Lesson 9
Data Analytics for the IoT /M2M Data

Analytics

- Organised Data after acquiring from the devices used for multiple purposes
- For example, analytics
- Analytics enables finding new facts, taking decisions on those facts

Two ways of usages after organising the devices data

(1) For monitoring, reporting and rule based actions. For example, in Internet of Streetlights, Application just do that. (Example 1.2)

(2) For Analytics, new facts, and taking of the decisions on those facts. Application do analytics also

Analytics

- Enabling facts based decision making in place of the intuition driven decision making
- Providing Business Intelligence
- Providing key for the success of an Enterprise/Business

Example of Usages of Analytics

- Internet of ACVMs can use Analytics
- New facts are found, for example user chocolate preferences location wise,
- Facts enable taking of the decisions for new option(s) to maximize the profits from the machines

Phases of Analytics

1. Descriptive analytics:

   Enable deriving the additional value, from visualizations and reports

Analytics Phases

2. Predictive analytics:

Advanced Analytics which enables extraction of new facts and knowledge, and then predict/forecast

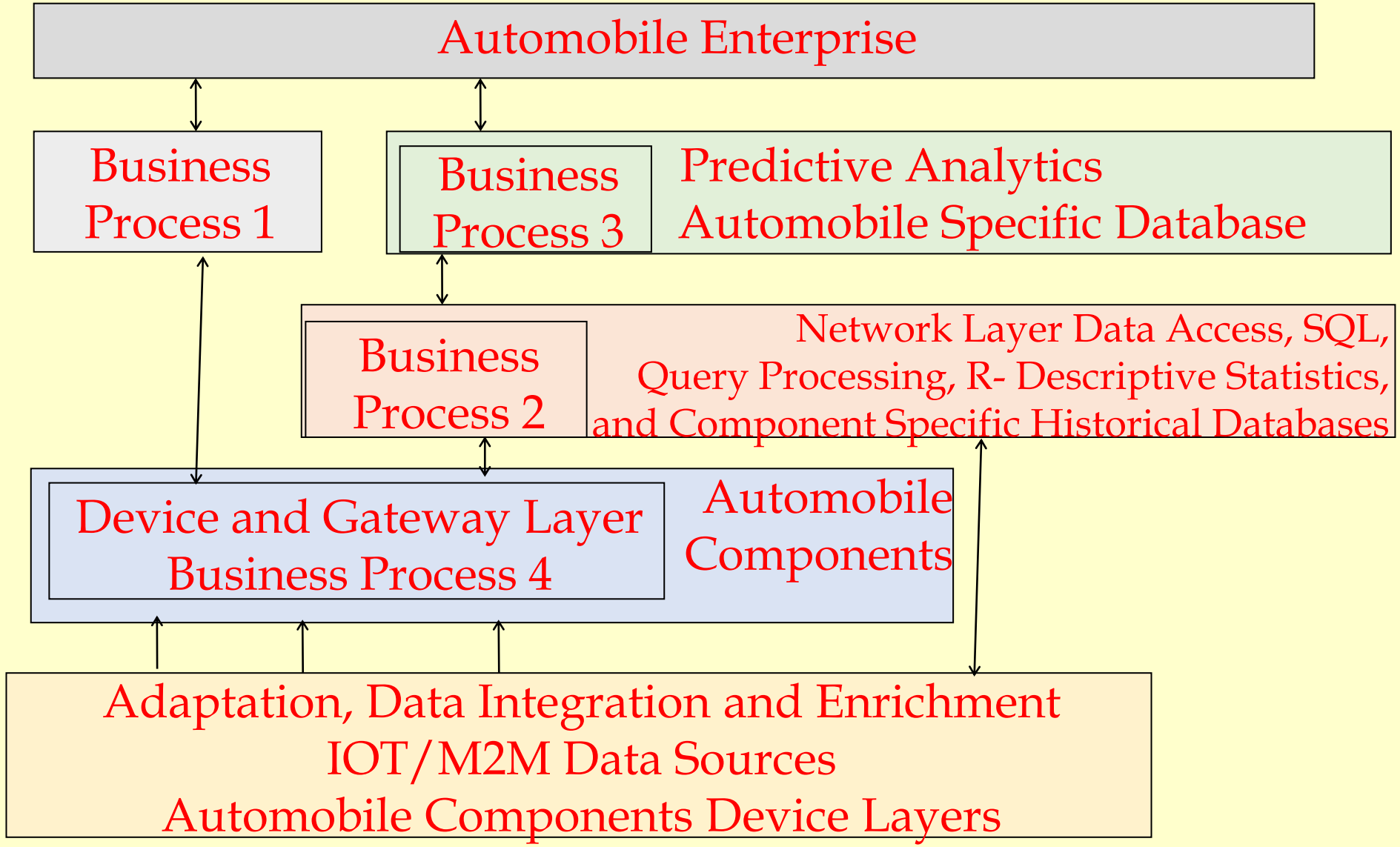

Fig. 5.3 Distributed Business Processes at Enterprise, Network and Device/Gateway Layers

