

“Geospatial Information Systems” a Management Tool in Petroleum Industry

Mohammad A. Rajabi

Assistant Prof. & Head, GIS Division

Dept. of Geomatics Eng., University of Tehran

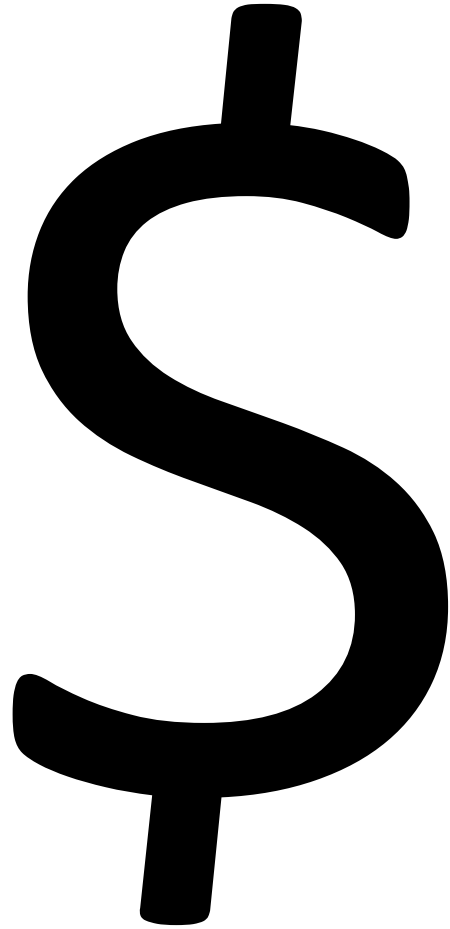
Tel: (+98 21) 8833 4341, Cell: (+98) 912 132 5823

