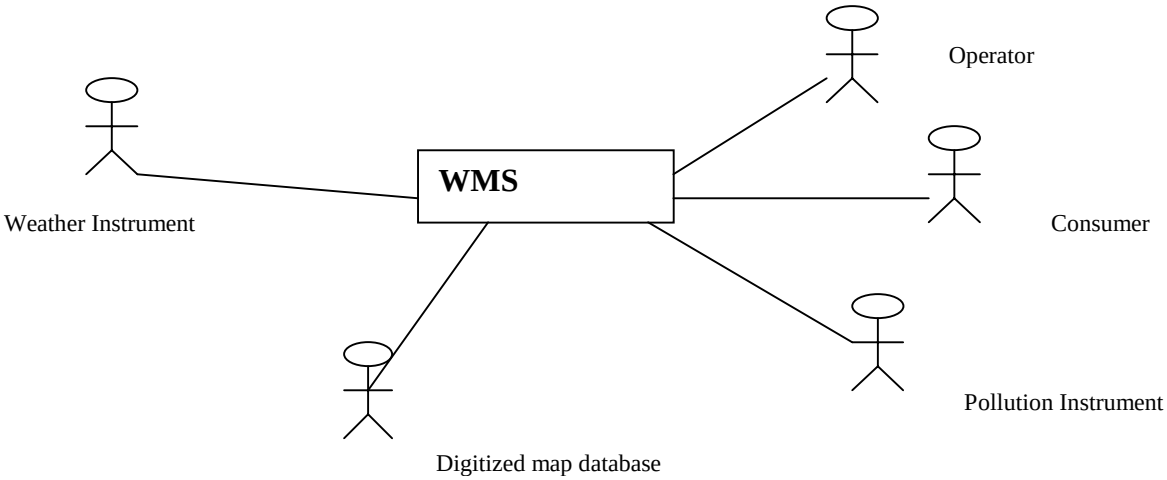
# Lab 1: Solutions

## *A. Use Case Modeling*

1.The following actors may be identified from the requirements: Instrument, Weather Instrument, Pollution Instrument, Operator, Digitized map database and Consumer.




***Actor documentation:***

- Operator: a person who is responsible for the maintenance of the weather mapping system.
- Consumer: a person who uses or needs the weather information produced by the system.
- Weather Instrument: weather sensors related to weather stations used to collect raw weather data.
- Pollution Instrument: air data sensors used to collect air data for pollution monitoring.
- Instrument: generalization of weather and pollution sensors.
- Digitized map database: an existing database containing mapping information.

2.The following needs must be addressed by the system:

- The Consumer actor needs to use the system to view or print weather maps.
- Weather sources collect weather data and send them on request to the area computer.
- The area computer validates, integrates and archives the weather data collected, and then processes weather maps.
- The digitized map database provides the mapping information needed to process local weather maps.
- The Operator actor manages and maintains the system.
- The area computer monitors the weather sources, for start-up, shutdown, and for instrument testing and calibration.

***Needs:***

Based on these needs, the following use cases may be identified:

- Startup
- Shutdown

- Collect data
- Calibrate
- Test
- Validate
- Integrate
- Archive
- Process map
- Display
- Print

