

## Annex 3: Rules for the construction of right hand side Storybuilder diagrams

Hans Baksteen, 12 April 2005

### *Introduction*

Before the start of the Right-Hand-Side(RHS)-construction of a Storybuilder(SB)-diagram for a particular bowtie there are several points of special interest:

- Mitigating related aspects
- Dose-response related aspects

### *Mitigating related aspects*

Mitigating related aspects are aspects which determine or influence the dose which results from the occurrence of a Center Event.

*Before analysing* the incident descriptions the analyst should have a clear picture of the factors that determine the dose. If those dose determining factors (DDFs) are mentioned in the incident description than they should be recorded in the RHS of the SB-diagram in a **DDF**-block. Before the construction of the RHS of a SB-diagram for a particular bowtie RIVM should deliver the list of DDFs for that bowtie and discuss this list with the story builders.

Example 1: Dose determining factors for Bowtie 1 “Falling from height”

Dose determining factors Bowtie “Falling from height”
<ol style="list-style-type: none"><li>1. Falling height</li><li>2. Shape of the impacted surface</li><li>3. Hardness of the impacted surface</li><li>4. Energy dissipating barriers between starting and final point</li></ol>

Example 2: Dose determining factors for Bowtie 12 “Contact with electricity”

Dose determining factors Bowtie “Contact with electricity”
<ol style="list-style-type: none"><li>1. Voltage (type of current (AC/DC), low/ high)</li><li>2. Resistance (way of current through body, material of shoes, temperature, humidity, ground, condition of skin, contact surface)</li><li>3. Time of current flow</li><li>4. Amperage (low/medium/high)</li></ol>

In fig 1 the SB-diagram of the DDFs of bowtie 12 is presented.

