



THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF WATER AND IRRIGATION

**Introduction to Water Information System
(WIS)**

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Water Information System (WIS)

Objective:

Offers a methodological framework, databases and tools to manage relevant water data and provides water specialists (MWI, WAJ, JVA, universities, research institutesetc) with reliable managed data and information for water sector monitoring, management and planning.

Water Information System (WIS)

Components :

- *Data:* Water sector data are stored in spatial and tabular database management systems (DBMS).
- *Software:* ORACLE and Access standard packages are used as tabular DBMS, spatial data are managed with ArcView.
- *Hardware:* PCs, printers and plotters, network infrastructure

Water Information System (WIS)

Components :

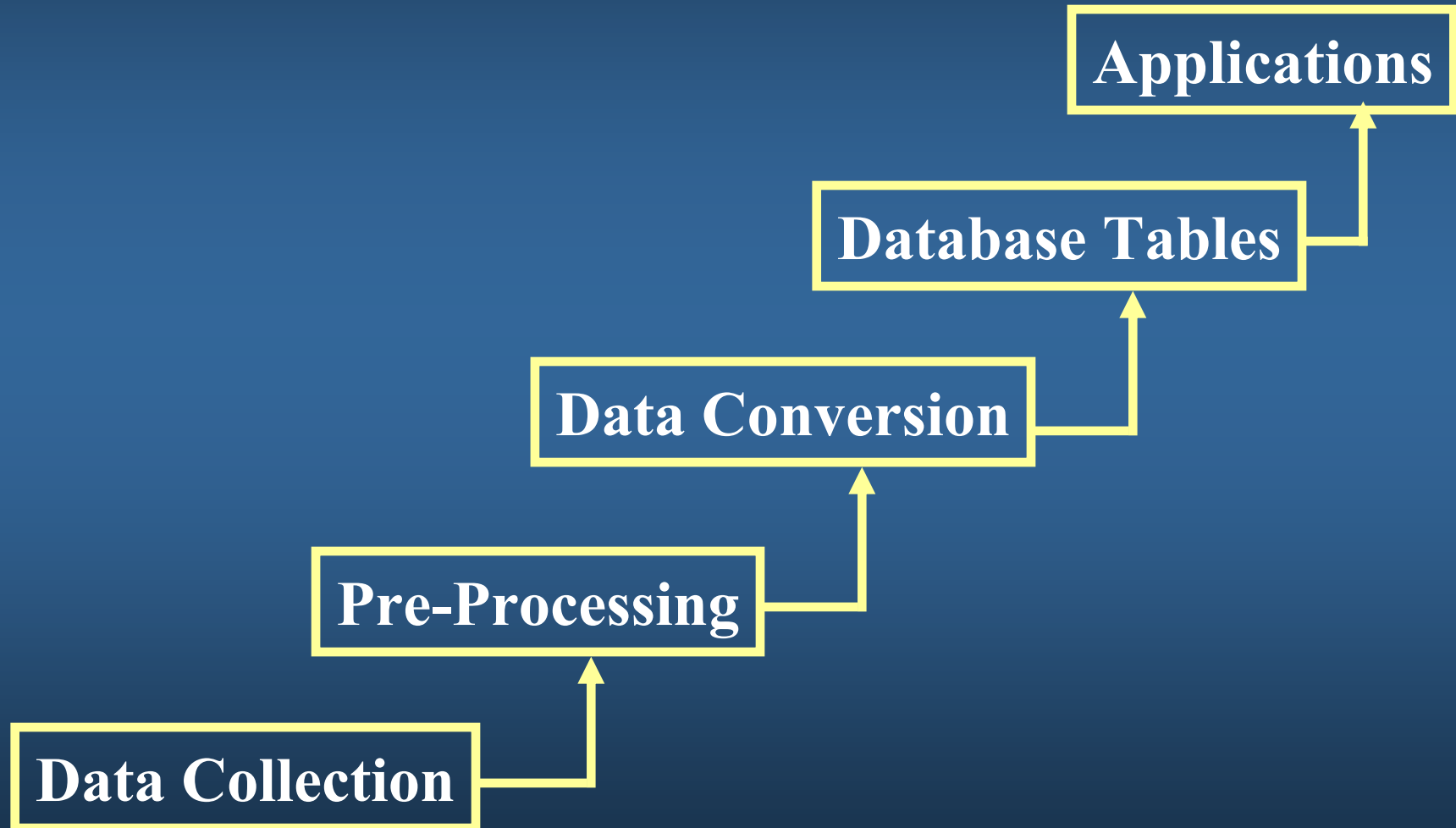
- *Procedures and Methodologies:* A set of procedures and methodologies describes and organises data exchange, storage, quality assurance as well as data processing
- *Data Exchange Relationships:* Regular Data exchange relationships exists or will be developed with MWI, WAJ, JVA and others Institutions.

Water Information System (WIS)

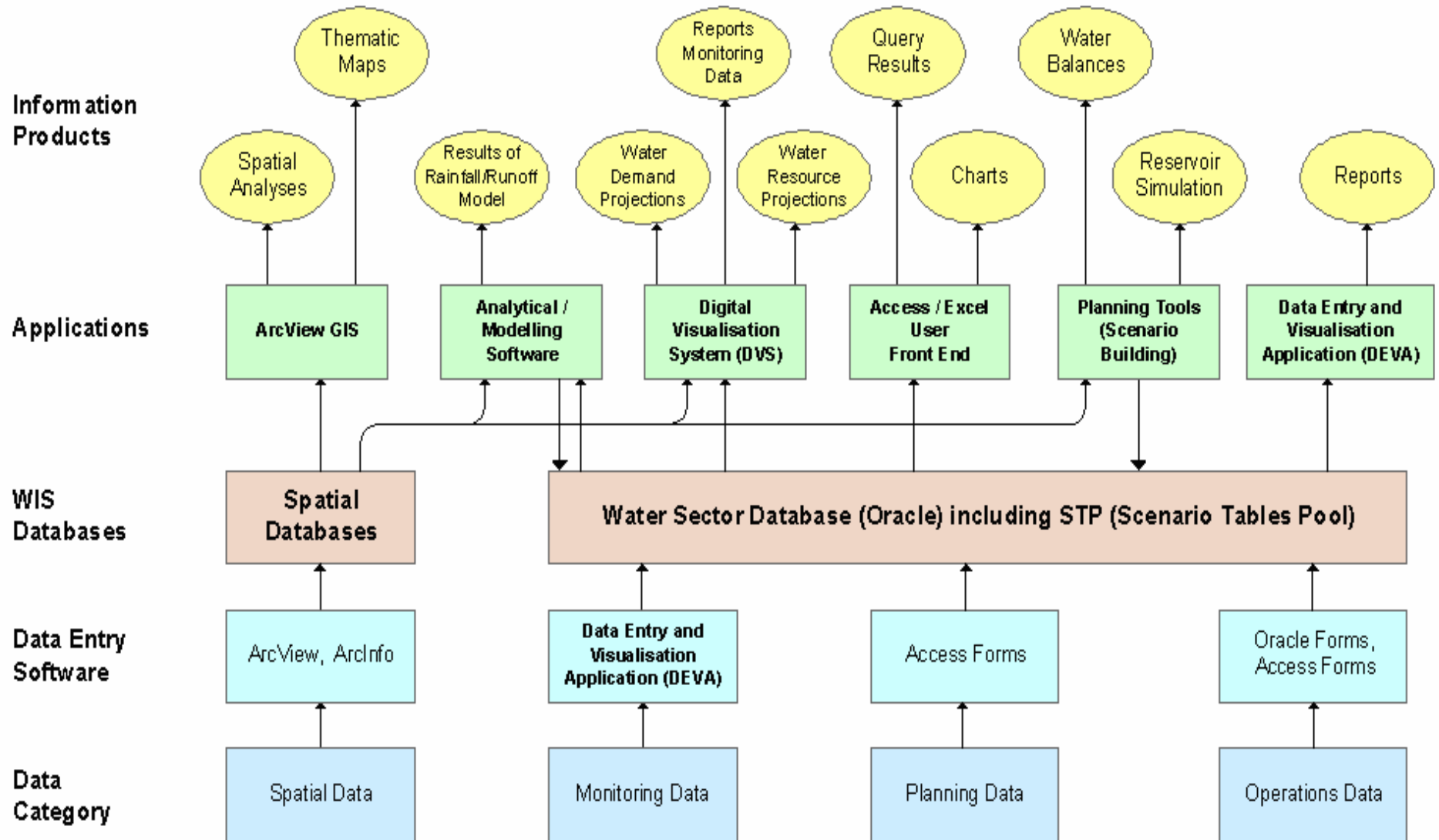
Components :

