Risk Analysis

- For each risk assess the probability and affects of the risk.
- Probability can be: low, moderate, or high.
- Effect can be: insignificant, tolerable, serious, or catastrophic.
- Example:

Risk: *It is impossible to recruit staff with the skills required for the project.*
Probability: *high.*
Effect: *Catastrophic.*

Risk indicators

Risk type	Potential indicators
Technology	Late delivery of hardware or support software; many reported technology problems.
People	Poor staff morale; poor relationships amongst team members; high staff turnover.
Organizational	Organizational gossip; lack of action by senior management.
Tools	Reluctance by team members to use tools;demands for higher-powered workstations.
Requirements	Many requirements change requests; customer complaints.
Estimation	Failure to meet agreed schedule; failure to clear reported defects.

COST

- The easiest way to measure the size or functionality of the work area is to count the number of adjacent systems on the context model as well as the number of inputs and outputs.
- Another way to estimate the cost is the amount of data stored by the work.
- More accurate still is function point counting. We will study this next week.
- We will use function points for Business Use Cases of the work.

Decision: Go or Not Go?

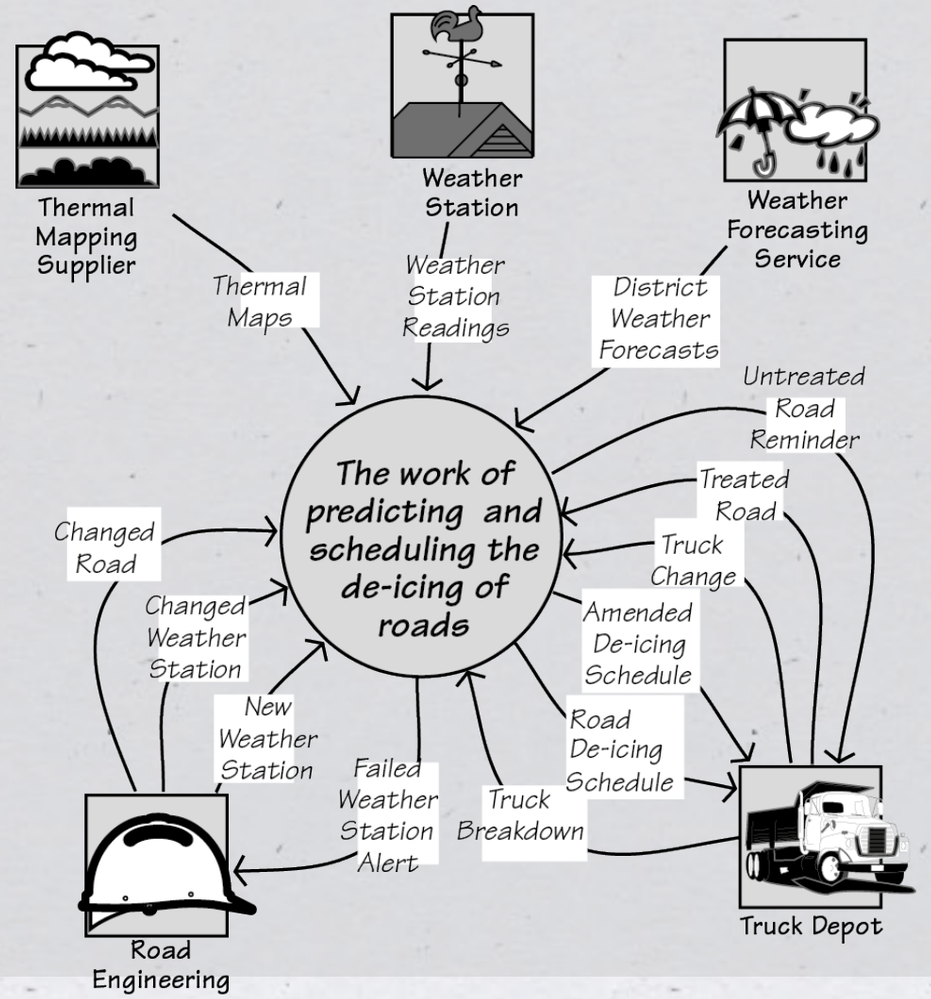
- ✦ Is the product goal clear and unambiguous? Or does it contain fudge words?
- ✦ Is the goal measurable? That is, will it give a clear indication when you have successfully completed the project?
- ✦ Does the goal indicate an actual benefit to the owner?
- ✦ Is it viable? Is it possible to achieve the objectives of the project within the allotted time and budget?
- ✦ Have you reached agreement on the scope of the work?
- ✦ Are there some risks that have a high probability of becoming problems?
- ✦ Is the impact of these risks such that it makes the project unfeasible?
- ✦ Is the cost of investigation reasonable given the product's benefit?
- ✦ Are the stakeholders willing to be involved?
- ✦ Do you have sufficient justification to invest in the project?
- ✦ Do you have enough reasons not to invest in the project?
- ✦ Is there any further investigation that you should do before launching the requirements project?

Business Use Cases

Chapter 4

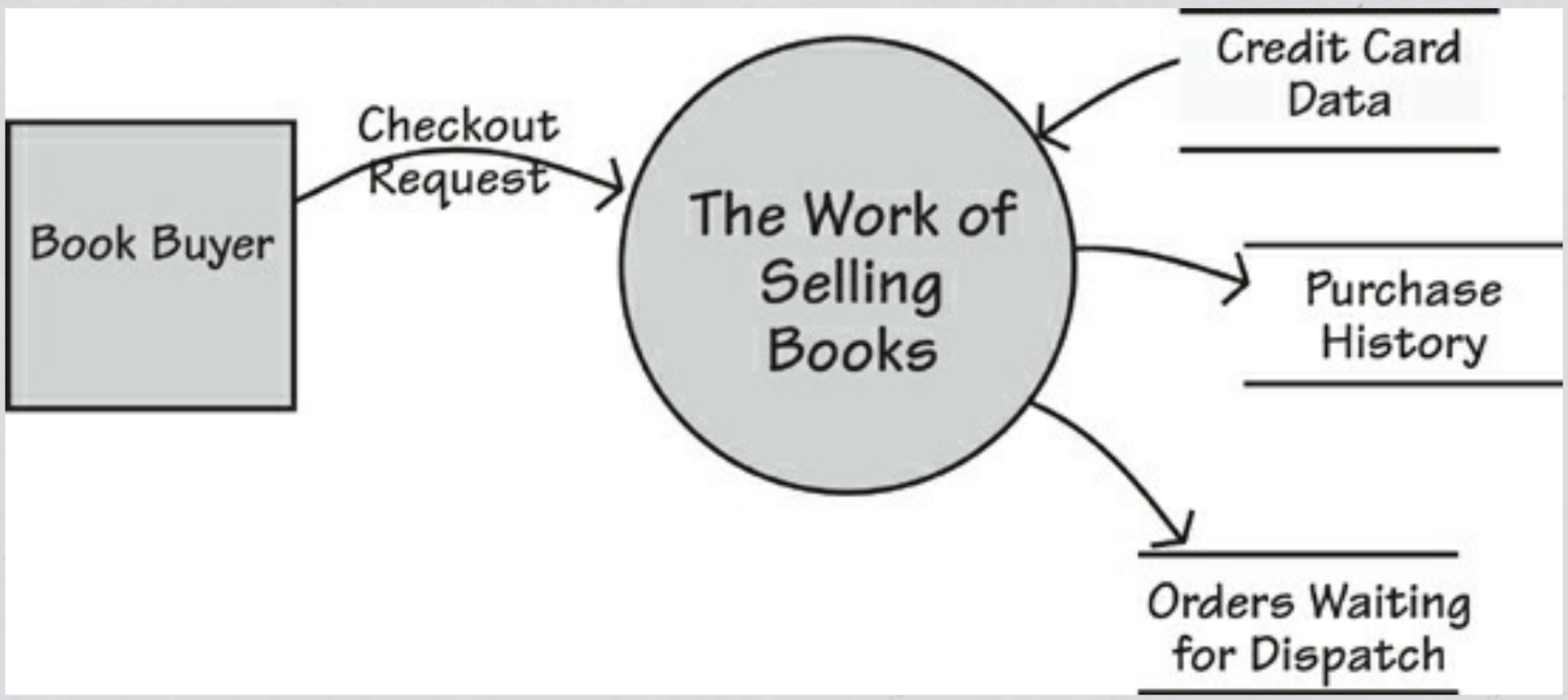
Start with the Work

- The Work Context Diagram shows the scope of the business problem that you want to study.
- The *work* (the central circle) is part of the business that your client wants to improve. You will investigate the work to derive the requirements.
- Adjacent systems are parts of the business that you will not study but they receive or send information (data) to the work.



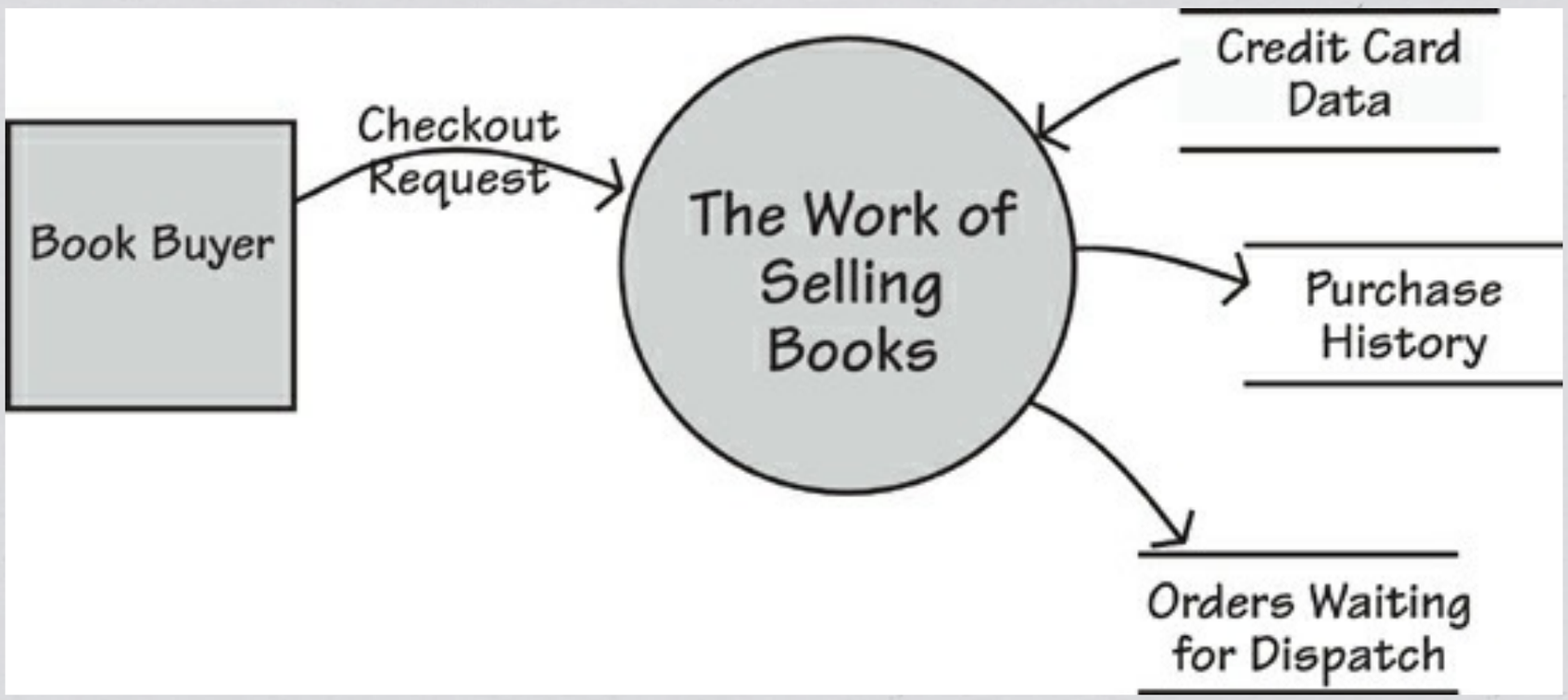
Business Event Triggered by an adjacent system

- ✦Any work responds to events that happen outside the work, we call them *business events*.
- ✦The work learns about the business event through an incoming flow of data.