Email: marajabi@ut.ac.ir

Homepage: www.marajabi.com

Table of Contents

- Introduction
- Management
- GIS
- GIS in Petroleum
- Conclusions



PMBOK



9 Knowledge Areas - 42 Total Processes

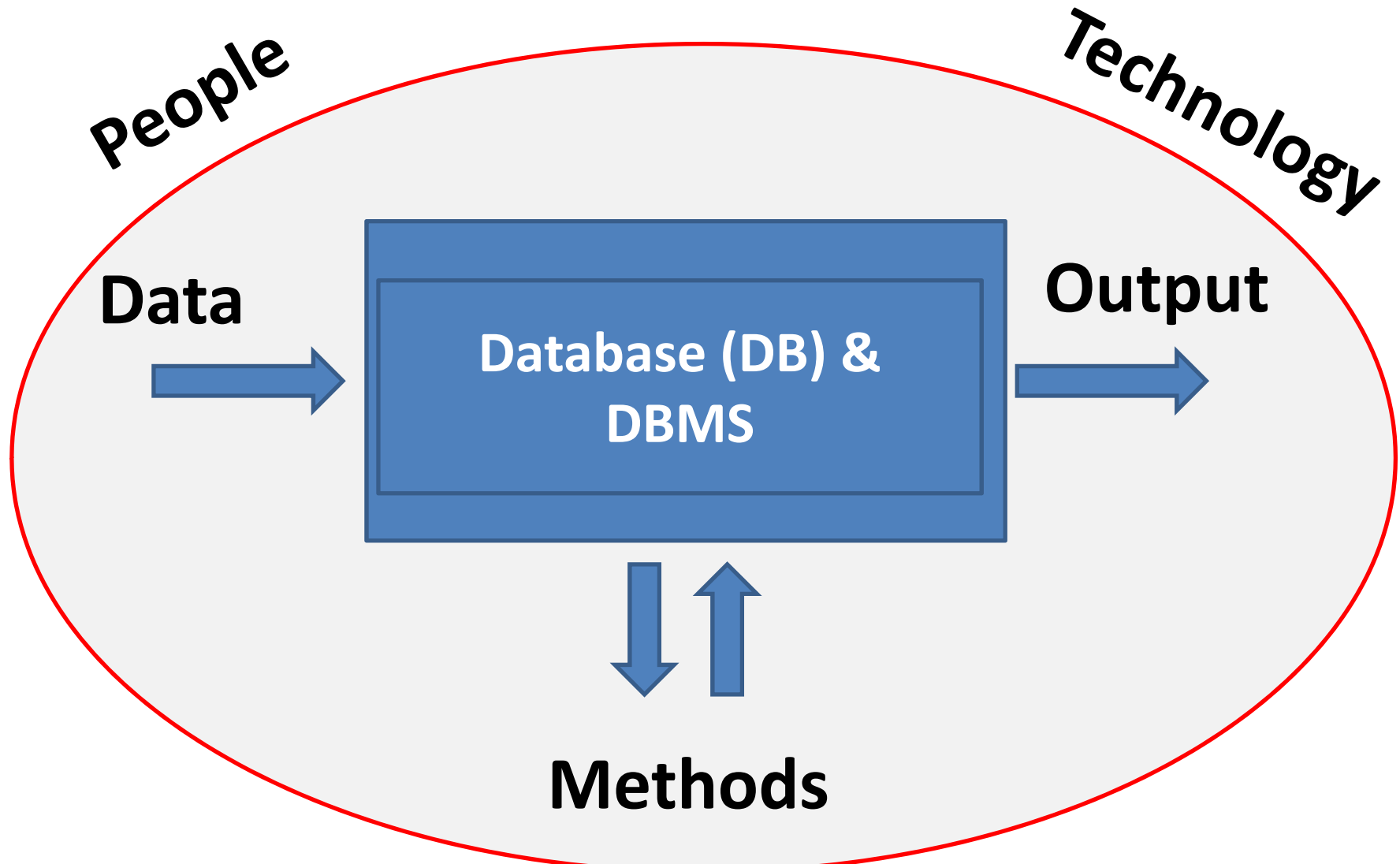
IT and GIS