- *User Interfaces:* To provide standard information products and application for data entry and reporting.
- *People:* as individuals or in organisations use and manage the WIS.

WIS Conceptual Data Flow Diagram

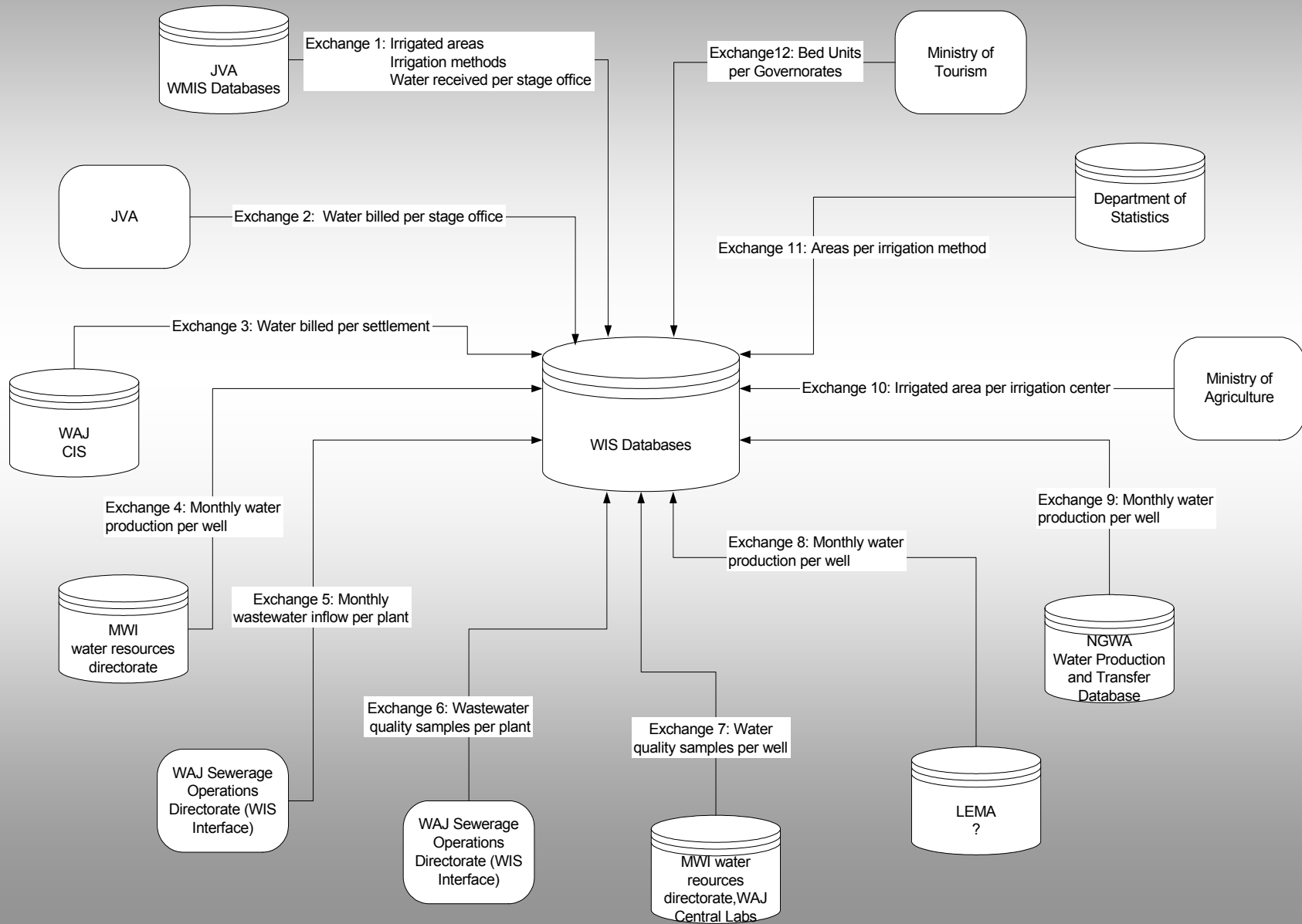


WIS Structure



Data Sources	RJGC, WAJ, JVA	MoWI, WAJ, JVA, MoA	WAJ, JVA	WAJ, JVA
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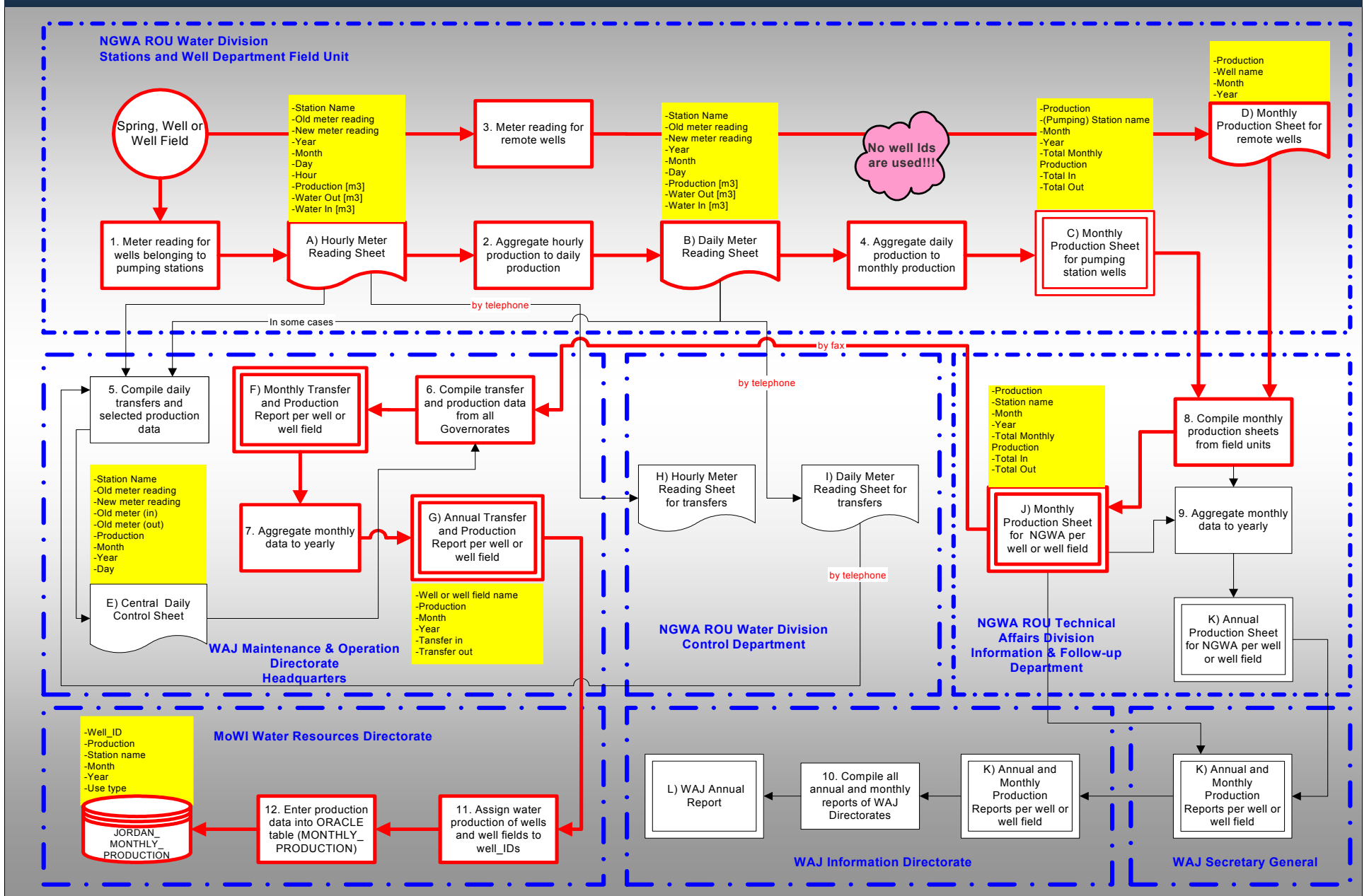
Overview of NWMP Data Exchange