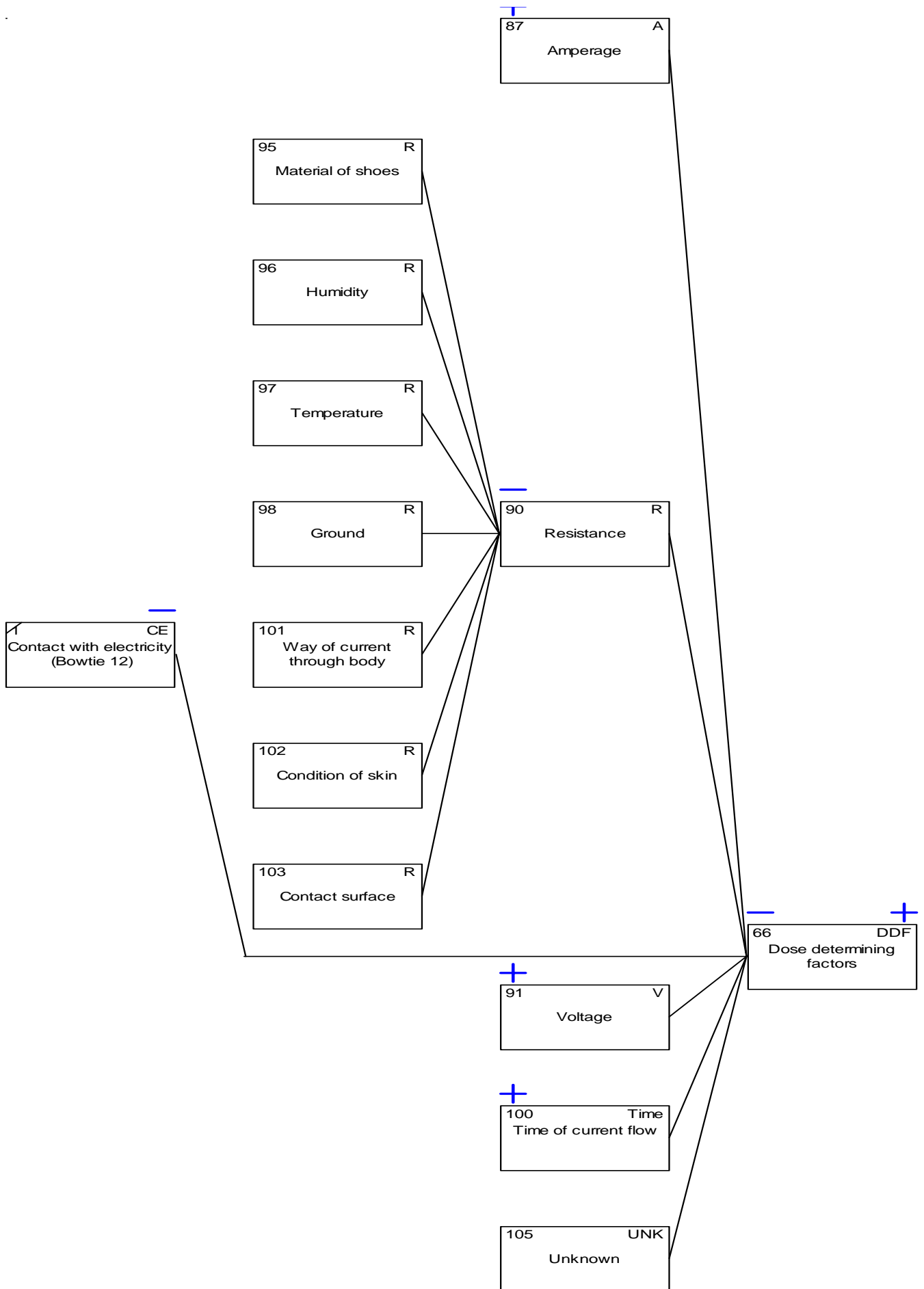


Fig.1 Dose determining factors of Bowtie 12 (“Contact with electricity”)

The unknown-block must be used if there is no information at all about the DDFs in the incident description. If f.e. only a part of all DDFs is known than the corresponding DDFs-blocks should be filled in and the unknown-sub-blocks of the unknown DDFs.

Probably the number of DDFs can change during the construction of the SB-diagram, because new DDFs might appear when reading all the incident descriptions.

When constructing **Barrier**-blocks in the SB-diagram *during analysing* the incident descriptions, keep in mind that there are three general types of mitigating barriers which influence the final dose (see Yannis' presentation in Chester):

1. Barriers limiting the amount or the intensity of the hazard
2. Barriers shielding persons from the hazard
3. Barriers limiting the duration of the exposure

For every type of bowtie these barriers will be different. It depends upon the definition of the Center Event whether all three types of barriers will be present.

Example: Mitigating barriers for Bowtie "Falling from height"

*Mitigating barrier, type 1*

Given a specific fall, the height and the ground are situation-specific and therefore fixed. These factors will determine the dose. Only barriers which prevent that the person hits the ground will limit the intensity of the hazard. So a fall arrestor, a safety net, or ground protection are barriers of mitigating barrier type 1.

*Mitigating barrier, type 2*

If a person is protected by a hard hat or a cap (like horse(wo)men), this hat or cap shields the person from the hazard and is a mitigating barrier type 2.

*Mitigating barrier, type 3*

If a person falls there are no barriers which can reduce the exposure time.

*Dose-response aspects*

Dose-response aspects are aspects which determine or influence the final consequence of a Center Event given a dose.

*Before analysing* the incident descriptions the analyst should have a clear picture of the factors that determine the consequence given a dose.

For most of the bowties the next 4 general characteristics of the injured person (CIP) will determine the final consequence given a dose:

1. Age of the injured person
2. Weight of the injured person
3. Sex of the injured person
4. Condition of the injured person

If those characteristics are mentioned in the incident description than they can be recorded in the RHS of the SB-diagram in a **CIP**-block.

In fig. 2 the SB-diagram of the 4 general characteristics of injured persons which determine the final consequence given a dose are presented.