Geospatial Information Systems

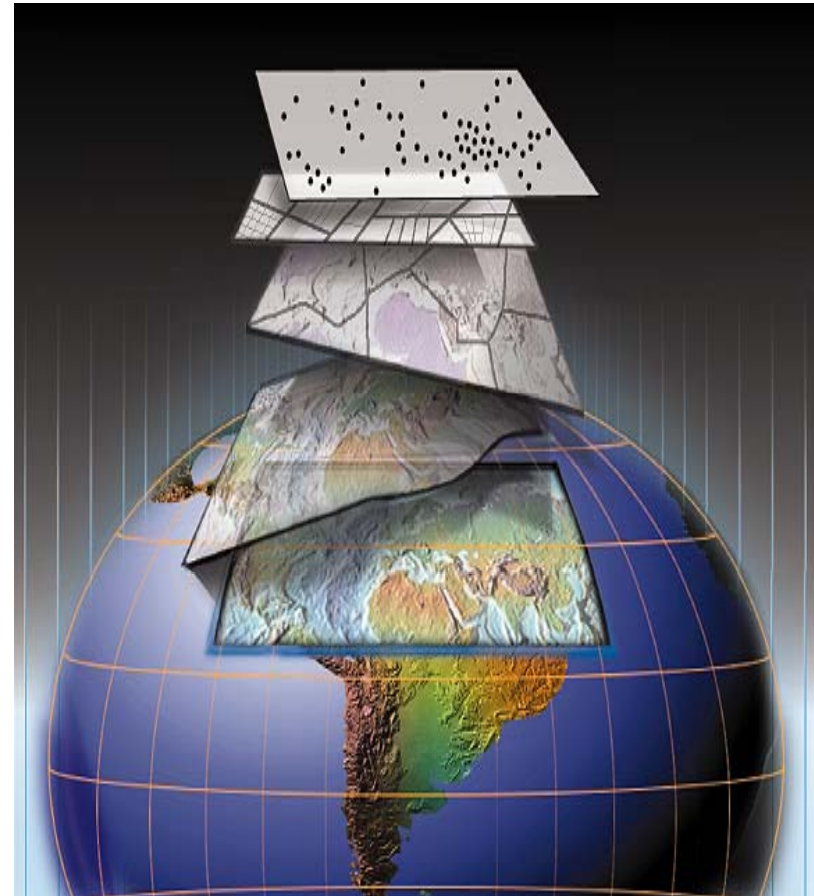
- Importance in daily life
- Storing, manipulating, analyzing, and displaying all forms of geospatially referenced information
- History
- Components:
 - Hardware
 - Software
 - People
 - Data
 - Methods