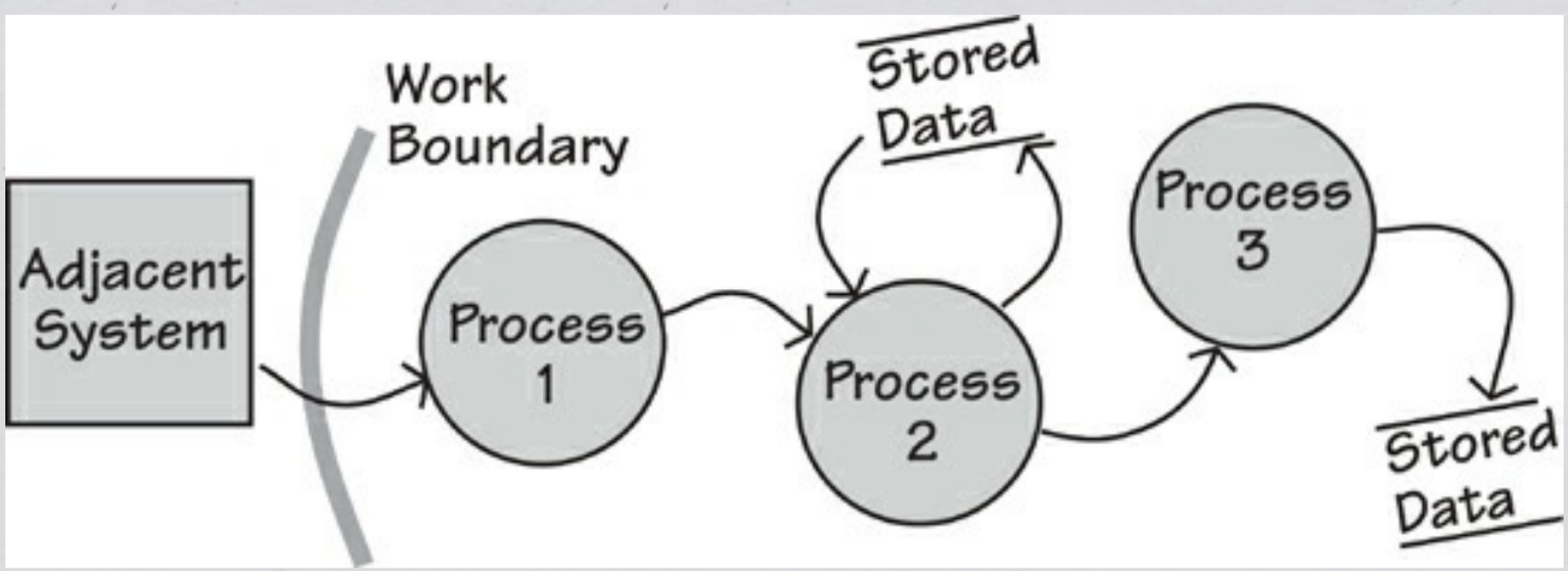
Business Event Triggered by an adjacent system

- The work responds to the business event by initiating a business use case.
- A Business Use Case (BUC) is a pre-planned response to a business event.



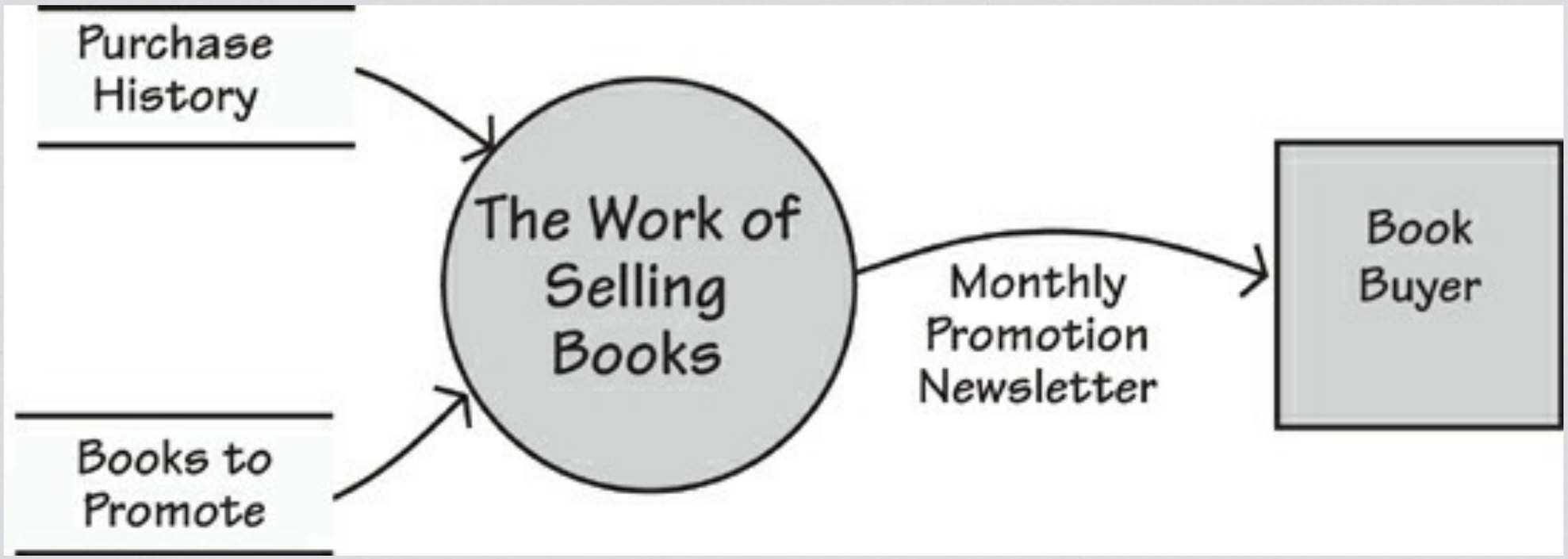
Business Use Case

- For every business event, the work does something that involves processing of data..
- You can find one or more stakeholders who are expert in the event.



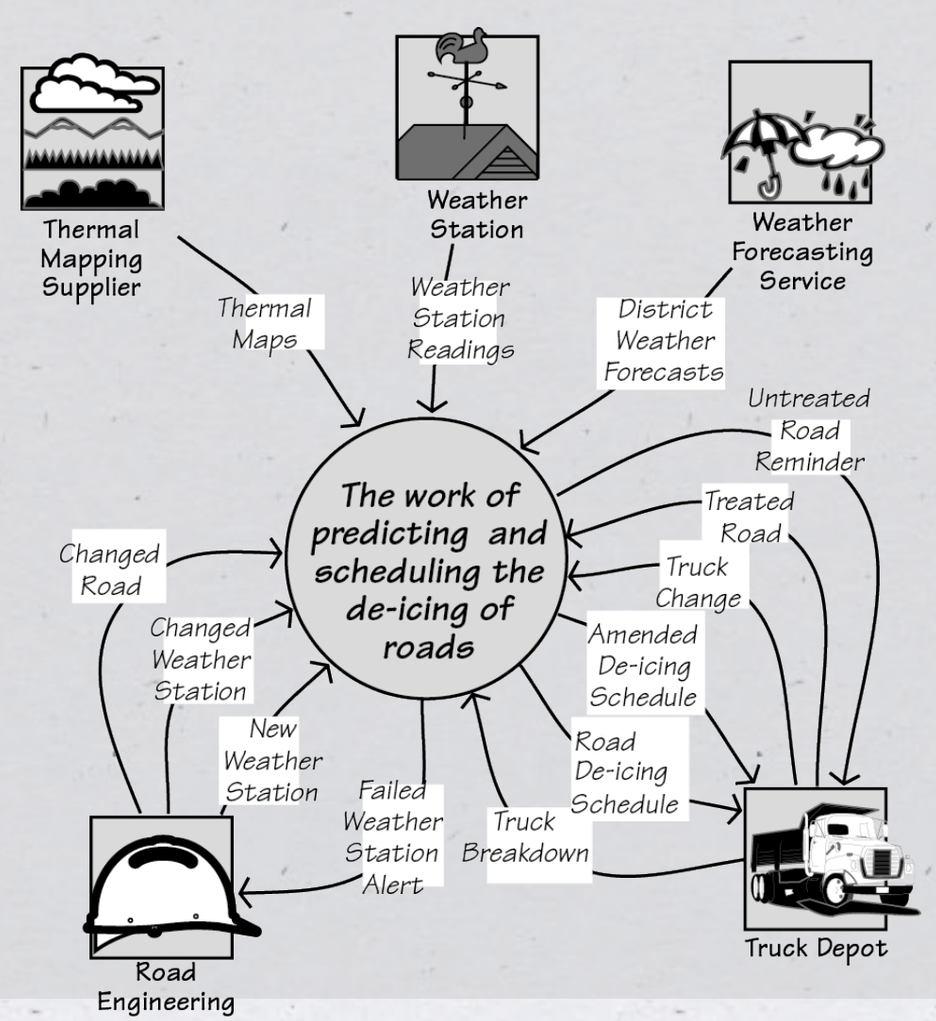
Time-Triggered Business Event

- Happens when a pre-arranged time is reached.



Business Use Case

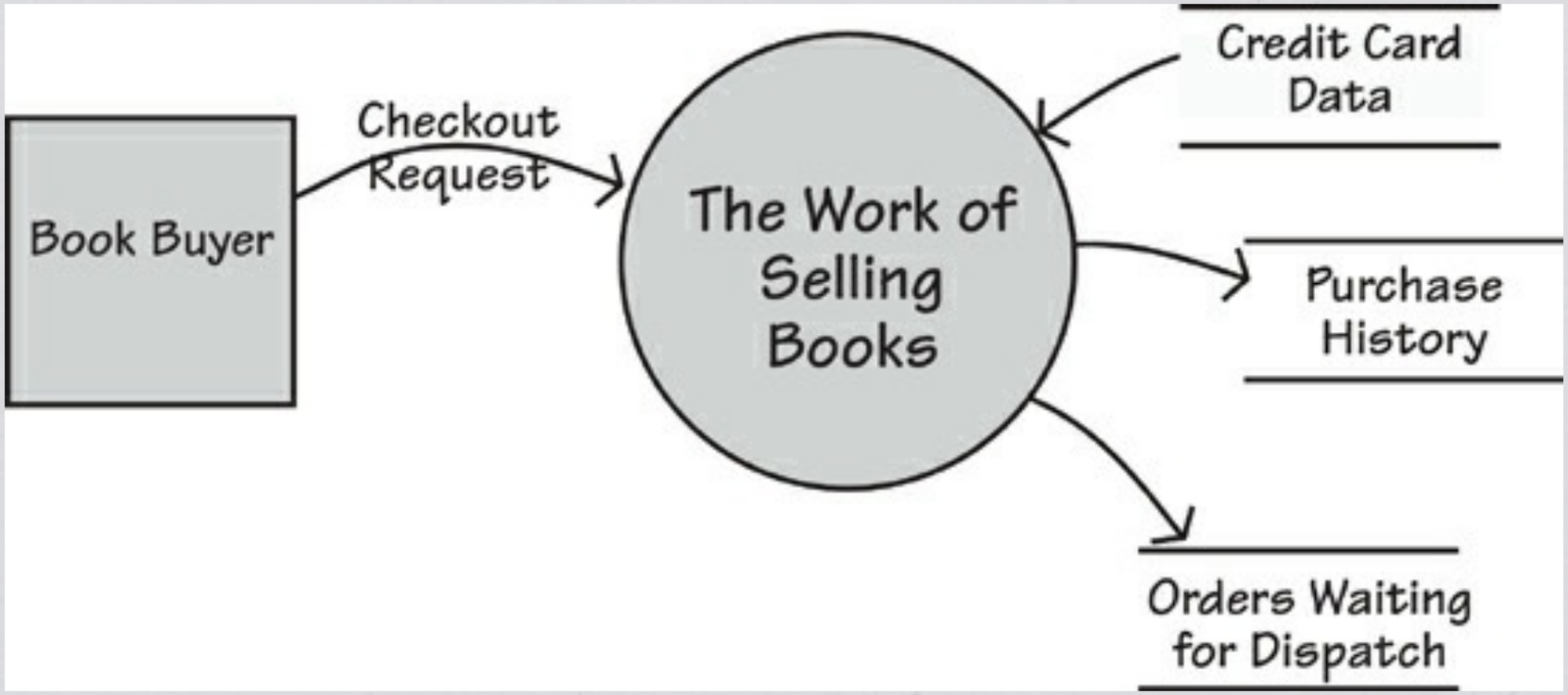
- We can partition the work into several Business Use Cases (BUC).
- BUC form the basis of functional and non-functional requirements.



Business Event Triggered by an adjacent system

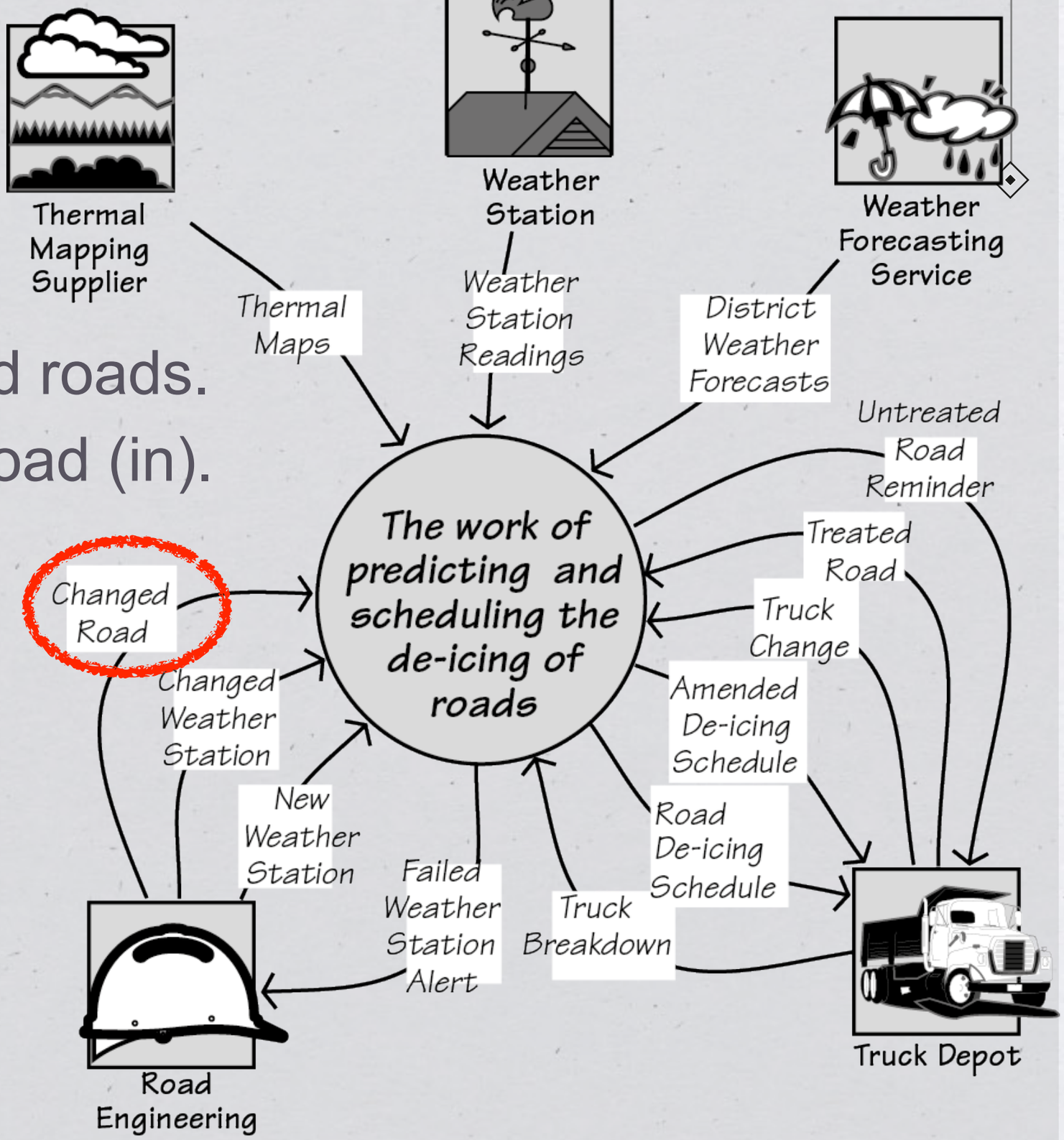
Event: Book Buyer initiates a checkout request.