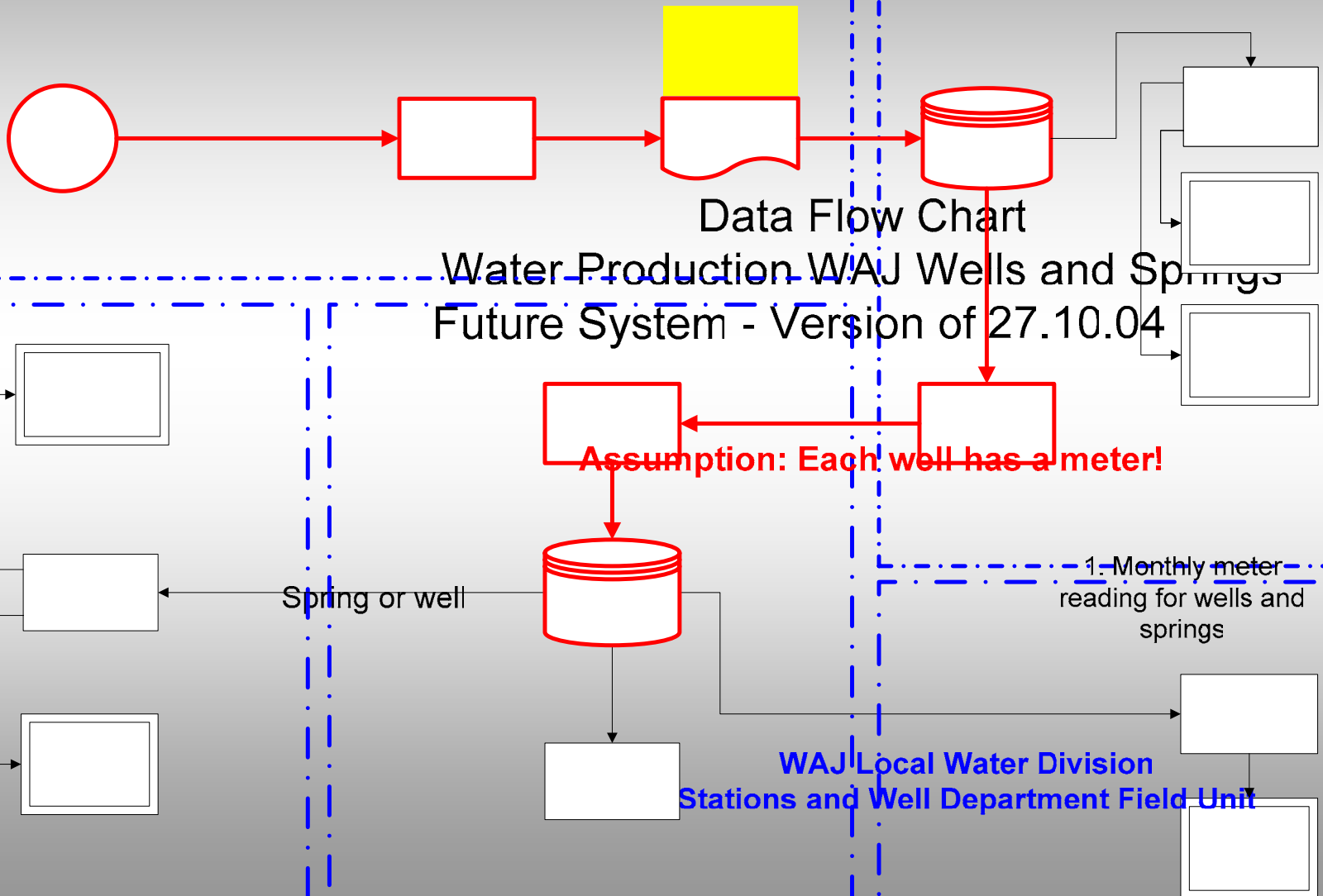
Overview of WIS Data Flows

Data Flow Name	Flow Number	Domain	Data Owner	Frequency
Production Data of Public Wells	001	Production	WAJ-Maintenance & Operation	Monthly
Quality Data of Public Wells	002		WAJ-Lab Directorate	
Water level & Quality of Public Wells	003		MoWI-Surface &GW Monitoring Unit	
Drilling Data of Public Wells	004		WAJ-Drilling Directorate	
Production Data of Private Wells	005		WAJ-Security & Protection Unit	Monthly