GIS, Another View



Data

- Spatial
 - Surveying
 - Photogrammetry
 - Remote Sensing
 - (Spectral, Temporal, Spatial)
 - GPS
 - Internet
 - (GTOPO30, SRTM, TIGER, Virtual Earth, Google Map, ...)
 - Paper Maps (Scanning, Digitizing)
- Non-Spatial/Attribute

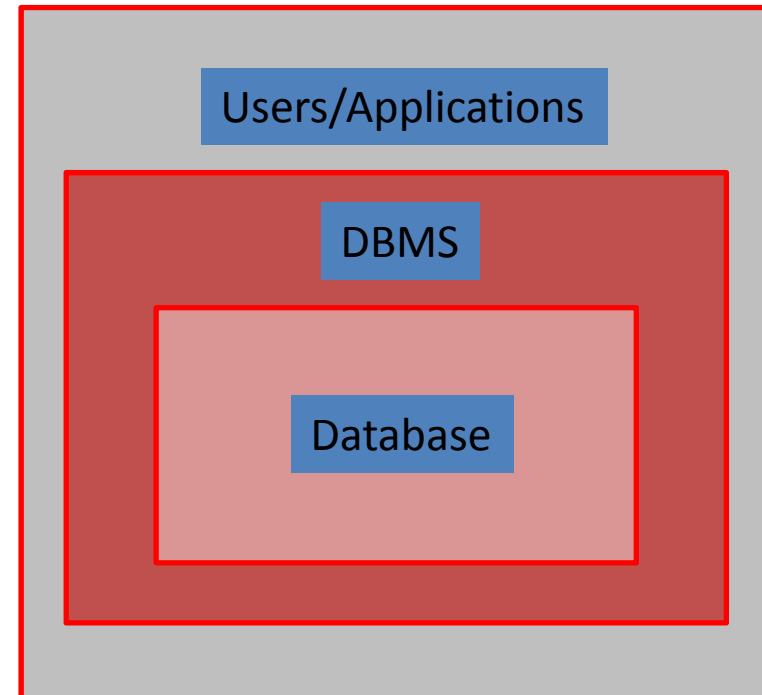


Data Concerns

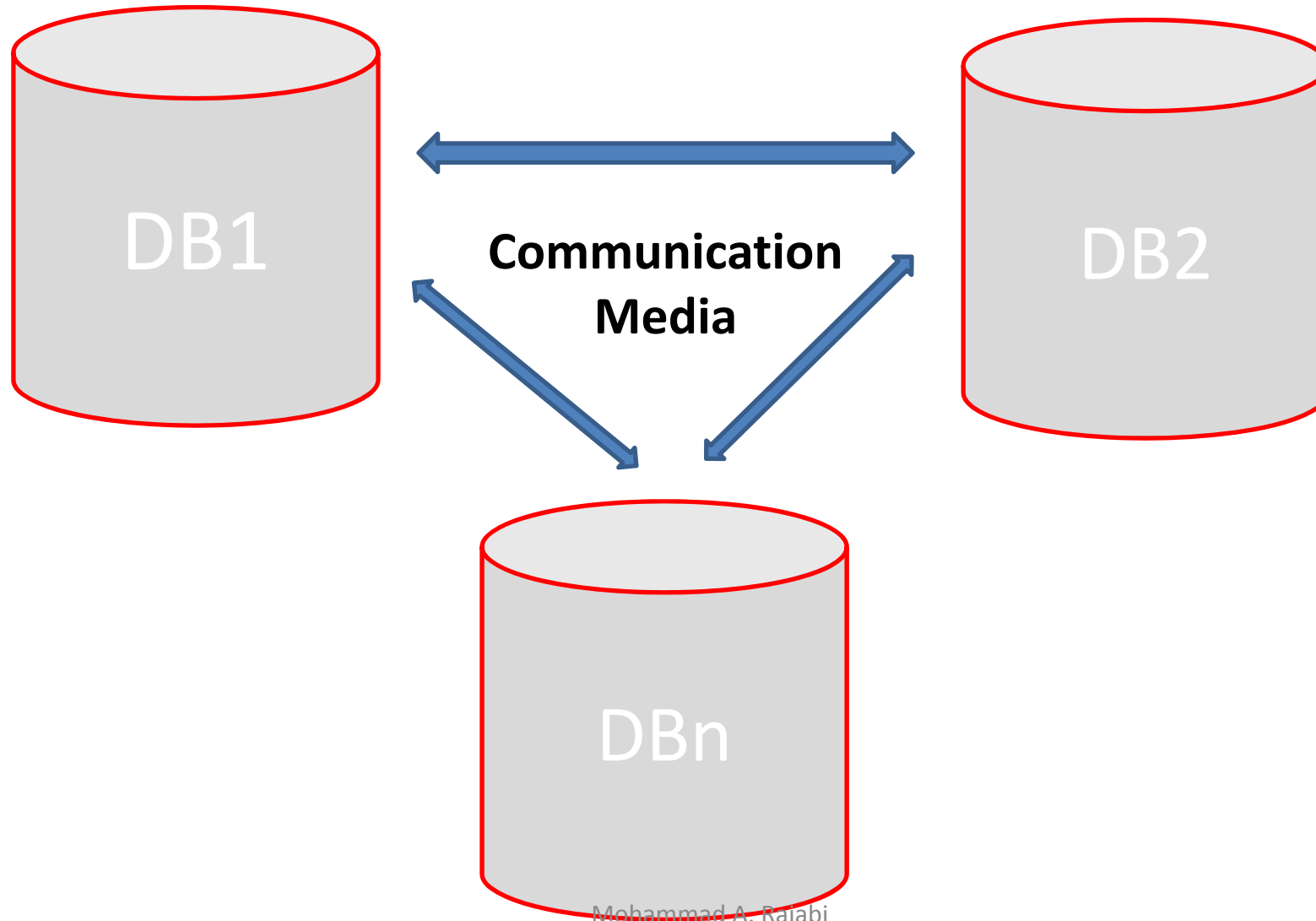
- The very first bottleneck
- Cost (collection, updating)
- Different datum and map projections
- Different sources/quality
- Data types (raster & vector)
- Metadata
- Standards, Interoperability
- Spatial Data Infrastructure (SDI)