Input/Output: Checkout request (in).



Event: Road engineers advise there are changed roads.

Input/Output: Changed road (in).

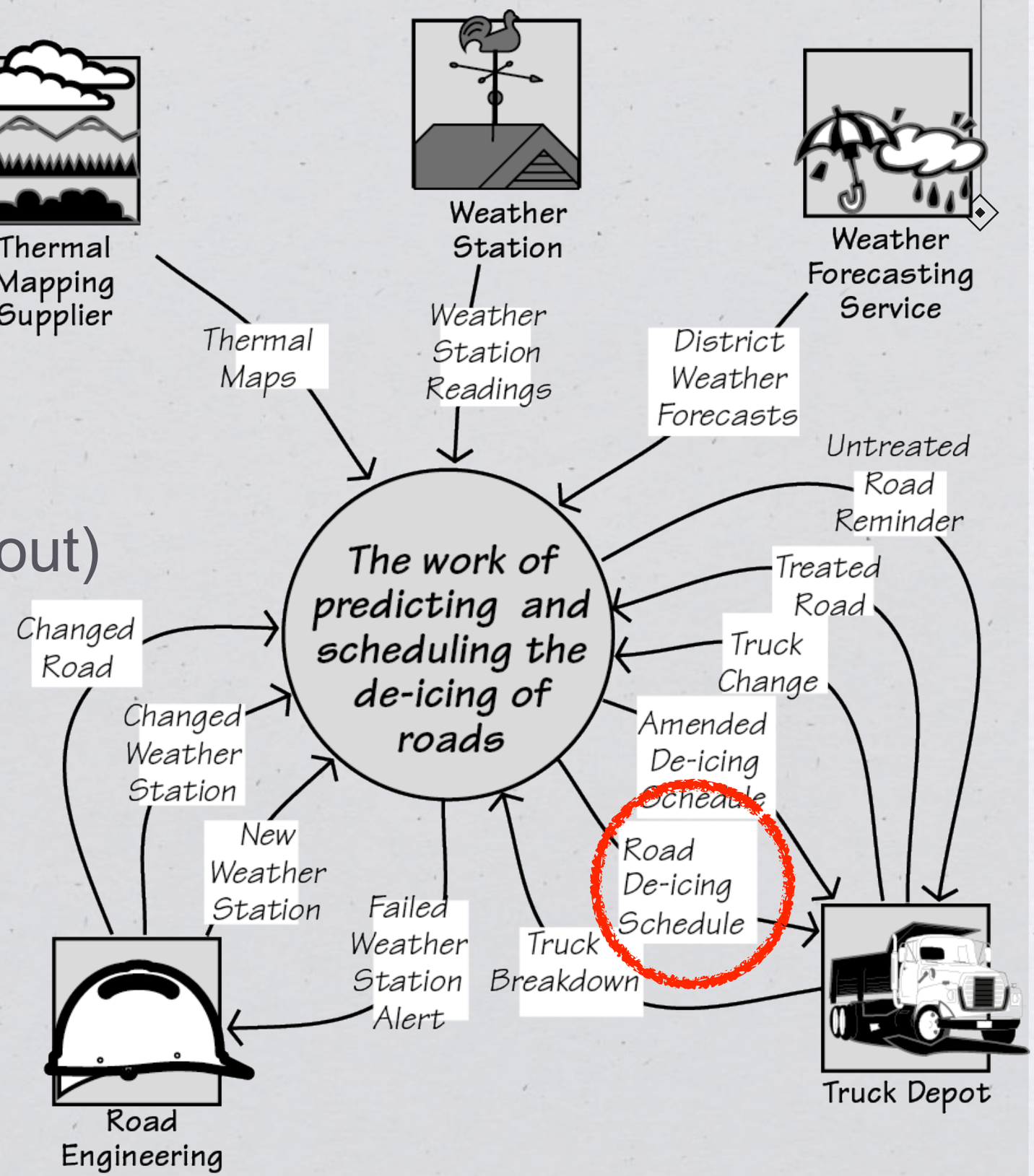


Event: Time to detect icy roads.

Input/Output:

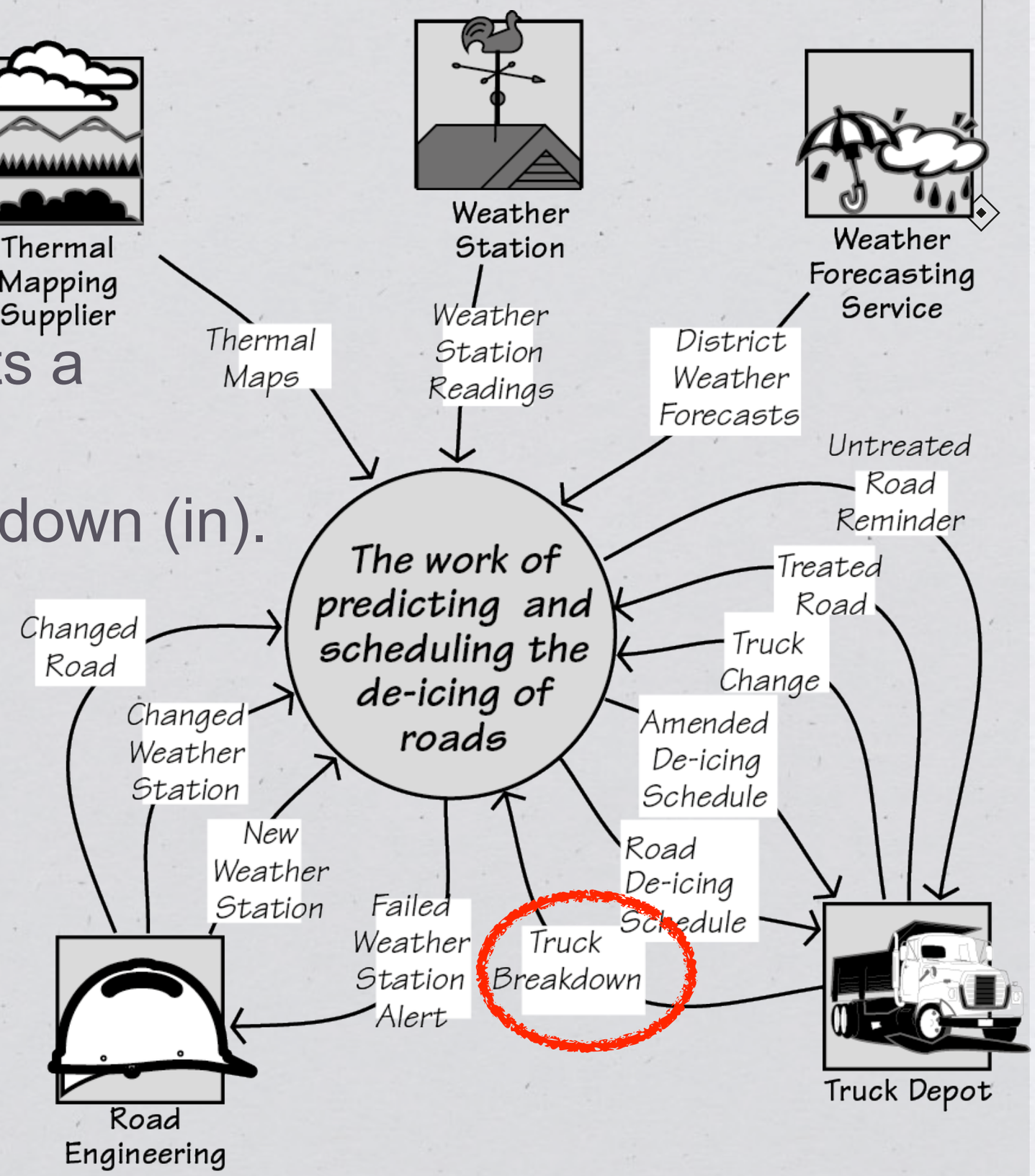
Road De-icing Schedule (out)

Time-Triggered Business Event



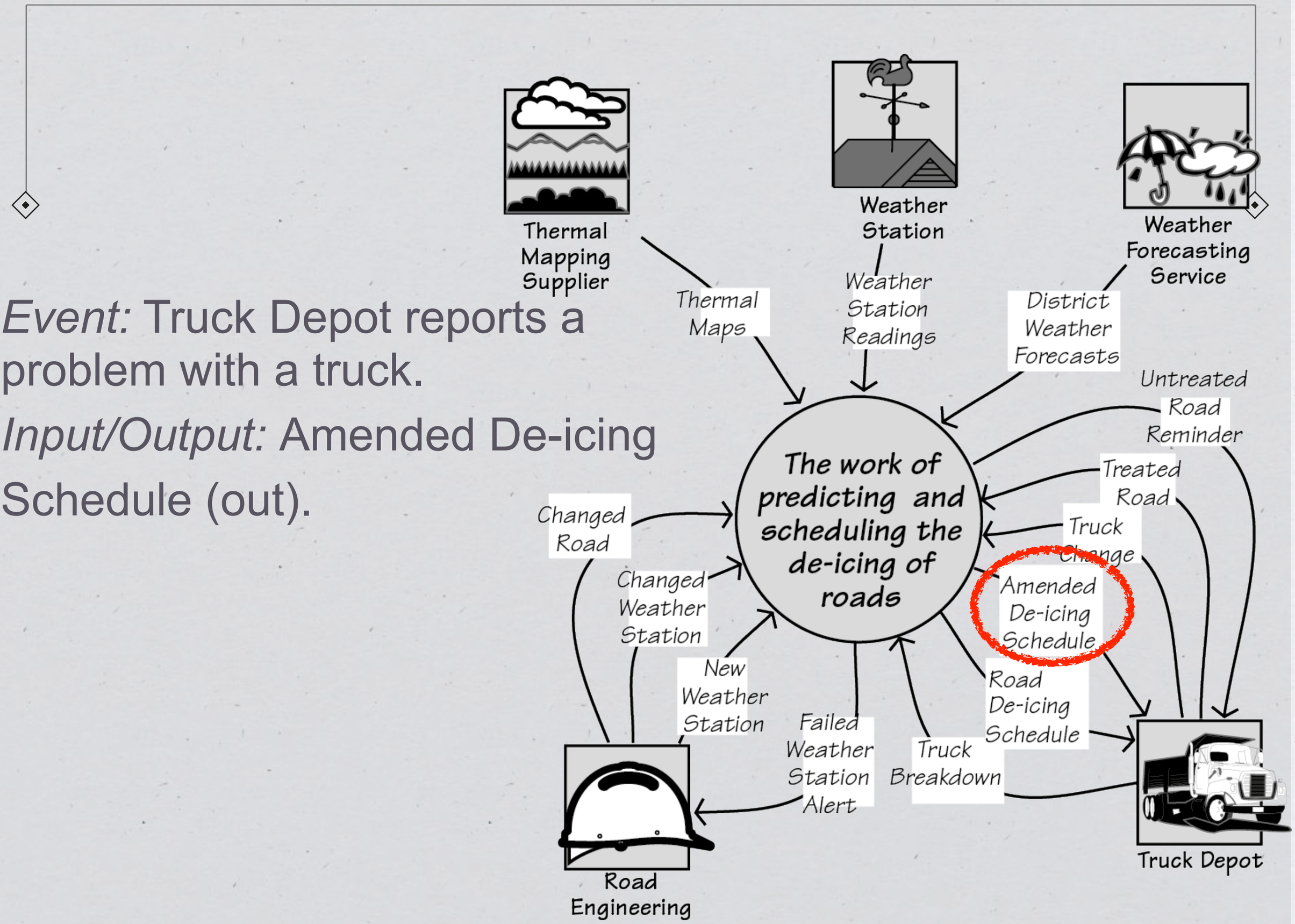
Event: Truck Depot reports a problem with a truck.

Input/Output: Truck breakdown (in).



Event: Truck Depot reports a problem with a truck.

Input/Output: Amended De-icing Schedule (out).