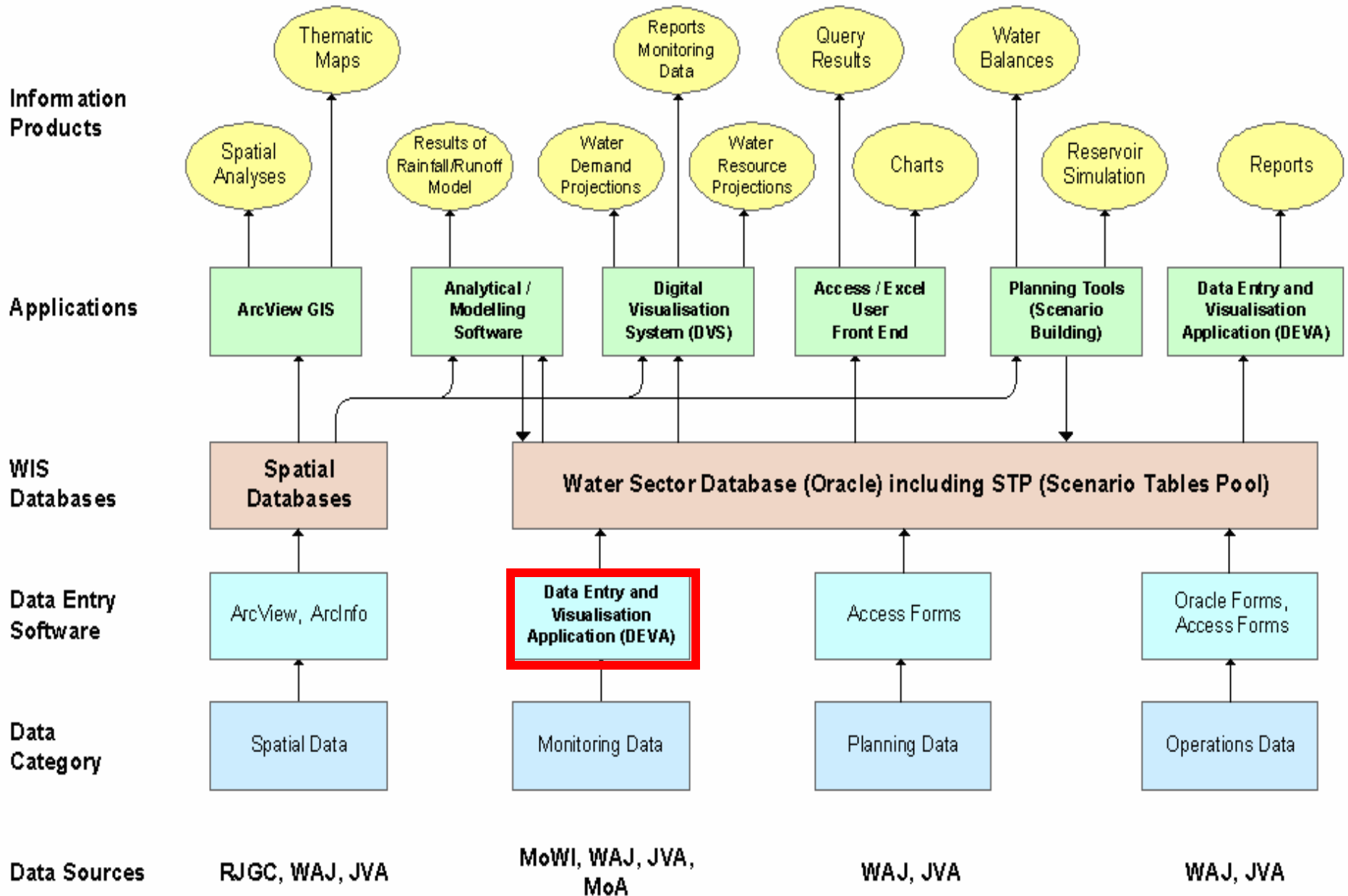
Water Production Data Management Activities for WAJ Wells with Data Elements (Present Situation)



Water Production Data Management Activities for WAJ Wells with Data Elements (Future Situation)



WIS Structure



Data Entry and Visualisation Application (DEVA)

DEVA is used for **data entry** and reporting operations.

The screenshot displays the 'Water Information System - [INQ_FRM]' application window. The menu bar includes 'WIS Databases', 'Process Type', 'LUTS', 'Reports', and 'Window'. The 'Process Type' menu is open, showing 'Data Entry Query' selected, with a red arrow pointing to the 'Quarterly Billed Water Data' form.

The 'Quarterly Billed Water Data' form includes a title bar, a 'Year' input field, a 'Quarter' dropdown menu, and a table with the following columns: Settlement, Billing category, Water Billed (m³), and Comments. The table is currently empty. At the bottom of the form, there are navigation buttons: '<<', '<', '>', '>>', 'Query', and 'Exit'.

On the left side of the application window, there are two logos. The top logo is the national emblem of Jordan, featuring a crown, two eagles, and a shield. The bottom logo is for the 'Water Quality Improvement and Conservation Project', featuring a stylized water drop and a person, with the text 'مبادرة تحسين نوعية المياه والمحافظة عليها' and 'WATER QUALITY IMPROVEMENT AND CONSERVATION PROJECT'.

Data Entry and Visualisation Application (DEVA)

DEVA is used for data entry and reporting operations.

Water Information System - [INQ_FRM]

