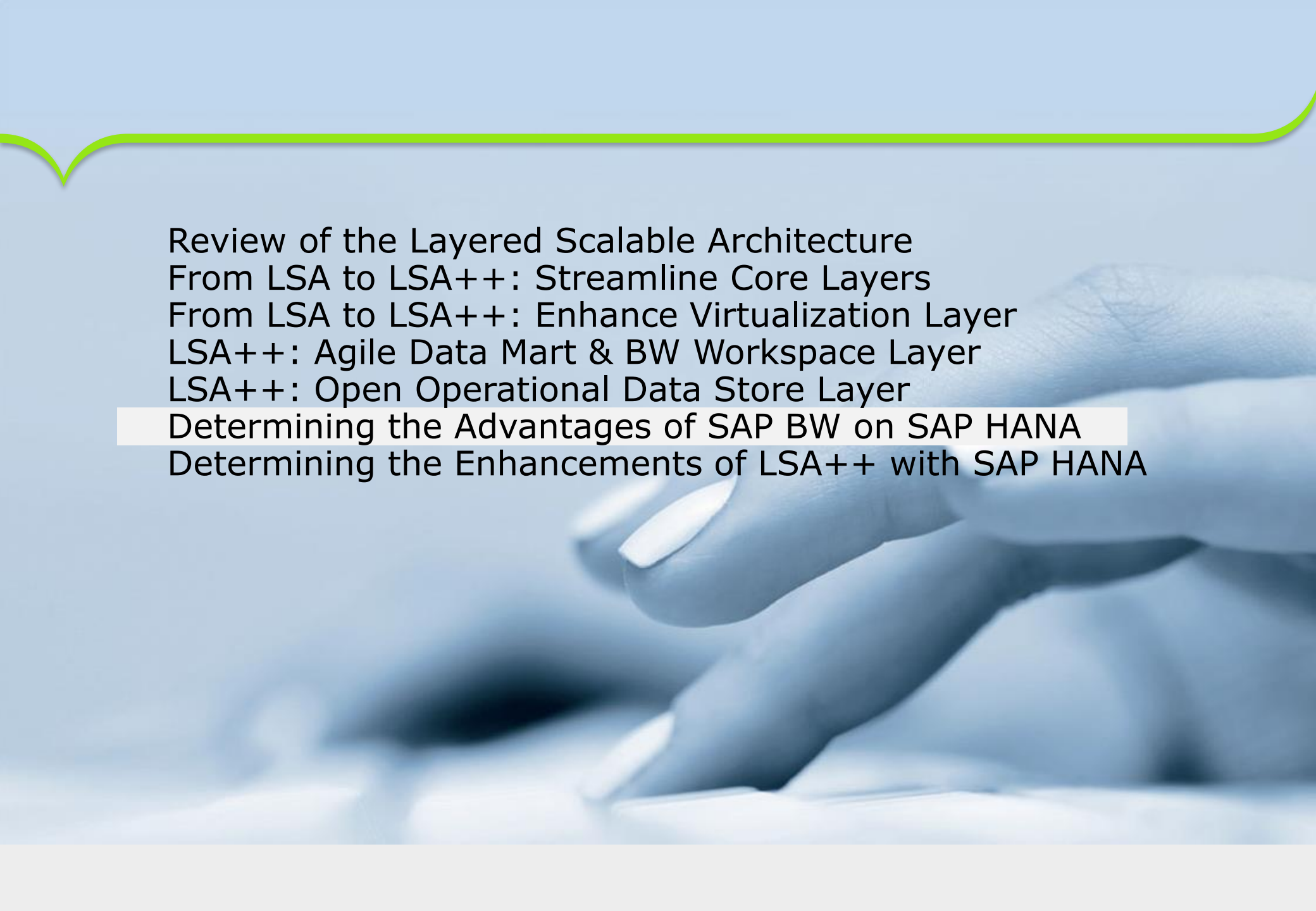
- Transfer/Consume HANA Modeler schemas in BW and vice versa



Open ODS view- (Use Cases)