List of Business Events

Event Name	Input and Output
1. Weather Station transmits a reading	Weather Station Readings (in)
2. Weather Bureau forecasts weather	District Weather Forecasts (in)
3. Road engineers advise there are changed roads	Changed Road (in)
4. Road Engineering installs a new weather station	New Weather Station (in)
5. Road Engineering changes the weather station	Changed Weather Station (in)
6. Time to test Weather Stations	Failed Weather Station Alert (out)
7. Truck Depot changes a truck	Truck Change (in)
8. Time to detect icy roads	Road De-icing Schedule (out)
9. Truck treats a road	Treated Road (in)
10. Truck Depot reports a problem with a truck	Truck Breakdown (in) Amended De-icing Schedule (out)
11. Time to monitor road de-icing	Untreated Road Reminder (out)

The Work

- The work's response to a business event brings together all the things that belong together (i.e. a Business Use Case).
- The business analyst must look past the current way of doing business and instead understand the true nature of the work. We cannot assume the "system".
- OK, what I mean by the previous sentence?
- *Example: An insurance clerk receives a claim from a car insurance policy holder and then enters the claim into the automated system.*
- Origin of the business event: Is it the clerk entering the details to the system?

Origin Business Event

- The real originator of the previous event is the driver at the time of the accident (not the insurance clerk).
- Start by investigating the real origin of the problem, then you will build a better product.
- You can build a product that can process insurance claims in real time at the time of the accident.
- Another example: *"A caller contacts the help desk. The help desk person initiates the use case by asking the caller for details of the problem and logging the call."*

Origin Business Event

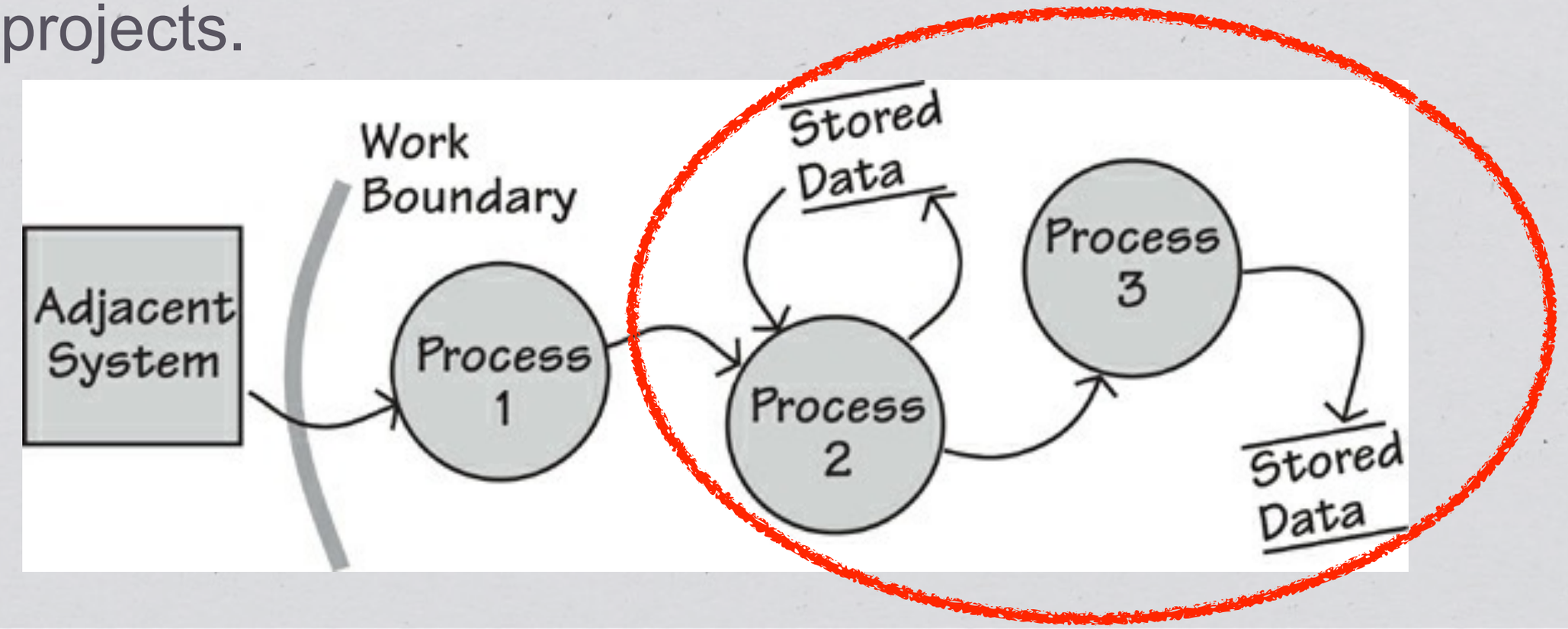
- Another example: *"A caller contacts the help desk. The help desk person initiates the use case by asking the caller for details of the problem and logging the call."*
- The real originator of the business event is the malfunction in the caller's equipment, not the initiation of the call to the help desk.

Business Use Case

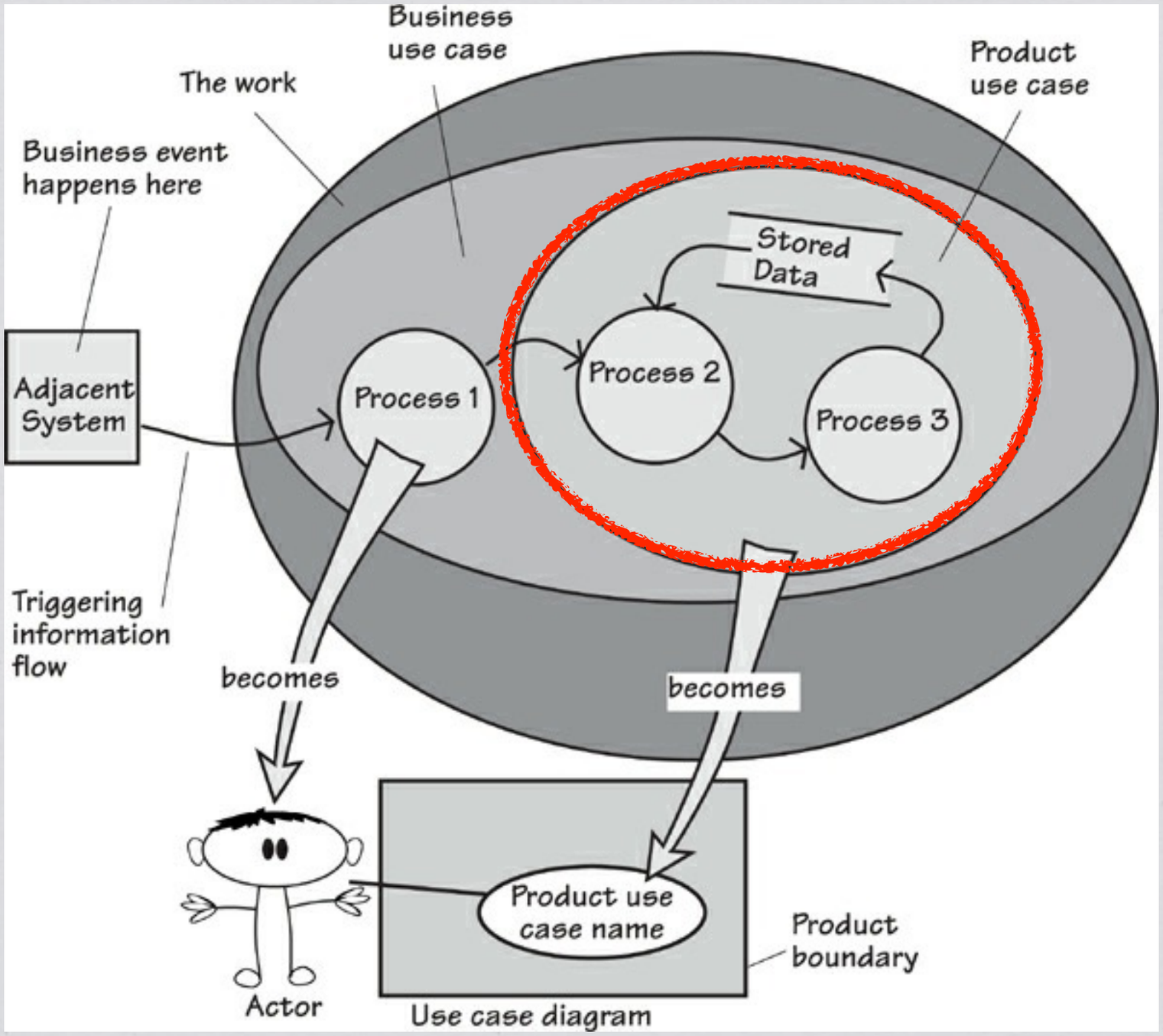
- Business Use Cases partition the work in the context diagram.
- Some of Business Use Cases will be part of the the product (Product Use Case PUC).
- Product Use Case is part of the BUC handled by the automated system.

Product Use Case

- ✦Derived from BUC.
- ✦Part of BUC that you want to automate (i.e. include in your product).
- ✦Sometimes you partition a BUC into a number of PUCs so you can reuse PUCs from previous projects.