DB Versus DBMS

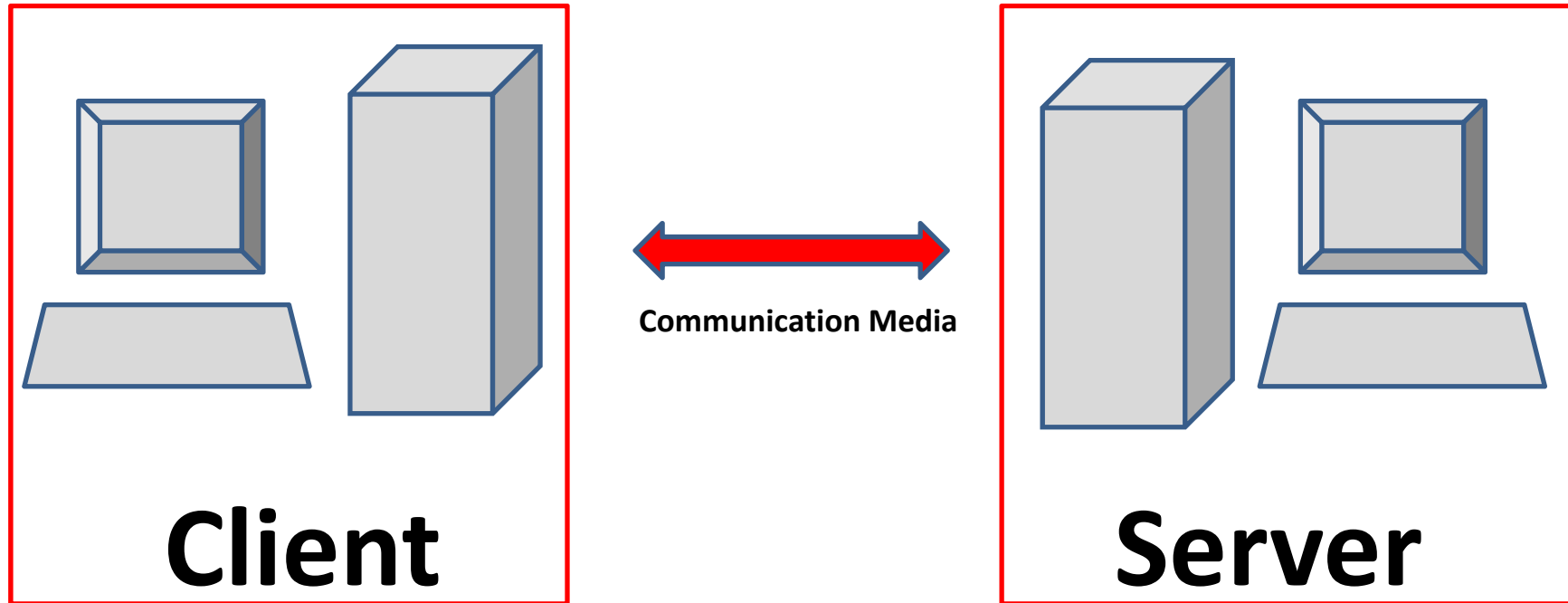
- Security and Integrity
- Real World
- Conceptual Modeling
 - Simplified World
- Logical Modeling
 - Tables & Relations Diagrams
- Physical Modeling
 - Creating Tables
- Data Entry