- 1. Consume External Data without staging:** The Open ODS view allows data sources to be virtually consumed without the need for a separate BW persistence for the data e.g HANA Smart Data Access
- 2. Combine external data with BW models:** By using links to InfoObjects, you can combine Open ODS views with BW models and thereby use master data attributes and texts in BW. Here Open ODS view can be combined in composite provider.
- 3. Consuming in Composite Provider:** Embed Open ODS Views into Composite Providers (Only Union is allowed for Open ODS Views up to SAP BW 7.4 SP7, Join is supported as of SP8 onwards)
- 4. Embedded BW:** Like in SAP BW/4HANA, In case of Embedded BW too Open ODS view are created

Source → Access ↓	ERP	HANA	SDA
Direct (Non-Persistent)	Open ODS View on SAP Datasources	Open ODS View on HANA Table/View	Open ODS View on HANA Remote Table
Staged (Scheduled/Real-time)	Field-based DSO derived from Open ODS View	1) Field-based DSO derived from Open ODS View 2) HANA Table/View as ODP Datasource	Field-based DSO derived from Open ODS View

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SAP HANA Applications overview

SAP HANA is a database. A special In-memory database ,much faster as compared to other common databases like Oracle, SQL Server, but still a database. This means you can use it as a database for a SAP system (non-BW), or even for a 3rd party development, like your fancy e-commerce system or your custom-made data warehouse.

SAP BW, on the other hand, is a full-grown BI system, that includes tools for data modelling, ETL, data load management, OLAP engine, data mining, authorization and so on. SAP BW can work on different databases (Oracle, SQL Server) and also on HANA as underlying database.

SAP Business Warehouse (BW) on HANA combines the power of both the tools - BW Modeling and HANA in-memory computing engine to process huge amounts of data.

It helps you speed up data analysis by consuming data via a Data Warehouse (DW) for analytical reporting and data analysis. You can achieve key opportunities like real-time data integration and data modeling, and hence real-time BI reporting on large amount of data in the database.



SAP NetWeaver BW Running on Classical DB

	BW on Classical DB Approach – Challenges
Business User Dissatisfaction	Long wait times, slow reporting, not optimal to meet needs of business users
Real-Time Data Access	Traditional latency issues in getting timely information
Planning Performance	Planning speed slow due to bottleneck of reading & writing data to/from a classical database
Loading Performance	Challenging loading windows; loading and consolidation of data not optimal
Remodeling Effort	Complex and difficult to apply structural changes quickly enough to meet business user requests
Performance Optimization	Requires management of database like indexes, aggregates and DBA operations as well as management of BWA