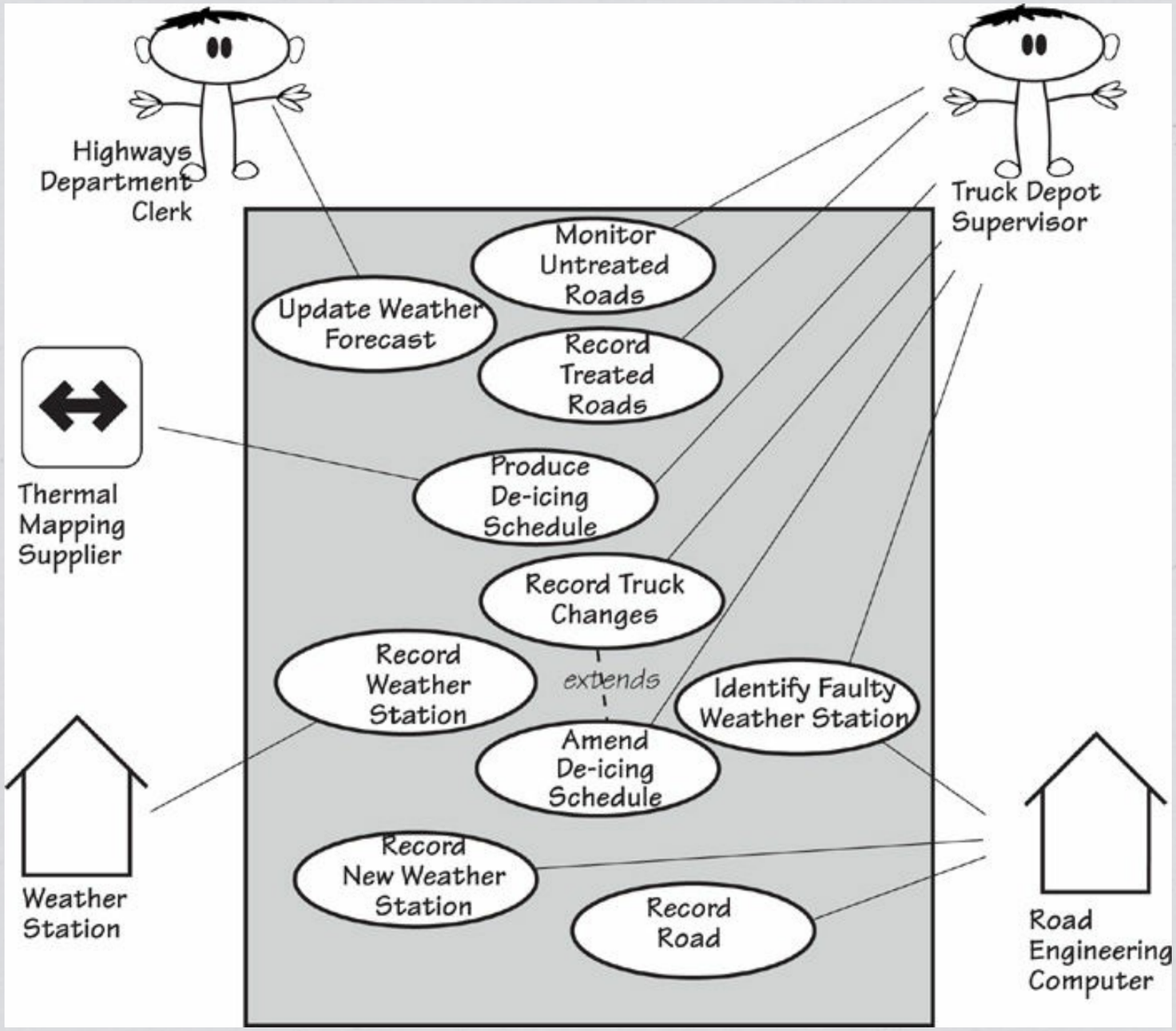


Product Use Case



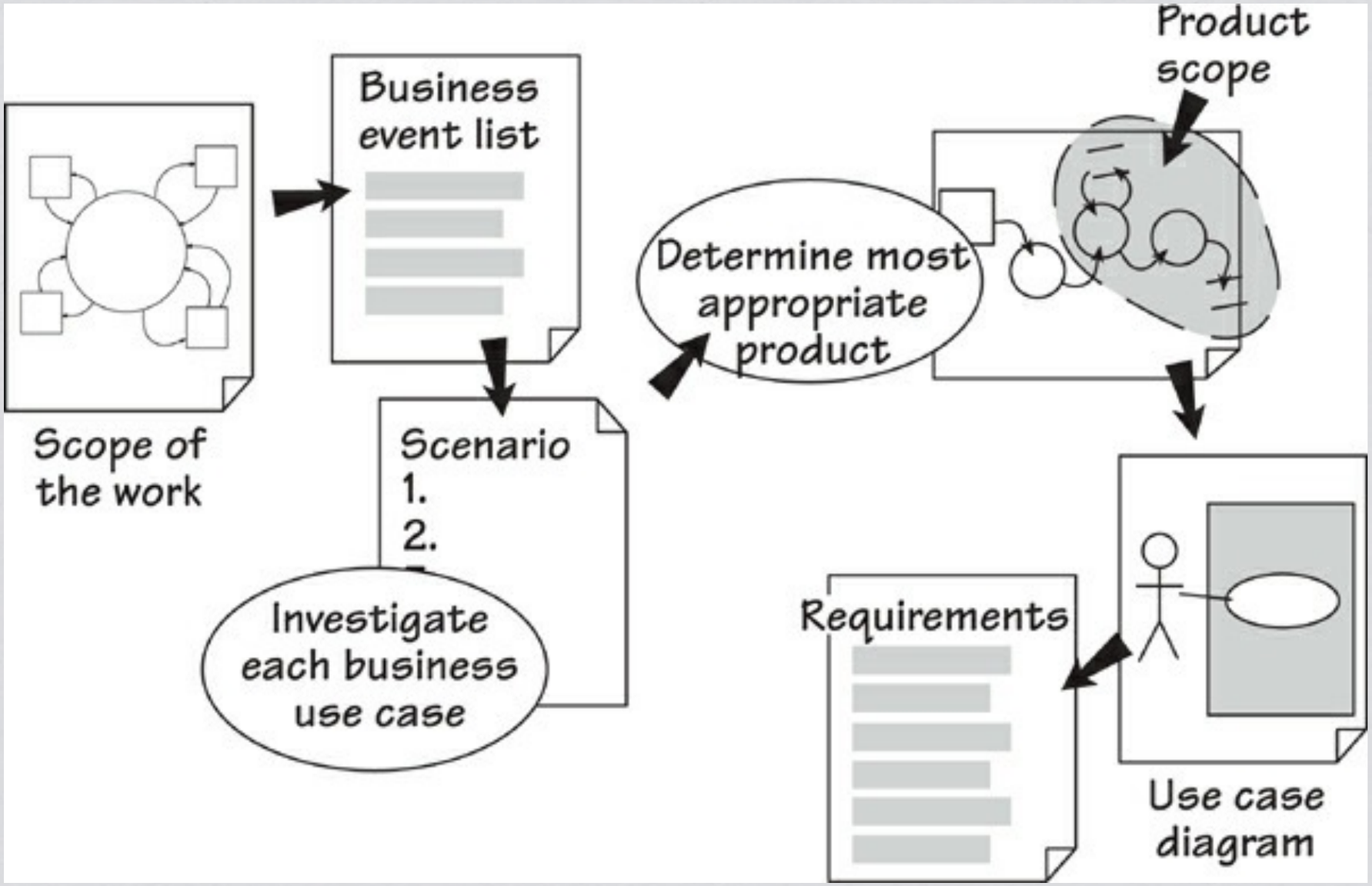
Whatever is immediately outside the scope of the product becomes the actor

Product Use Case Diagram



Actors are the people or systems that interact with the automated product

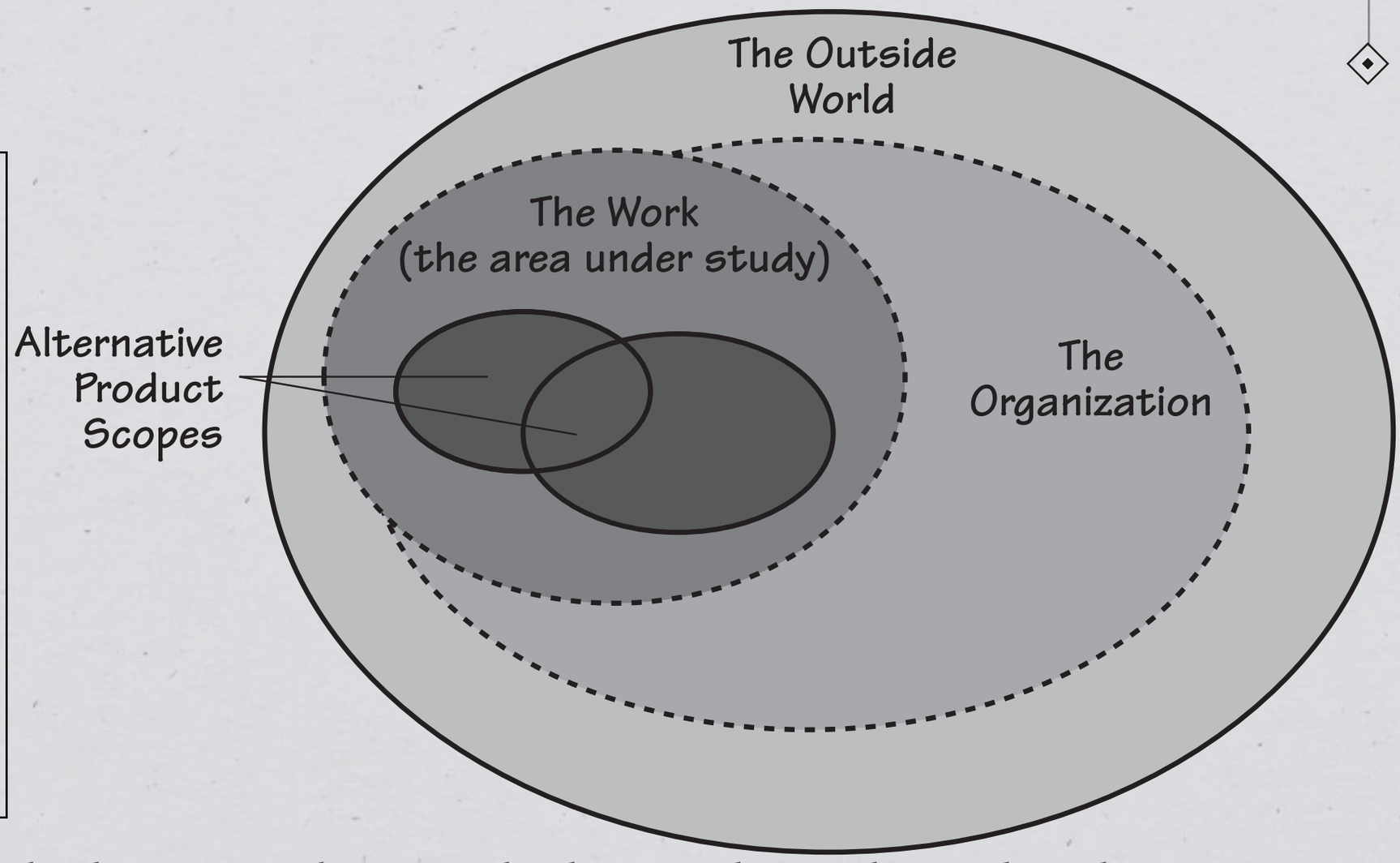
Requirements Discovery



Scope of the Work

Figure 3.3

The work is the part of the organization that you need to study to discover the requirements. The work is usually connected to other parts of the organization and to the outside world. You must study the work well enough to understand how it functions. This understanding will enable you to come up with alternative scopes for the product and eventually choose the one to build.



First understand the work, and then decide which product will provide value for that work.

The scope of the work is larger than the solution product.

Use Case: Brief History

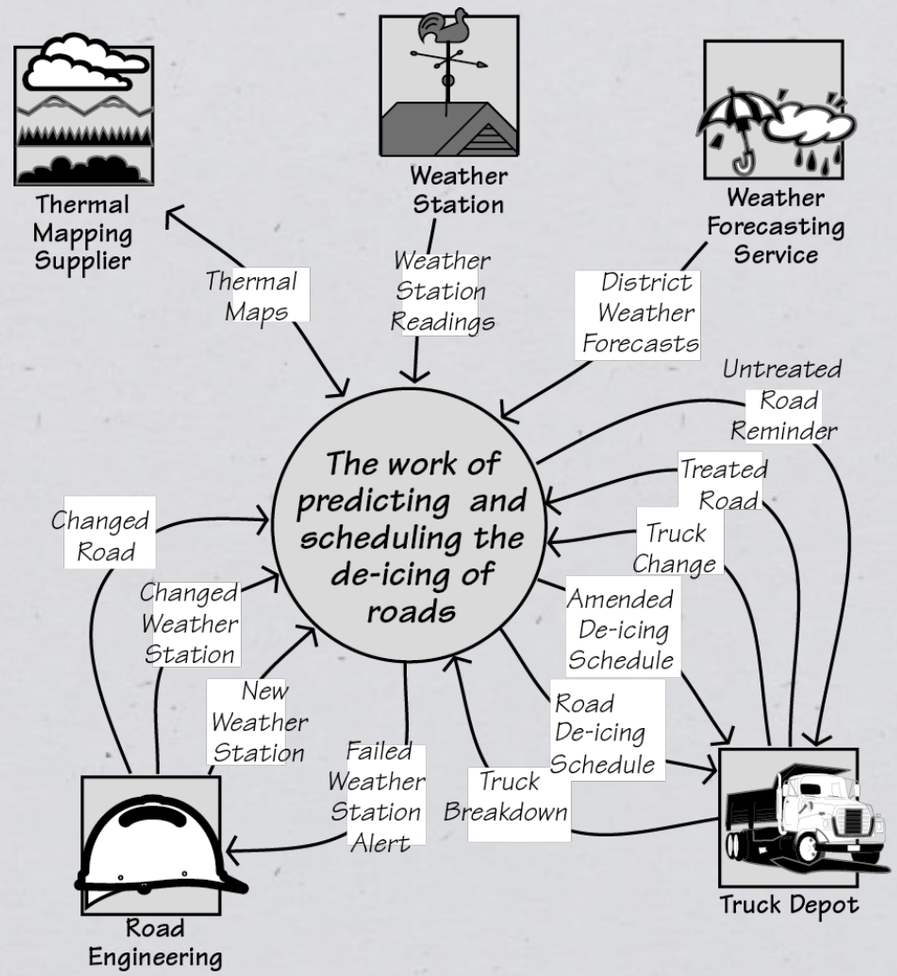
- Introduced by Ivar Jacobsen to describe any **interaction between a system and its user.**
- There are many definitions of use cases, none of them are agreeing..
- A use case is a set of steps defining an interaction between a system and a user.
- Generally, there is an **Actor,** who assumes the user role, and lies outside the system. And then there is **System,** which refers to the automated system under construction.

Cost Assessment

- There are many methods to estimate the cost. We will cover one particular method called function point counting.
- Function point counting uses the functionality contained by the work to estimate the effort needed to study it and gather its requirements.

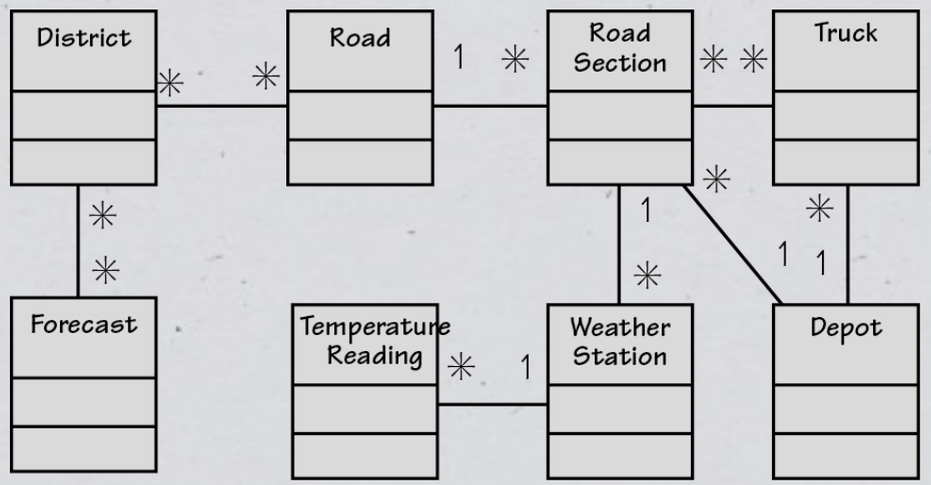
Cost Assessment

- The amount of needed functionality depends on the amount data elements carried by the flow.
- Start by counting the number of data elements carried by the flow entering or leaving the context diagram.
- Data dictionary can help in identifying the data elements.