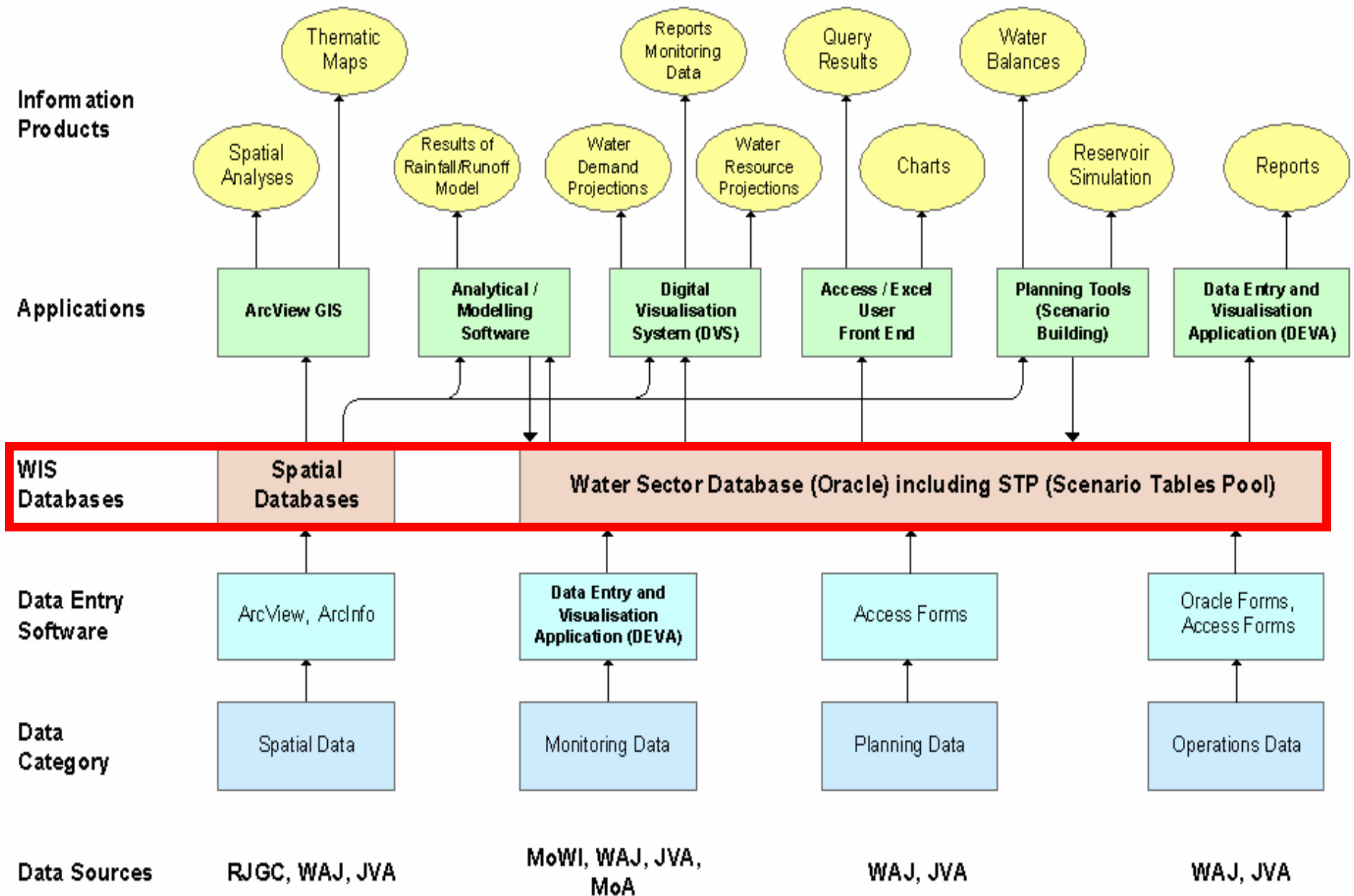
WIS Databases Process Type LUTS Reports Window

Ground Water
Wadi/Streams
Springs
Rainfall
Evaporation
Water Uses
Waste Water Treatment Plants

Monthly Daily Average Influent Per a Year
Monthly Daily Average Effluent Per a Year
Monthly Inlet Average BOD
Monthly BOD Efficiency
Total Monthly Influent in MCM
Total Monthly Effluent in MCM
Total Yearly Influent
Yearly Influent BOD
Yearly BOD Efficiency
Yearly Influent and Average Loads
Yearly Quality for Influent Effluent
Monthly Average Inlet and Outlet Quality Chart for
Monthly WWTP Efficiency Per a Year Chart For
Monthly Average Flow and Plant Capacity Chart
Yearly Quantity and Quality Data
Daily Average Influent and Effluent chart
Monthly Total Influent/Effluent Chart
Monthly Average Inlet BOD and Design Value Chart

**Welcome
To The Water
Information
System
Databases**

WIS Structure



WIS Database Elements

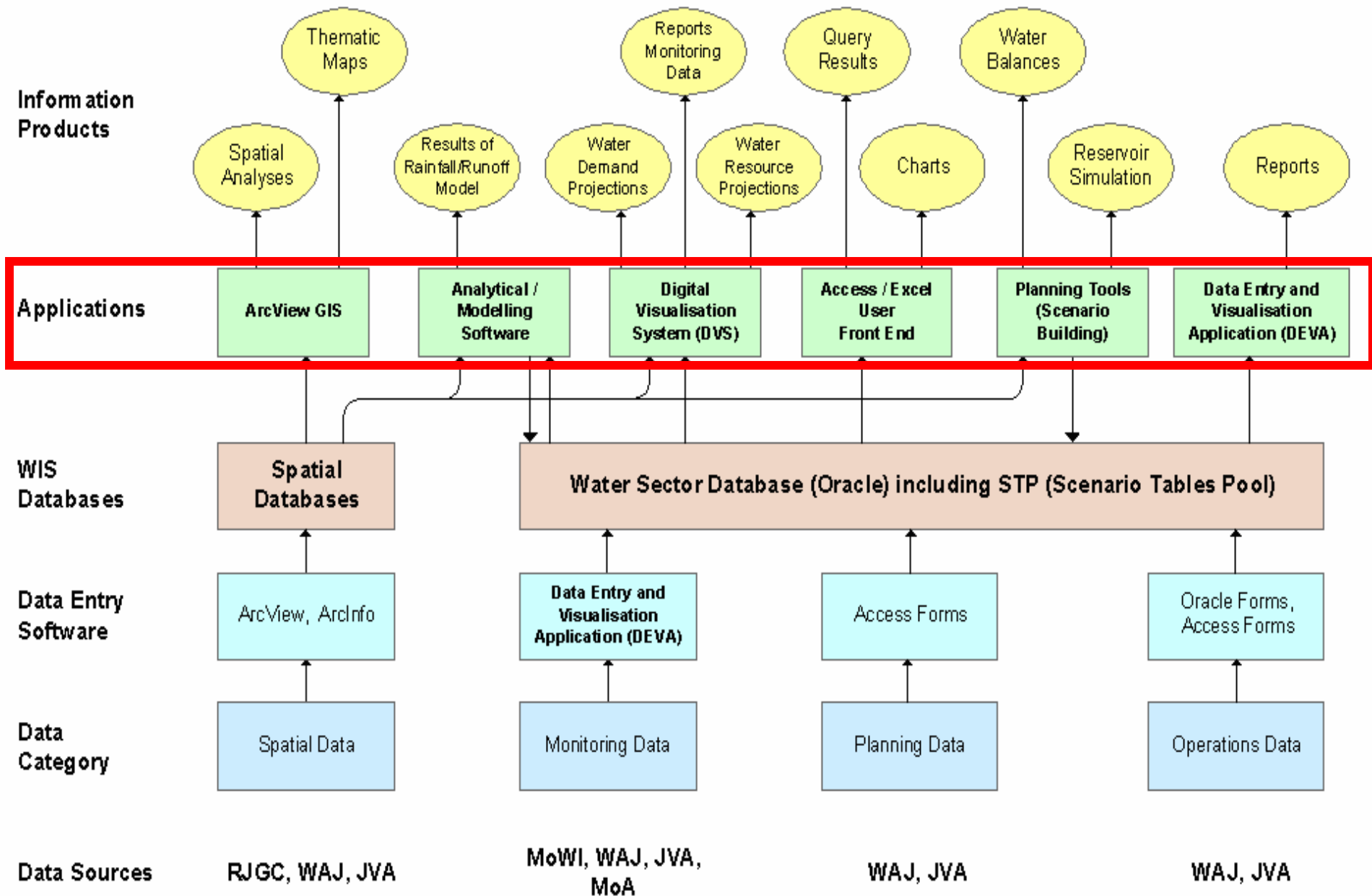
- GIS Spatial Databases (Arc View)
- Water Sector Database (Oracle)
 - *Water resources monitoring system (WMS):* Water resources quantities and water quality monitoring.
 - Water Uses and Demands
 - *Monitoring data for municipal and industrial facilities with wastewater discharges.*

WIS Database Tables

Two types of database tables are used:

- *primary tables (45)*: contain basic data, such as station location and descriptive data, discharge data, water quality data, water level data, aquifer characteristic data.
- *Look-up tables LUTs (55)*: contain full descriptive information that typically is used to support the water monitoring data related to a primary table.