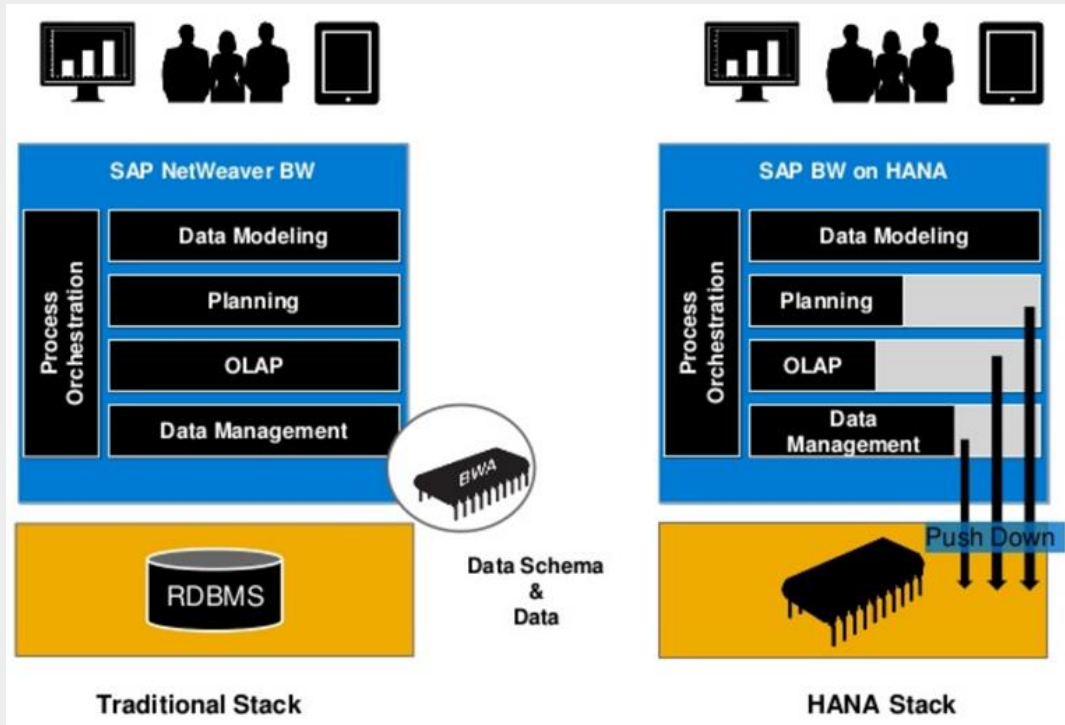
SAP BW on HANA – Benefits

1. Excellent performance in analytical reporting and data loading using HANA in memory database capabilities. All BW functions performed in SAP HANA benefits from in-memory database and calculation engines for faster data processing.
2. With HANA optimized objects, you can perform complex queries, detailed analysis, high data volume, and aggregations efficiently.
3. All existing BI tools such as BEx, Business Objects BI reporting tools, and Microsoft Excel are directly supported by SAP BW on HANA.
4. SAP HANA provides high level of data compression. Column storage of tables requires less storage type and hence provides lower Total Cost of Ownership (TCO).
5. Business Warehouse Accelerator (BWA) is not required while using HANA underneath BW.
6. You don't need aggregated tables and HANA supports on-the-fly aggregations.
7. It has simplified data modeling by using in-memory-optimized objects. There is no need to load BWA index.
8. When you use SAP BW on HANA, the following processes are not required –
 - Rolling Up Filled Aggregates
 - Filling of New aggregates
 - Adjust Time-Dependent Aggregates
 - Construct Database Statistics
 - Build Index
 - Delete Index



SAP BW On HANA- Smarter, Simpler and More Efficient

How Does BW running on RDBMS differ from BW running on HANA



Customer Values of SAP BW powered by SAP HANA

- Excellent query performance for improved decision making
- Performance Boost for Data load processes for decreased data latency
- Accelerated In-memory planning capabilities for faster planning scenarios
- Flexible combine EDW with HANA Native data for real time insights and decision making
- Data persistency layers are cutoff and reduced administration efforts
- Simplified data modelling and remodeling

Data intensive function are pushed down from BW to HANA layer.



Questions?

People matter, results count.

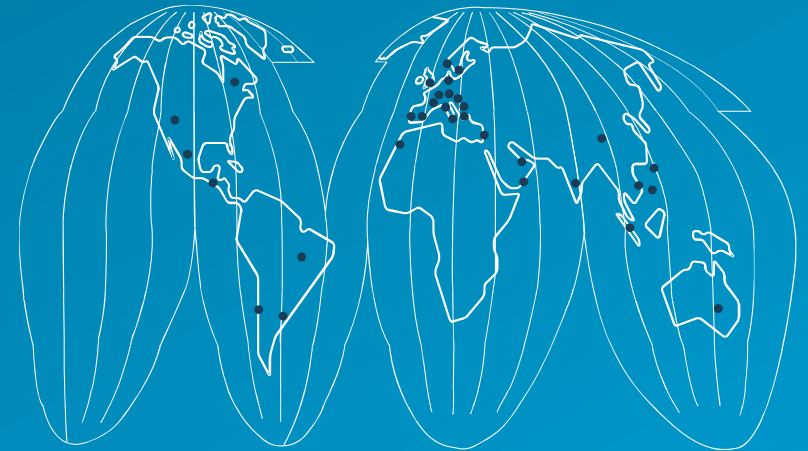


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