Cost Assessment

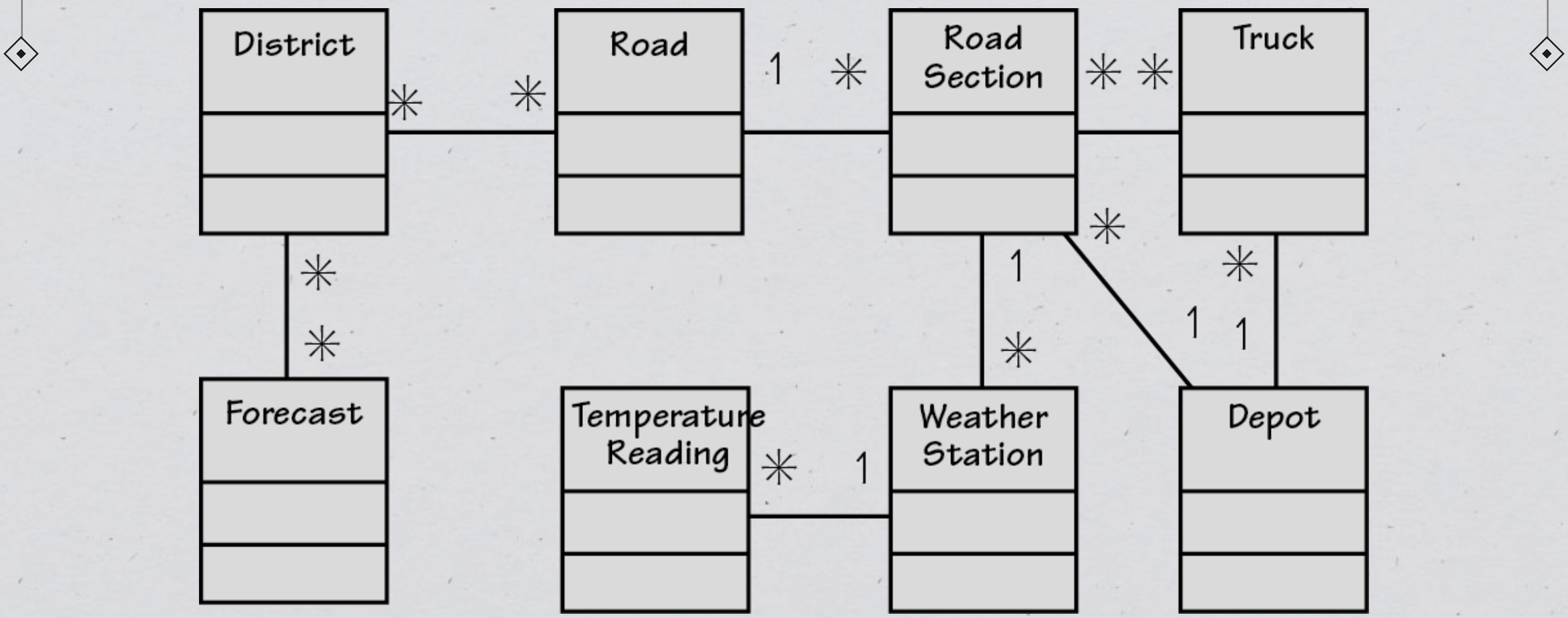
- One determinant of the needed functionality is the data stored by the work.
- Data (e.g., files and databases) require some functionality to maintain it.
- The functionality depends on the amount of data (number of data elements) and the complexity of data (number of records or tables that data is organized into).



Data Model

- ✦ Classes are anything that is uniquely identified by the work.
- ✦ If it carries an identifier (such as a credit card, a telephone, an account, an employee, a bank transfer, or a motor car), then consider it to be a class.
- ✦ Each of the classes shown in the data model contains attributes—that is, the elementary items of data that together describe the class.
- ✦ Attributes have alphanumeric values, and classes are the subjects of the data.

Data Model



- Each class represents something about data stored by the work.
- We will use both the number of classes, and attributes in function point counting.

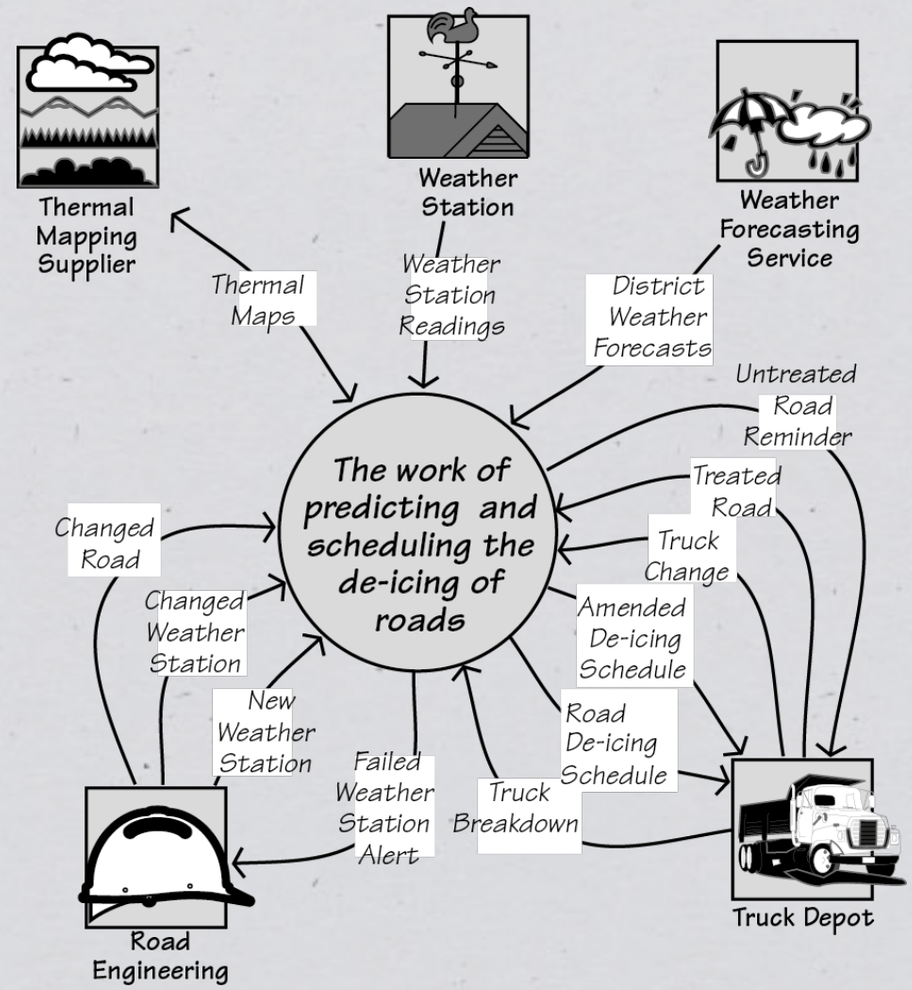
Business Use Cases

- ✦BUCs are also used in function point counting.
- ✦Since BUC partitions the work, we will count function points per BUC.
- ✦Three types of BUCs: Input BUC, Output BUC, Inquiries.
- ✦Input BUC supplies data to be stored in the work.
- ✦Output BUC supplies data to the adjacent system.
- ✦Inquiries are data supplied by time-triggered BUC, i.e., the data stored by the work is inquired upon.
- ✦Count the data elements incoming or outgoing the work.

Cost Assessment

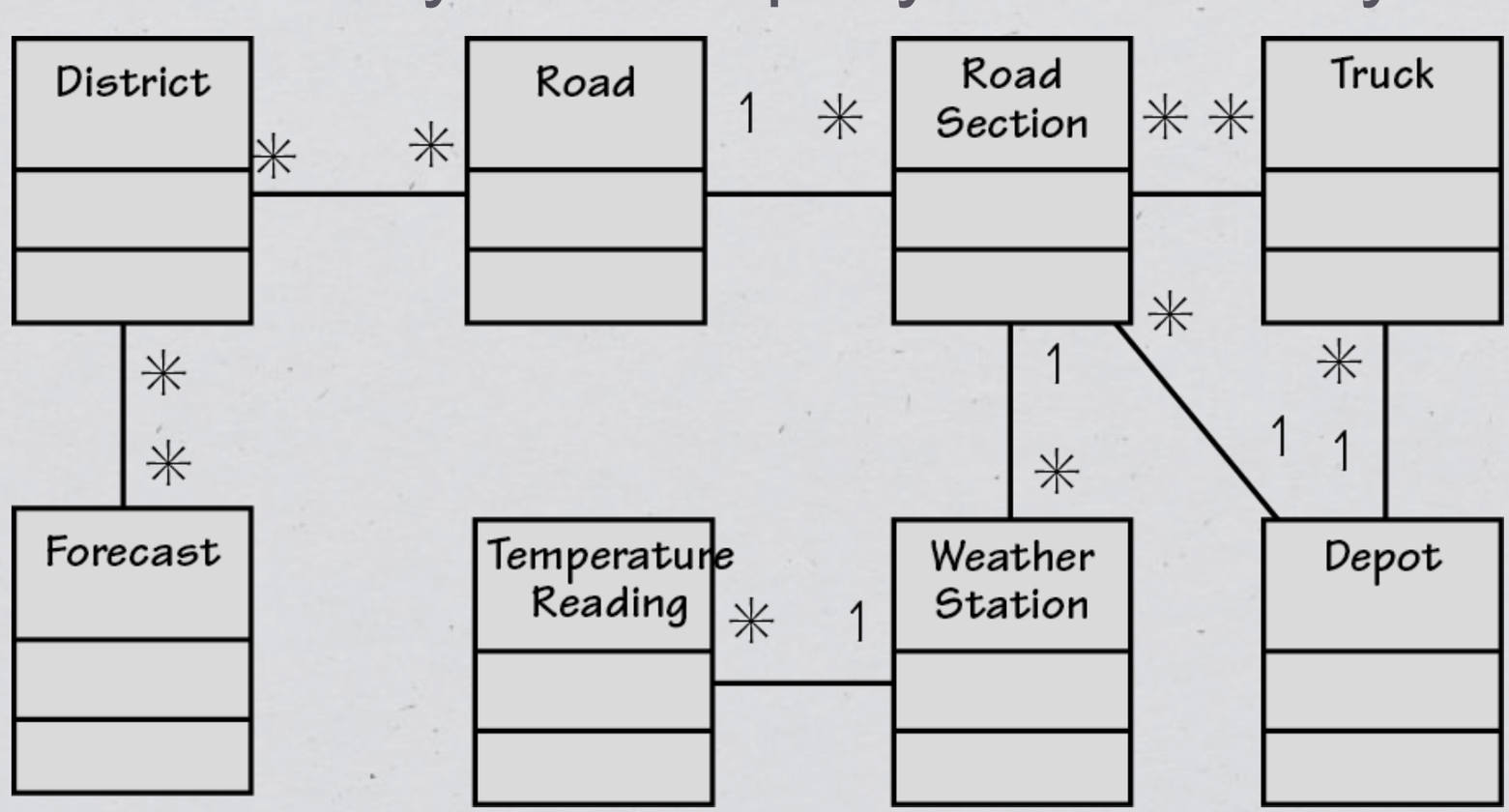
- Cost of requirement gathering for a project depends on:
  1. Size of data processed by the work.
  2. Functionality of the work (a.k.a Business Use Cases)
- Function Point Counting:

Function points use inputs, outputs, inquiries, internal data, external data.



Data Model

- ✦Models the business data stored by the work.
- ✦Start by listing data classes.
- ✦Data Classes are the concepts (subject-matters) of the stored data. They are uniquely identified by the work.



Class VS Attribute

- Classes do not have alphanumeric values. Attributes have alphanumeric values.

- Example: ***Road*** does not have an alphanumeric value. It is a concept. So ***Road*** is a class.

Road name has an alphanumeric value. So it is an attribute. ***Road name*** is an attribute of ***Road***.

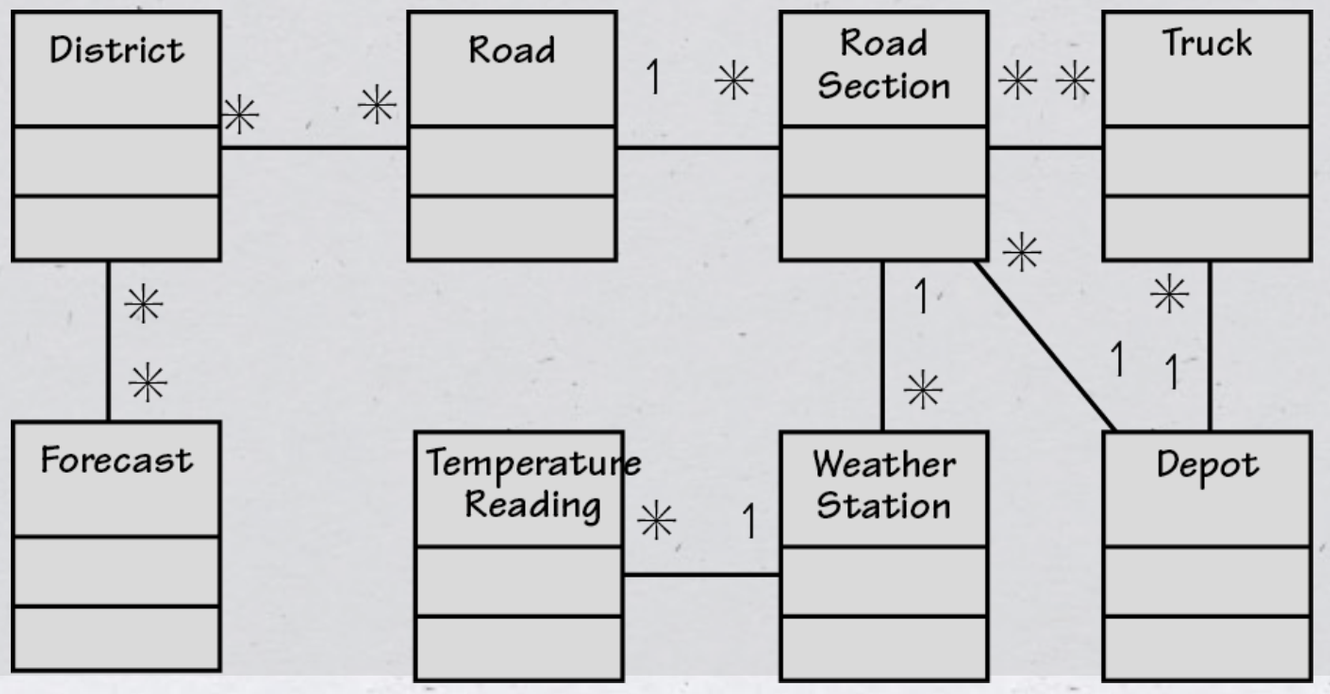
- Another Example: ***Account*** does not have an alphanumeric value. So ***Account*** is a class.

Account number has an alphanumeric value. ***Account number*** is an attribute of ***Account***.