WIS Structure

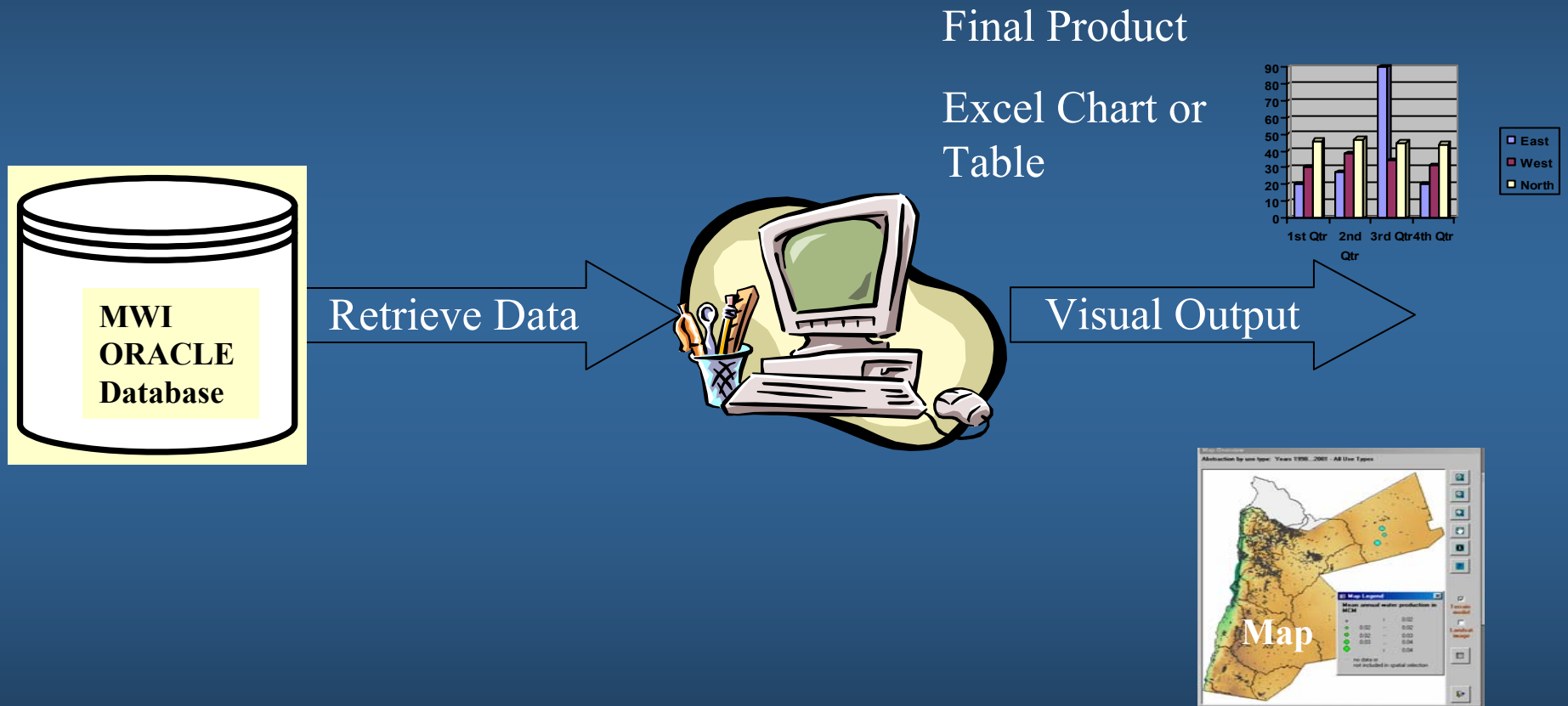


WIS Applications

Several Applications including:

- ArcView GIS.
- Analytical Modeling Software (Rainfall - Runoff Model).
- Access / Excel User Front End.
- Digital Visualization System (DVS).
- Digital Water Planning Tools for the regular Updating of the NWMP.