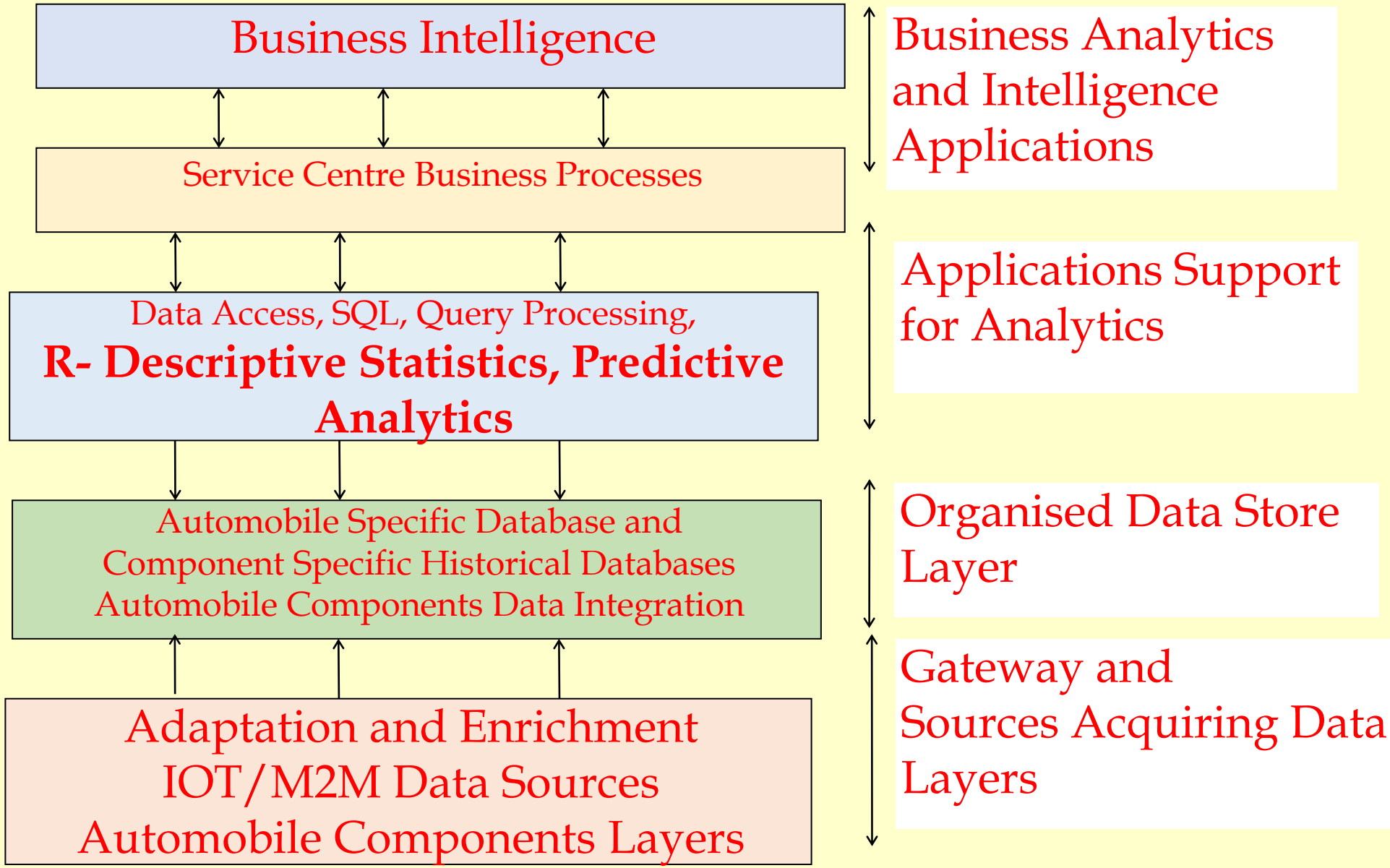

Fig. 5.2 Business Intelligence/Business Processes Architecture

Analytics Phases

3. Prescriptive analytics:

Enable deriving the additional value, and undertake the better decisions for new option(s) to maximize the profits.

Descriptive Analytics

- Answers the question what happened in the past
- Means finding the aggregates, frequencies of occurrences, mean values (simple or geometric averages) or variances in values or groupings using selected properties and using these.

Descriptive Analytics

Enable

- actions, for example, Online Analytical Processing (OLAP)
- **Analytics** reporting or generating spreadsheets,

Descriptive Analytics

Enable

- visualizations or dashboard displays of the analysed results, and
- creation of indicators, called Key Performance Indicators:

Descriptive Analytics Methods

(1) Spreadsheet Based Reports and data visualisations
Spreadsheet enables user visualization of *what if*.

Spreadsheet Based Reports and data visualisations

- A value in cell C_jR_i (cell at j^{th} column and i^{th} row) can be related to another cell or a set of cells through a formula or Boolean relation or statistically analysed value

Descriptive Analytics Methods

(2) Descriptive Statistics Based Reports and data visualisations

Statistical Analysis

- Finding peak, minima, variance, probabilities, and statistical parameters
- Formulae used for the data sets to enable the understanding of variations in data shown

Descriptive Analytics Methods

(3) Descriptive analytics, statistics, data mining and machine learning analytics tools.

Data Mining analysis

- Use of algorithms which extract hidden or unknown information or patterns from large amount of data
- Machine Learning– means modeling of the specific tasks

Data Mining analysis

- SAS and SPSS tools.
- R– A programming language and software environment for statistical computing and graphics
- R language – the core of many open source products

tables

Machine Learning

- Modeling of the specific tasks

Descriptive Analytics

(4) Online Analytical Processing (OLAP) for Analytics

Summary

We learnt

- Descriptive Analytics
- Actions, for example, Online Analytical Processing (OLAP) for the analytics,
- reporting or generating spreadsheets,
- visualizations or dashboard displays of the analysed results, and

Summary

We learnt

- Descriptive Analytics
- Creation of Key Performance Indicators

End of Lesson 9 on
Data Analytics for the IoT /M2M Data