Distributed Databases

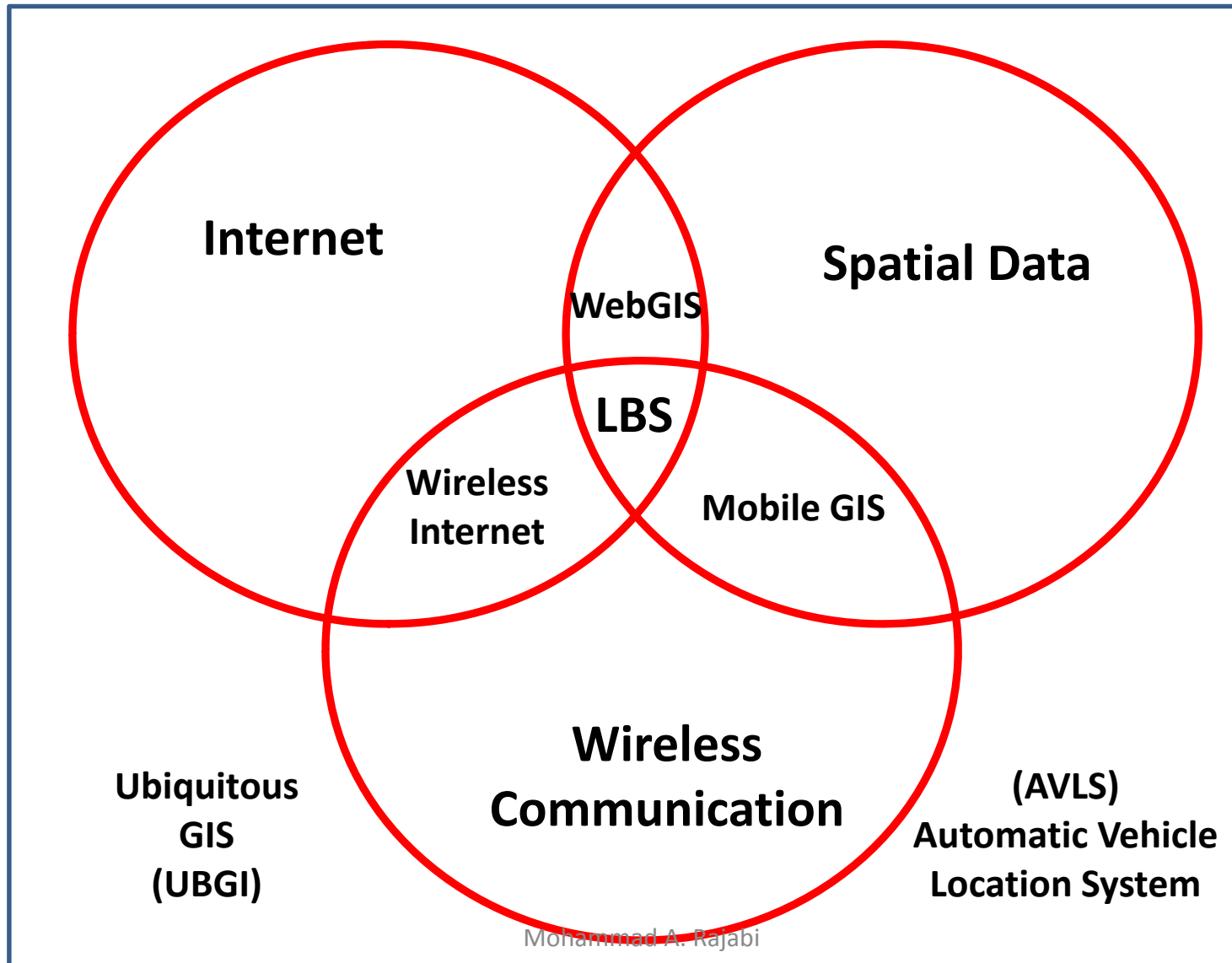


Client – Server Architecture



Presentation Logic Data

New Concepts



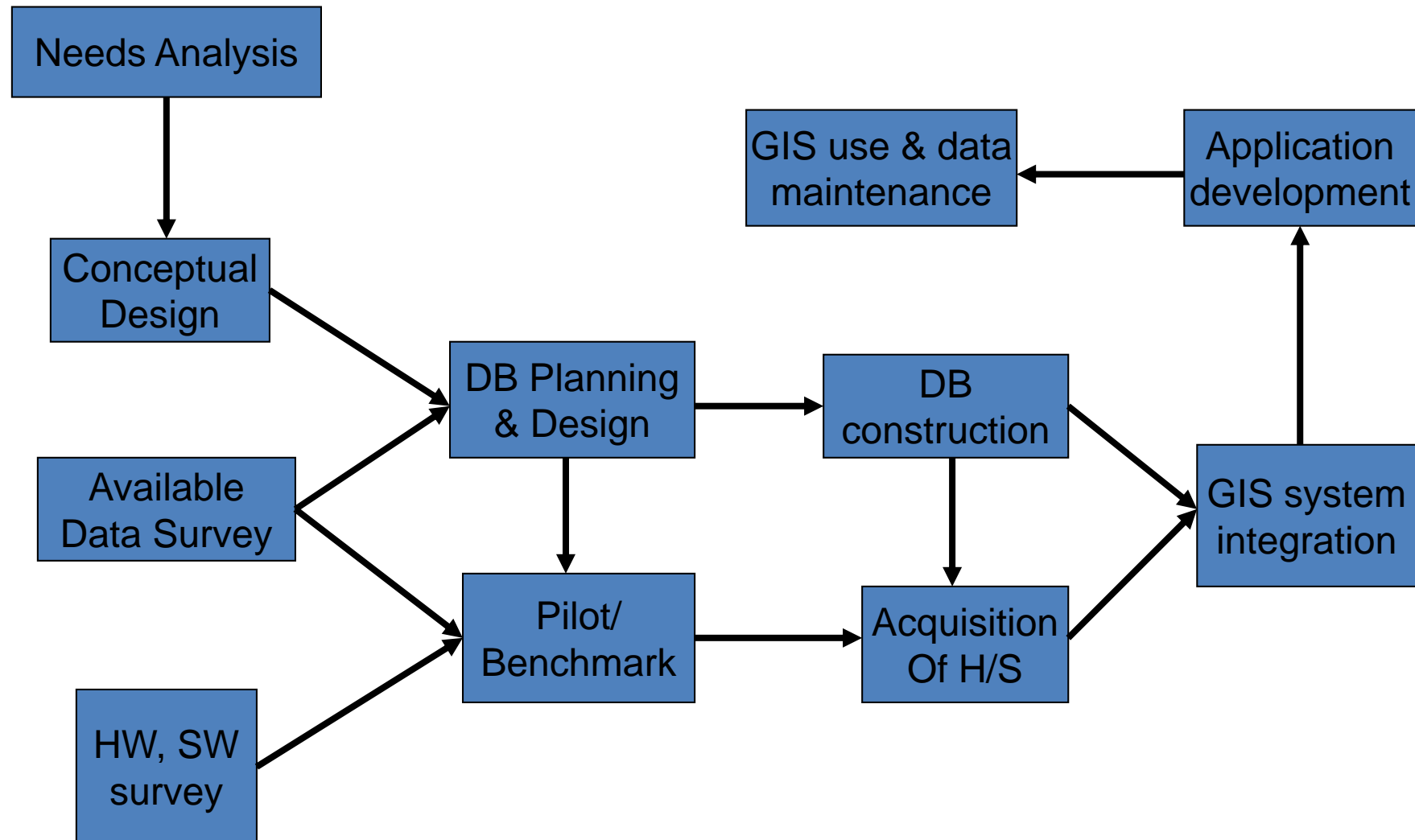
GIS Software

- Licensing (Open Source/Commercial)
- Operating System
- Supporting programming languages
- Pure Server
- Pure Client
- Mixed
- Add-on Applications
- Maintenance and Support

Output

- Reports
- Graphs
- Thematic Maps
- 3D Visualization and Virtual Reality

Development of a GIS



IRAN



Petroleum Industry

- Exploration
- Facilities Management
- Production Management
- Tanker Fleet Management
- Pipeline Routing
- HSE and Emergency Response

Exploration & GIS

- Combination of different data
 - Seismic
 - Gravity
 - Magnetic
 - DTM and Topographic Maps
 - Faults
 - Satellite Imageries
 - Boreholes & 3D Models of Subsurface
 - Cadastre Maps
- Location
- Allocation

Facilities Management

- Tracking equipments in the field
- Maintenance Management
- Asset Tracking using indoor positioning techniques (RFID, Wi-Fi, Bluetooth, ...)
- Personal Tracking
- As built maps
- Mobile GIS
- Spare parts integrity
- Utility Management

Production Management

- Environment Monitoring
- Major Incident Management
- HSE (What if ... Then... scenarios)
- Human Resource Management
- Procurement Management

Tanker Fleet Management

- Automatic Vehicle Location System (AVLS)
 - Online, using GPS and wireless communication
 - Offline, using GPS and memory cards
- Checking sensors

Pipeline Routing

- Cadastre Maps
- Topographic Maps
- Faults
- Parts Integrity Monitoring

HSE and Emergency Response

- Risk Assessment
- Risk Management
- Location and Allocation of emergency response teams

Conclusions (1)

- It is all about money!
- Management standards (PMBOK)
- GIS as part of IT business
- The importance of “G” in our daily life
- GIS definition
- GIS components
- Desktop versus distributed solutions
- New concepts
- GIS bottlenecks (data & people)

Conclusions (2)

- Petroleum industry inherently spatial
- Simultaneous management of spatial and non-spatial data
- Data flow over intranet and internet
- Integrated/standard data
- Real time/near real time data analysis
- Data standard
- Integrated management of equipments