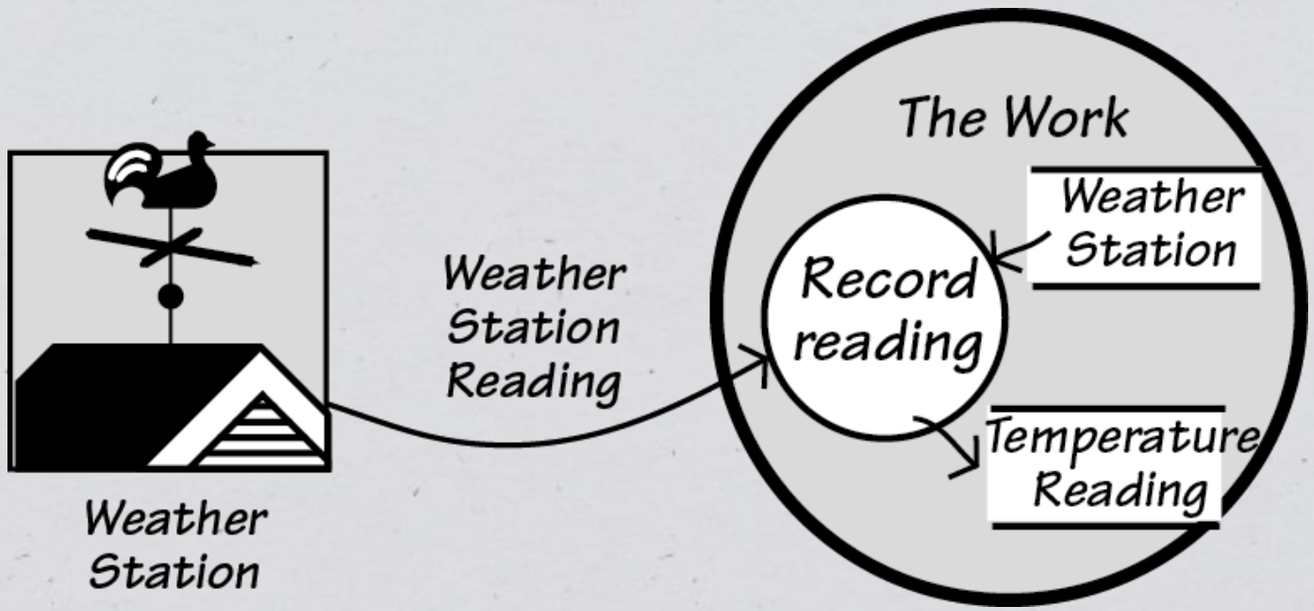
Data Model

- Find classes and attributes from the Naming Conventions (Data Dictionary).
- *Class*: **District** = A geographical area defined by the council
  Attributes: **District Name, District Size, District Coordinates**.

Attribute is also defined in the dictionary:
District Name = The unique name used by the engineers to identify a district

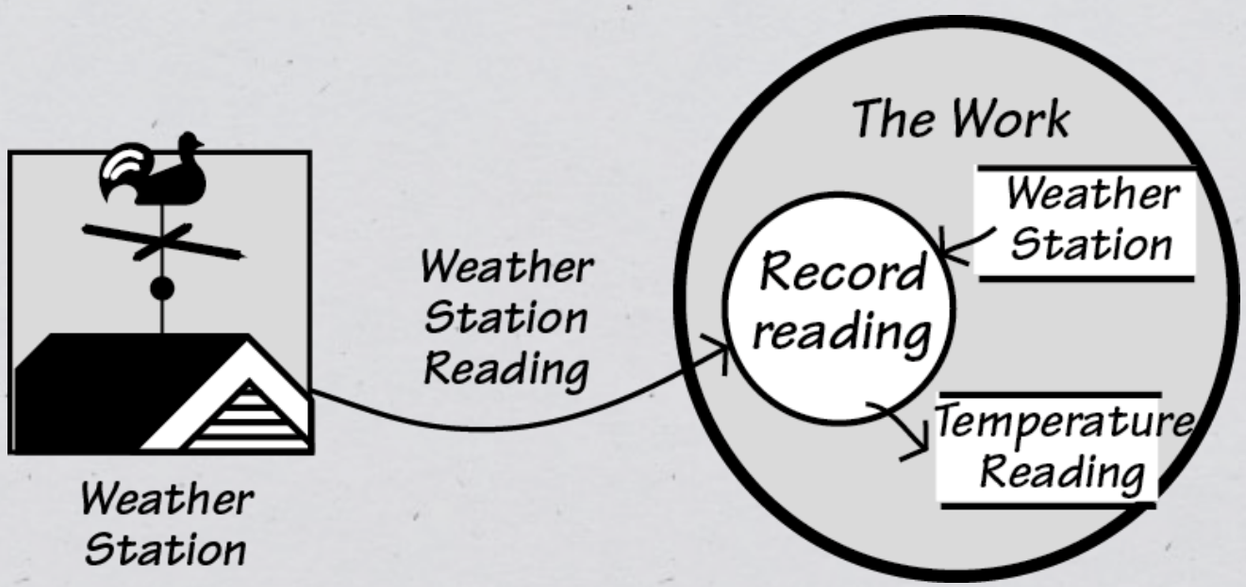


Counting Function Points: Input Business Use Cases



- ✦ The primary intention of input business use case is to alter internally stored data.
- ✦Count the elements/attributes involved in *Weather Station Reading*.

Counting Function Points: Input Business Use Cases



- Attributes: Weather Station ID, temperature, the moisture on the road surface, date, time, and possibly 2 more attributes. Total: 7 attributes.
- Weather Station Reading input event references two classes of stored data. Classes: **Weather Station, Temperature Reading.** Total: 2 classes.

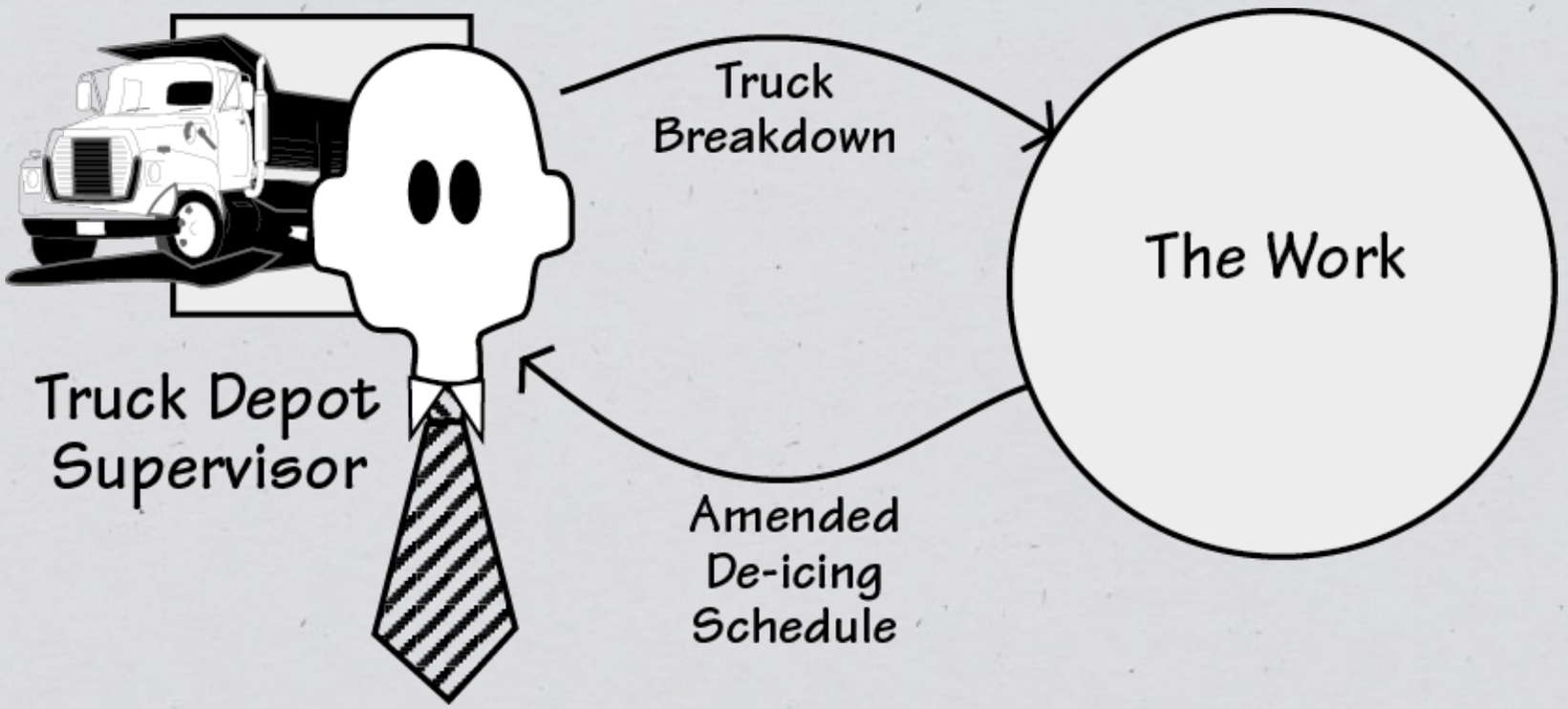
Counting Function Points: Input Business Use Cases

Data attributes of input flow

Classes referenced	1-4	5-15	16+
<2	3	3	4
2	3	4	6
>2	4	6	6

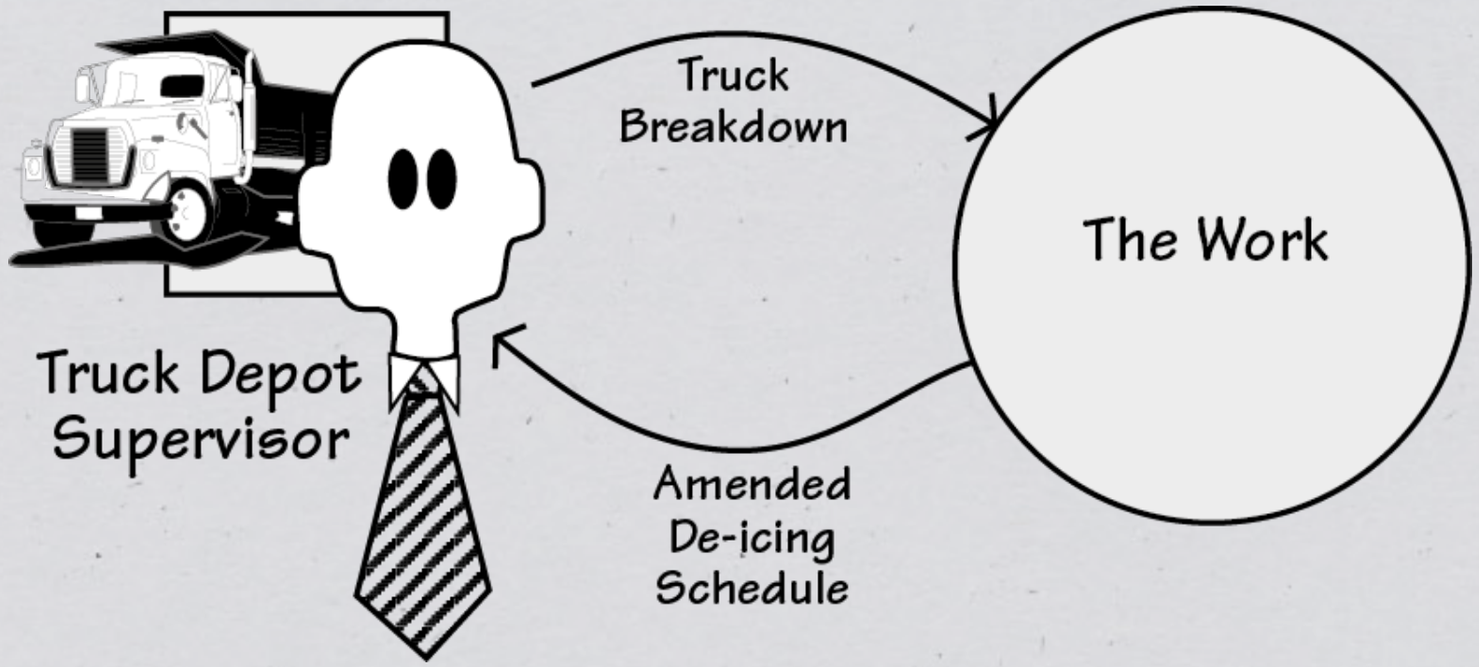
✦ 4 function points

Counting Function Points: Output Business Use Cases



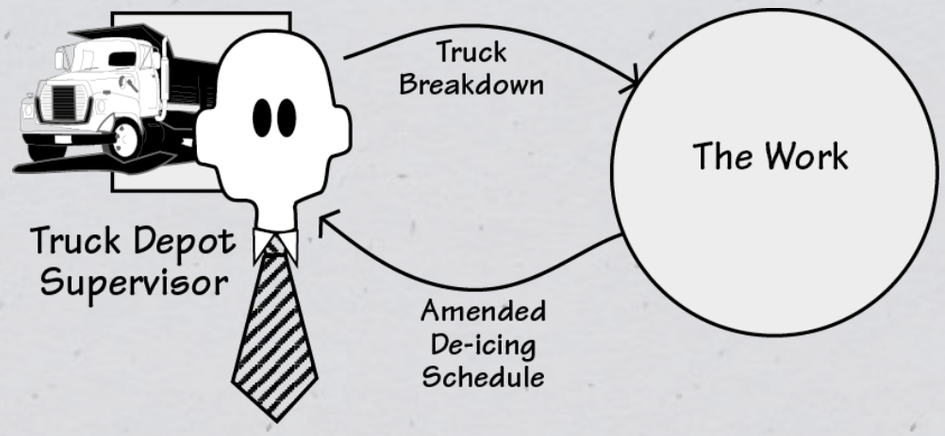
- The primary goal of the adjacent system when triggering an output business use case is to obtain the output information.