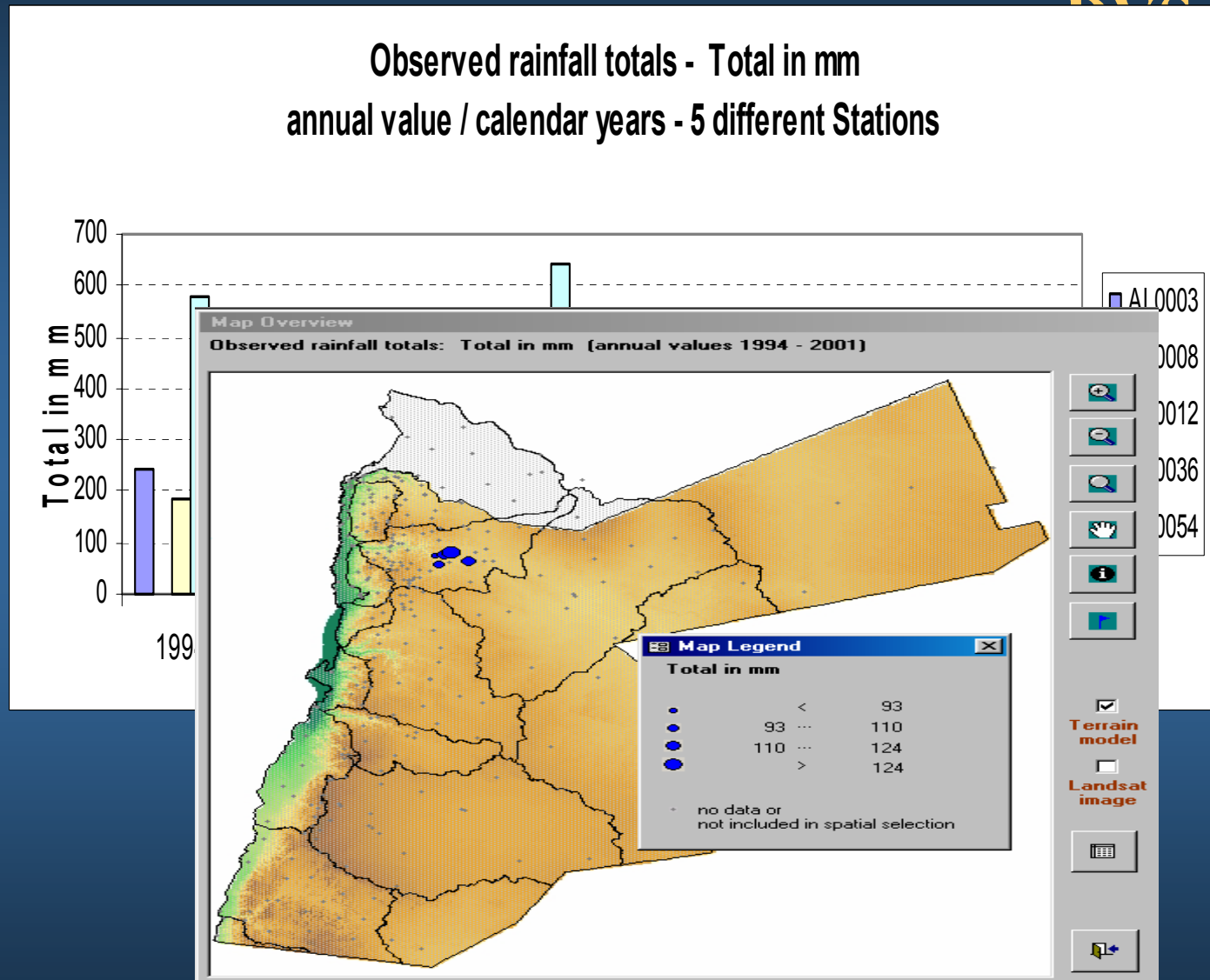
Data Flow Procedures



Objective of DVS: Perform Predefined Standard Queries under Local ACCESS Database

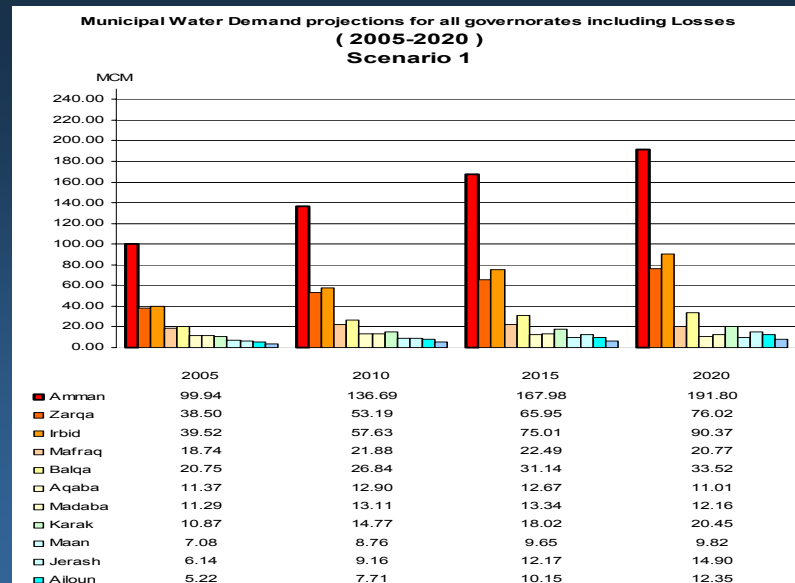
Examples of the products that can be produced by

Example 1:
Observed
Rainfall Totals
for different
Stations



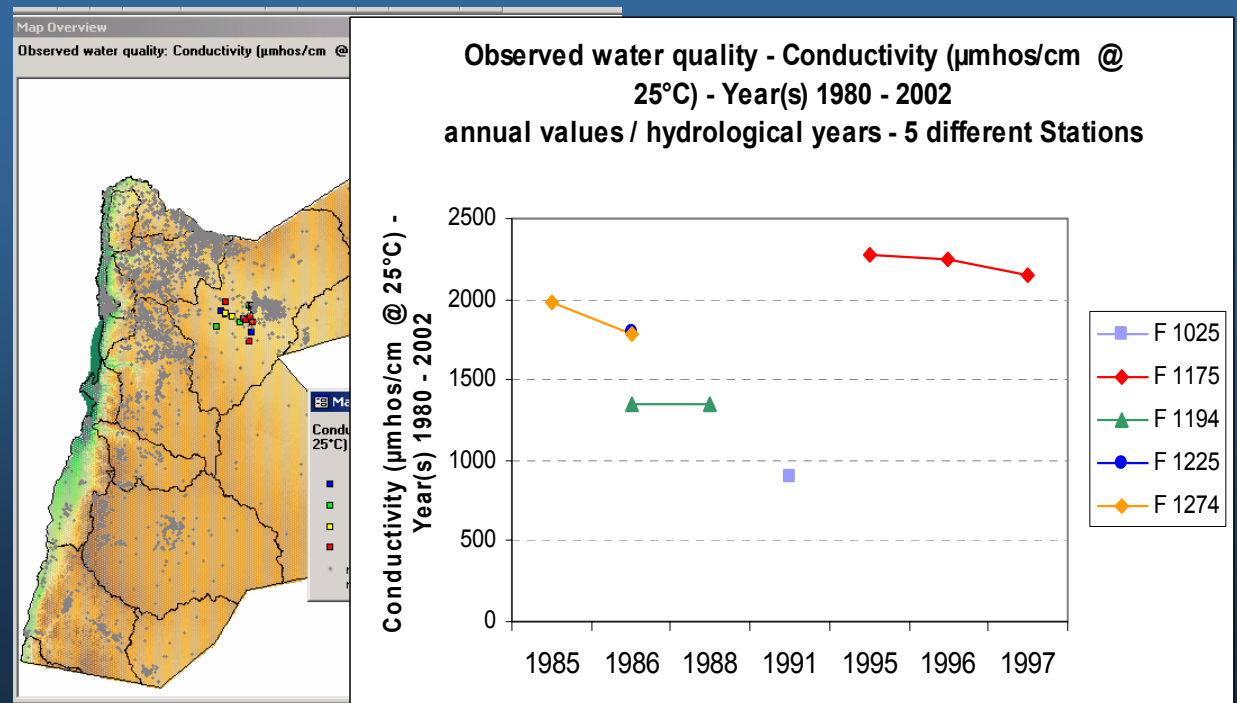
Example 2:

Municipal Water demand projections for all governorates



Example 3:

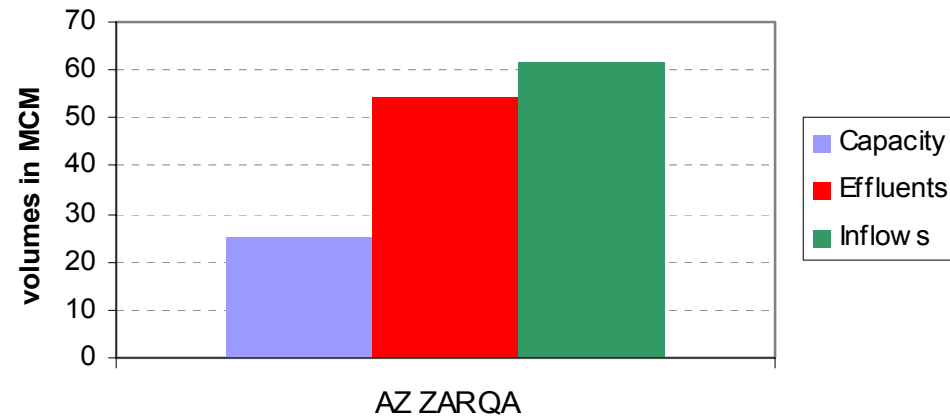
Groundwater Quality



Example 4:

WW Treatment Flow s

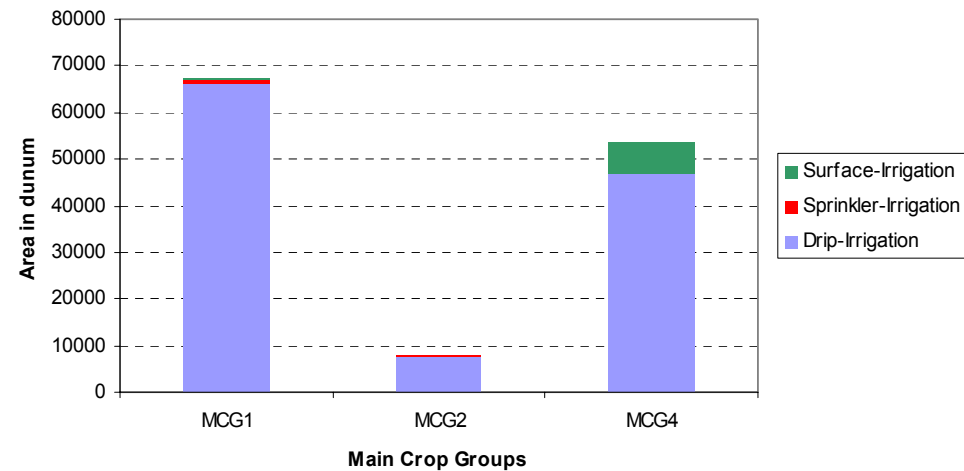
Waste water treatment plant flows - volumes in MCM
calendar years (inflows + effluents) - 1 selected
Governorate - Year 1998



Example 5:

Irrigation Areas

Irrigation Areas - Area in dunum
Year 1998 - only MCG(s) 1, 2, 4, 7 - all methods - Irrigation Center WESTERN
DESERT individual technologies, individual crops, Year 1998



Other Examples

Monitored flood flow at gauging stations

Monitored groundwater abstractions for various sectors

Monitored groundwater level—at single stations (hydrograph)

or mapping of regional change within a given interval

In order to fully benefit from the system

Data need to be updated regularly

Data need to be verified preferably through online queries (example: rainfall data)

Data structures must be compatible,
data codes must permit lossfree linking

Advantages

DVS helps the users to convert their data into useful information.

DVS helps verify data quality

DVS output is also used in the National Water Master Plan

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Digital Planning Tools

Rainfall/runoff model

Flood flow

GW recharge

Pre-processing modules of water resources
Using monitoring data from the ORACLE database of MoWI

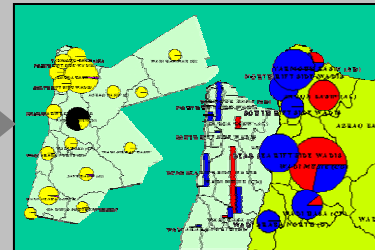
waste water module

Projected available water resources from 2005 to 2040

Scenario Tables Pool



Spatial Balancing



Calculated Water

Effect of Transfer Using the Transfer Module

Projected water demands from 2005 to 2040

irrigation demand module

NIR calculation

water losses module

Pre-processing modules of water demands (from ORACLE database)

municipal demand module

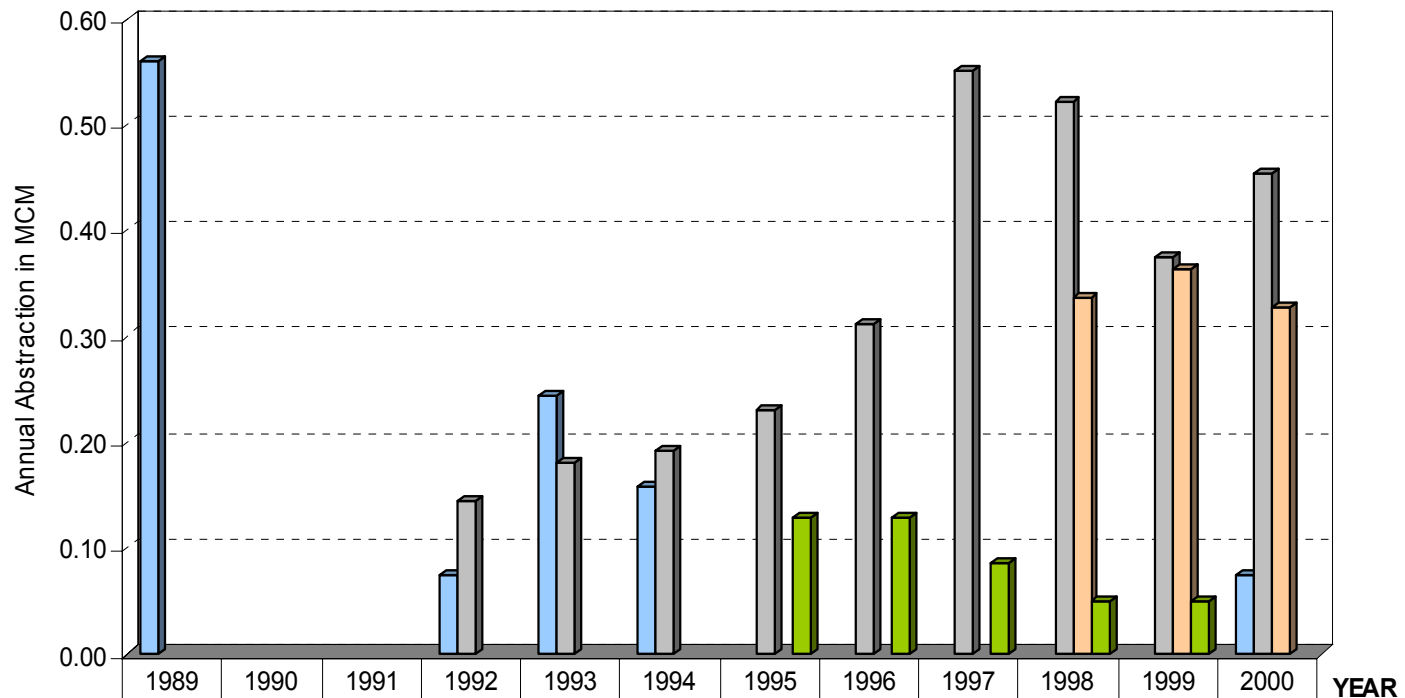
industrial demand module

tourist demand module

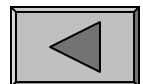
Thank You for Your Patience

Example for output of GW monitoring data from DVS to Excel (Abstraction of Hammad GW Basin by use type: 1989-2000)

TOTAL ABSTRACTION FOR HAMMAD GW BASIN PER USE TYPE PER YEAR



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
■ Domestic private 1	558,700			74,082	244,424	158,316						74,000
■ Domestic gov. 2				144,594	179,760	191,622	230,749	311,713	551,108	521,328	374,352	454,534
■ Pastoral 4										336,768	364,215	326,896
■ Irrigation 6							128,880	129,445	85,635	48,600	48,600	



Example for output of monitoring data from DVS to Excel (Water Level for Selected Station - 1998)

Groundwater monitoring - AL1300 , YEAR 1998