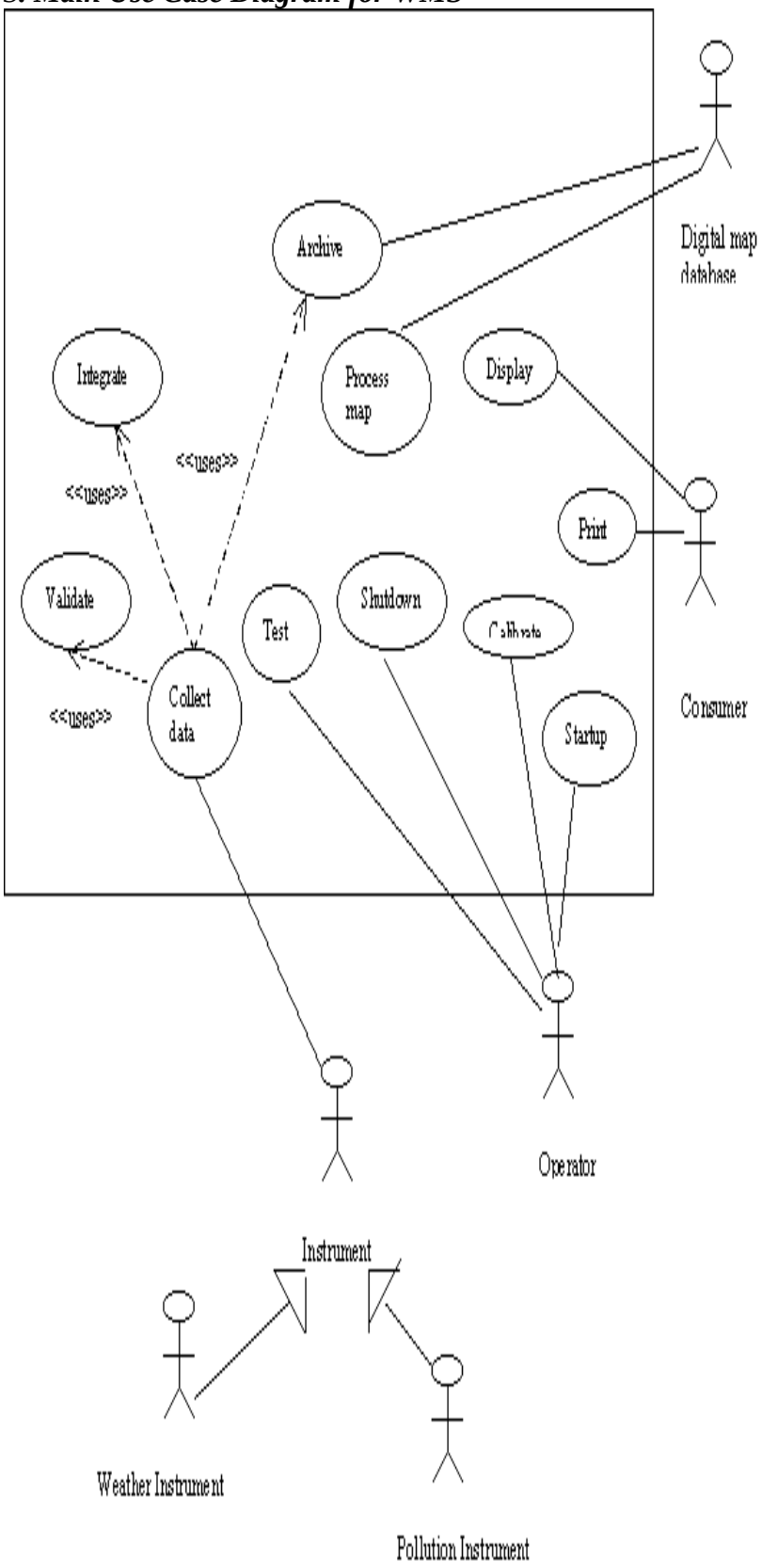
You may identify different use cases (or the same use cases with different names). In all cases the sum of the use cases identified must cover all the key functionalities mentioned in the needs. That should appear through the documentation that you will provide.

***Use Case Documentation:***

The documentation provided for a use case consists of a brief description of the purpose of the use case in a few sentences. For instance, a brief description of the *Collect data* use case may be:

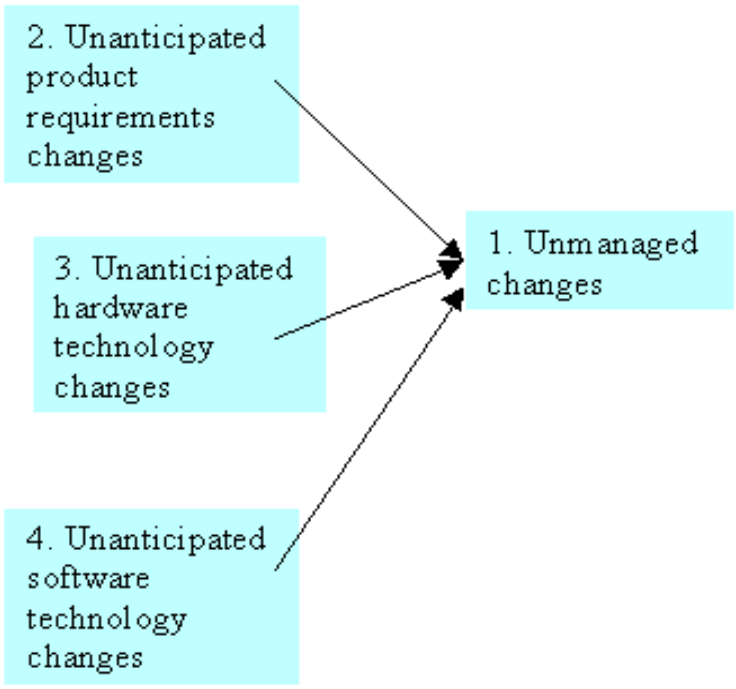
*The operator or the system starts this use case. It consists of sending a request for data collection to the weather sources, which collect and summarize weather data from the instruments and send them to the area computer.*

*3. **Main Use Case Diagram for WMS***



## *B. Risk Analysis*

1. ***Cause-effect tree***



***Risk Registry***

| Risk | Description | Causes | Source of uncertainty | Nature | Probability | Impact | Reduction Measures |
|---|---|---|---|---|---|---|---|
| 1 | *Unmanaged changes:* failure to cope with the changes occurring in the system development or operation; excessive cost or effort required modifying, updating, evolving, or repairing the system during its operation. | Project fails | Event | Some of the components may remain stable and other may change over time. | L | E | S1:Identify, and Isolates functionalities and components, which are likely to change.<br>S2: Make it easy to add or remove components (modular design, separation of policy and implementation, separation of interface and implementation etc.)<br>S3: Portable design (use open standards and technologies; use platform independent technologies and standards such as Java and CORBA) |
| 2 | *Unanticipated product requirements changes:* product requirements such as the frequency or procedures of weather data reporting by | 1 | Event | Complex design; Design lack of flexibility. | L | E | S1, S2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | weather stations may change in the future. | | | | | | |
| 3 | *Unanticipated hardware technology changes:* physical characteristics of the weather data acquisition instruments may change in the future. | 1 | Event | Complexity, lack of portability. | L | E | S1, S3 |
| 4 | *Unanticipated software technology changes:* upgrade of COTS components, standard changes (e.g. file formats, communication of weather information etc.) | 1 | Event | Complex design; design lack of flexibility | L | E | S1, S2, S3 |

2.

The collect data use case is related to the change management risk in several respect: weather data acquisition instruments change, weather information communication procedure and standard change etc.

***Flow of Events Description***

The flow of events should include:

- When and how the use case starts and ends
- What interaction the use case has with the actors
- What data is needed by the use case
- The normal sequence of events for the use case
- The description of any alternate or exceptional flows

The following description may be given for the *Collect data* use case:

***1.0Flow of Events for the Collect Data Use Case***
***1.1Preconditions***
*The main flow of the Startup use case needs to complete before this use can start.*
***1.2 Main Flow***
*This use case begins when the weather data collection system establishes a modem link with the weather station and requests transmission of the data. The weather station sends an acknowledgment to the collection system (E-1), and then collects and summarizes the data from the weather (S-1) and air (S-2) data instruments. The summarized data is sent to the weather data collection system.*
***1.3 Sub flows***
*S-1: Report weather data*
*Weather data readings are collected and reported from weather data instruments. The data sent are the maximum, minimum and average ground and air temperatures, the maximum, minimum and average air pressures, the maximum, minimum, and average wind speeds.*
*S-2: Report air data*
*The pollution readings are collected and transmitted at the same time as the weather data.*
*The pollution data collected are NO, smoke and benzene rates*
***1.4 Alternative Flows***
*E-1: The collection system hasn't received any acknowledgment after a certain deadline. The main flow of Test use case is started. The use case is terminated and an error message is displayed.*