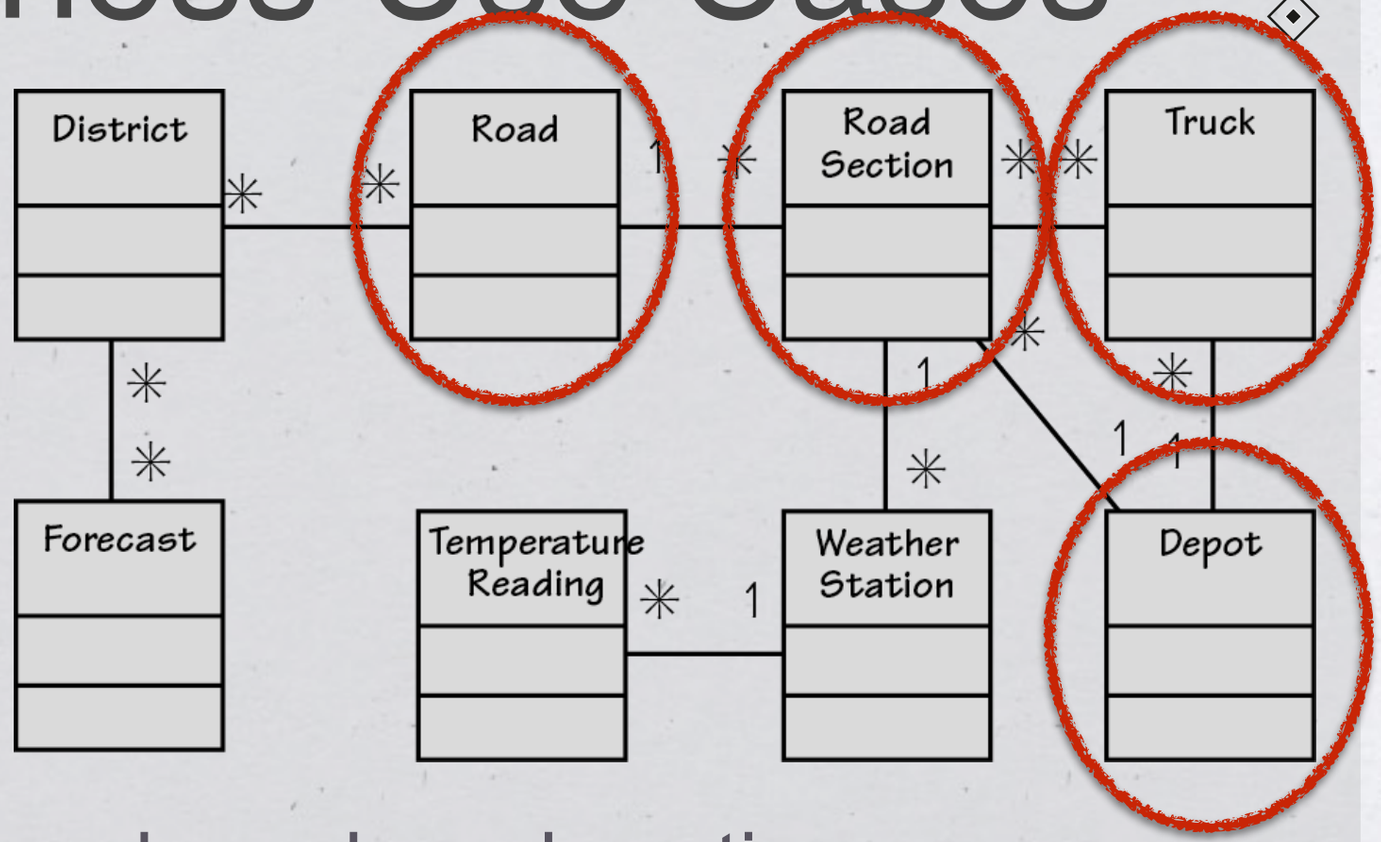
Counting Function Points: Output Business Use Cases



- ✦ Attributes: Truck ID, start time, end time, distance, road, road section, and maybe 2 more. Total: 8
- ✦ If an attribute appear on both input and output flows, count only one.

Counting Function Points: Output Business Use Cases





- You have to find the roads and road sections allocated to the broken truck, find another truck attached to the same depot, and reallocate the roads and sections.
- Classes: Road, Road Section, Truck, Depot. Total: 4

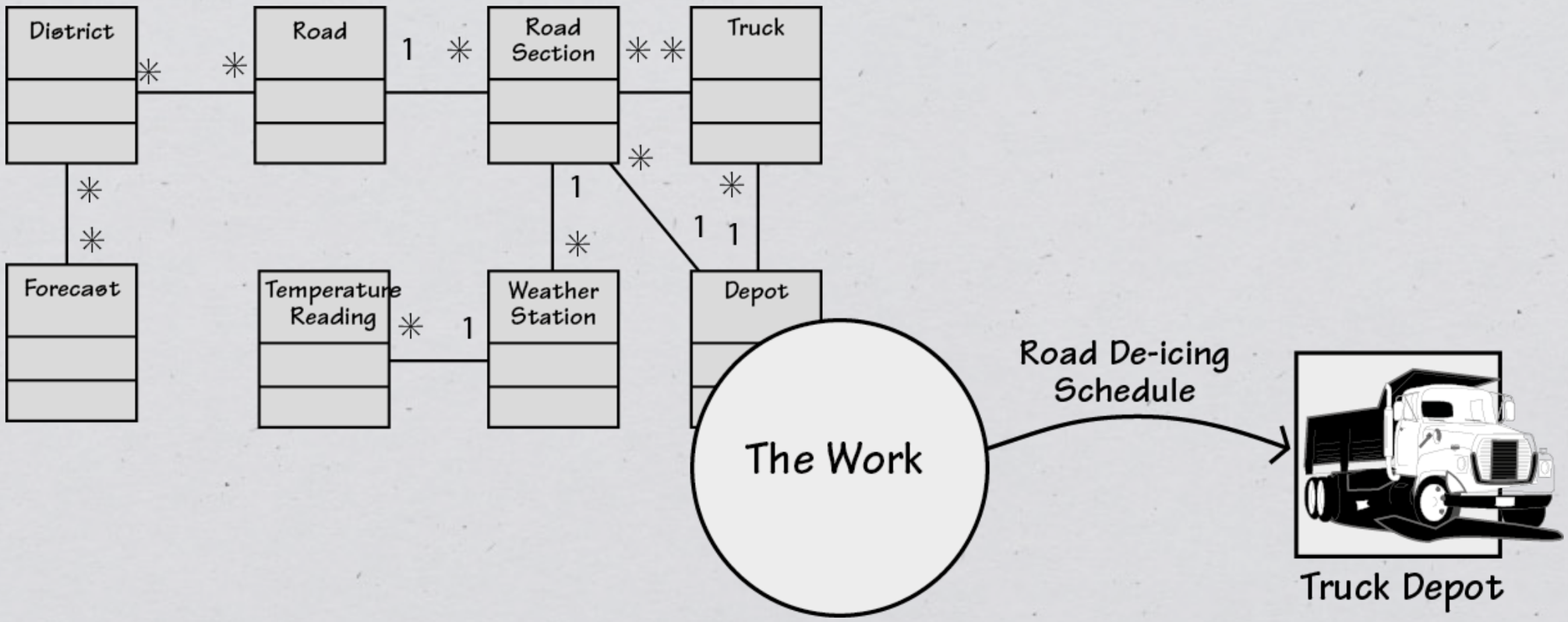
Counting Function Points: Output Business Use Cases

Data Elements

Classes Referenced	1-5	6-19	20+
<2	4	4	5
2-3	4	5	7
>3	5	7	7

✦ 7 function points

Counting Function Points:
Time-Triggered Business Use Cases



- It has to reference all 8 classes to make its prediction about ice formation.
- Attributes: Truck ID, start time, end time, distance, road, road section, and maybe 2 more. Total: 8

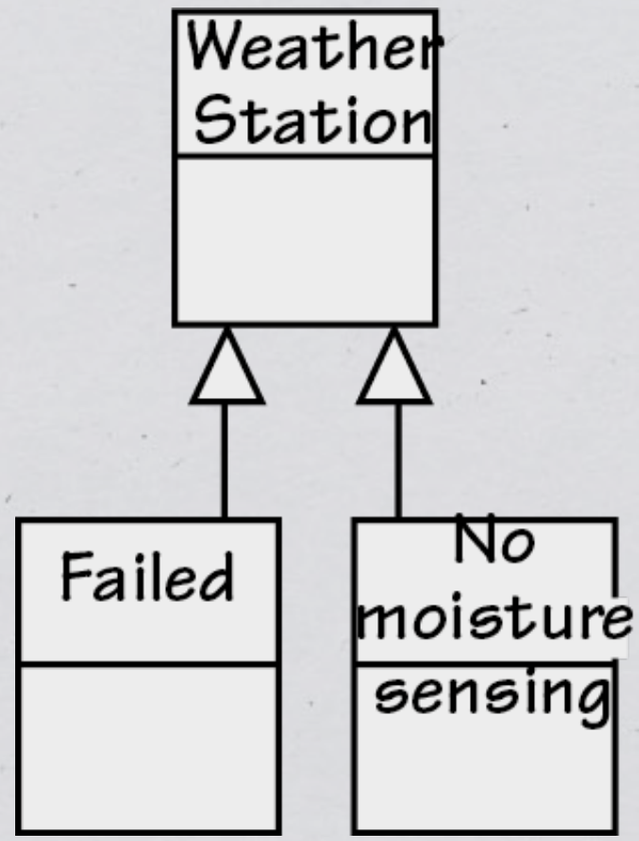
Counting Function Points:
Time-Triggered Business Use Cases

Classes Referenced	Data Elements: 1-5	6-19	20+
1	3	3	4
2-3	3	4	6
>3	4	6	6

✦ 6 function points

Counting Function Points:
Counting Internally Stored Data

- Count the classes.
- Suppose Weather Station has 2 types:
  One with no surface moisture sensor.
  Failed Station.
  Data collected from these kinds are diffrent.



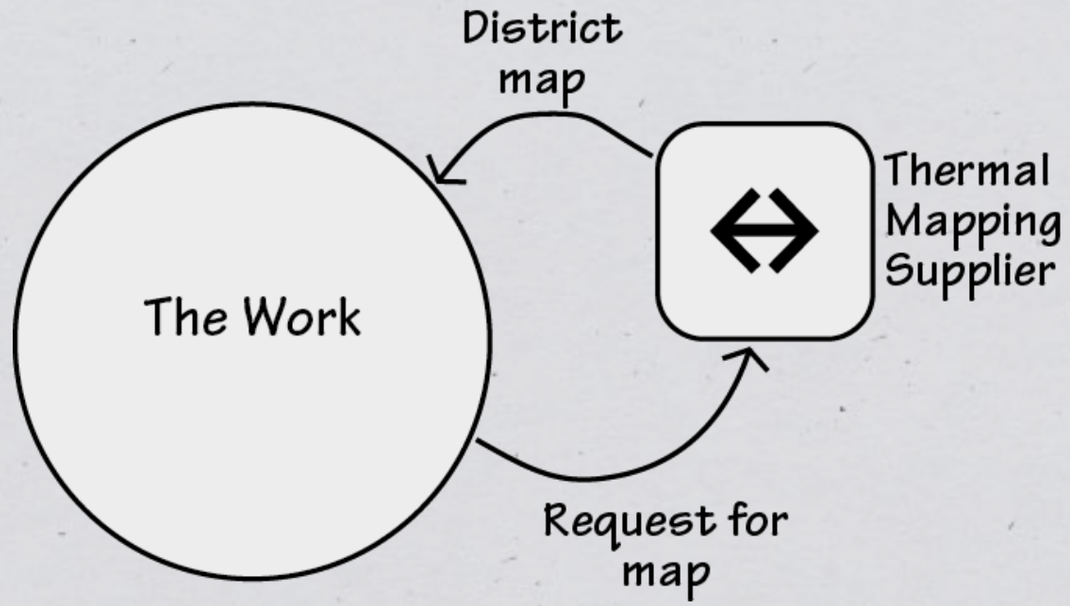
- In case of subclassing:
  Count only the subclasses of the Class.
- The Weather Station entity counts for 2 record elements.
- Classes with no subclasses: count 1.
- Count the attributes.

Counting Function Points:
Counting Internally Stored Data

Record Elements	Attributes: 1-19	20-50	51+
<2	7	7	10
2-5	7	10	15
>5	10	15	15

- Lets take the class Weather Station, how many attributes it has? More than 19??
- Number of record elements is total number of subclasses, if any. The number of record elements is 1 if the class has no subclasses.

Counting Function Points:
Counting Externally Stored Data



- ✦Data stored in the adjacent systems.
- ✦They appear as interactions with *cooperative adjacent systems* in the context diagram.
- ✦ The Thermal Mapping Supplier is an external system that maintains a database of the road surface temperature for every meter of every road.

Counting Function Points:
Counting Externally Stored Data

Attributes

Record Elements	1-19	20-50	51+
<2	5	5	7
2-5	5	7	10
>5	7	10	10

Function Point Counting

- Effort in staff months = (function points / 150) * function points$^{0.4}$
- So for a 1,000-function-point work area (this is a substantial, but not overly large area) the effort in person-hours is (1,000 / 150) * 1,0000.4, which is 105.66 staff-months.

Range of Uncertainty

Number of parameters used	Range of uncertainty
1	+ or - 40%
2	+ or - 20%
3	+ or - 15%
4	+ or - 10%
5	+ or - 5%

- You count function points using inputs, outputs, inquiries (time-triggered), internal data, external data.
- Each of them is a parameter..
- Range of uncertainty depends on the number of parameters used.