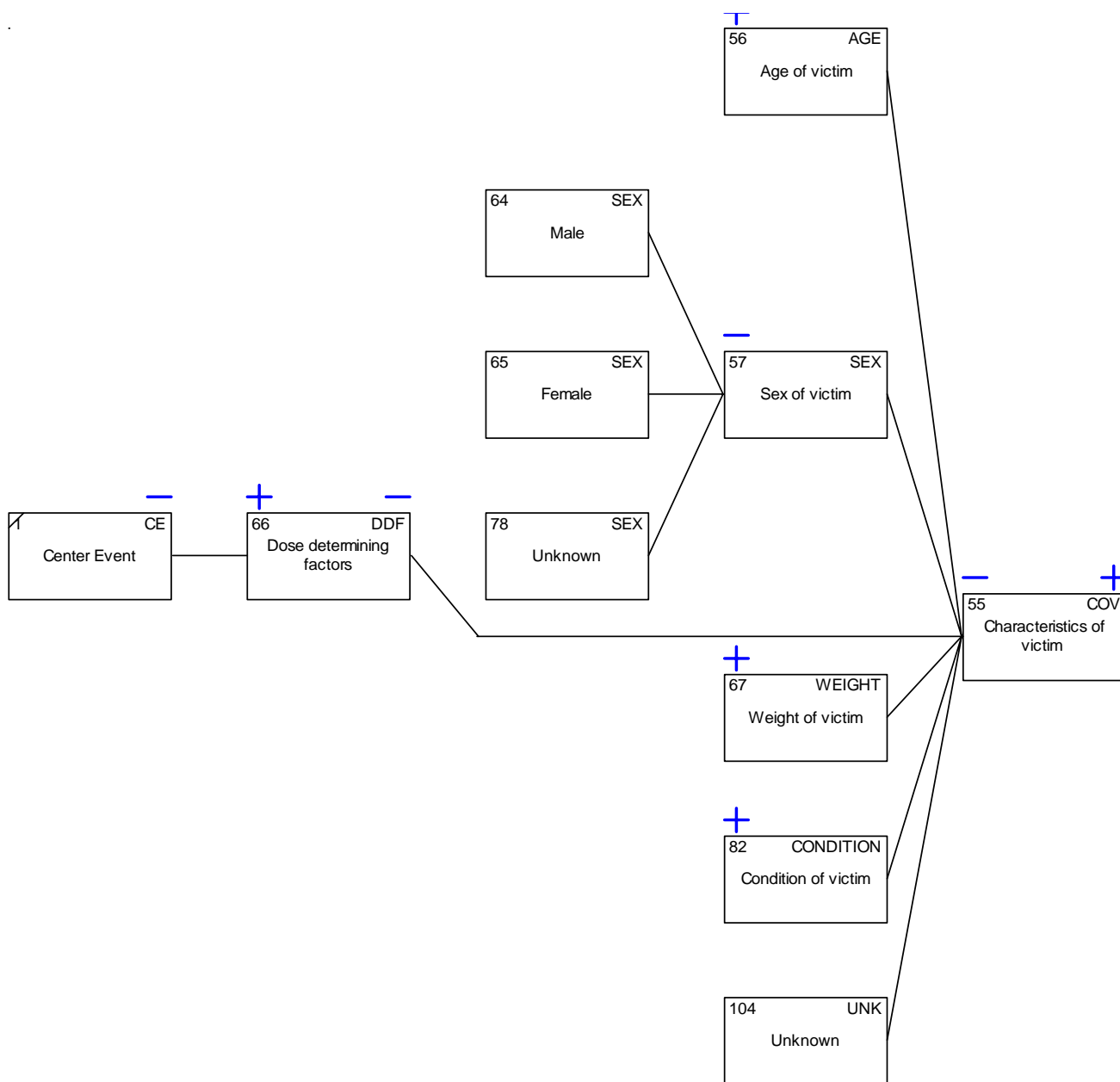


Fig.2 SB-diagram of the 4 general characteristics of injured persons which determine the final consequence given a dose.

The unknown-block must be used if nothing is known about the characteristics of the victim. If only the age is known, than the age-block should be filled in and the unknown-sub-blocks of the blocks 'sex of victim', weight of victim', condition of victim'.

***Because information about AGE & SEX are coded in GISAI there is no need to record this information in the storybuilderfiles (this information can easily be added to the sb-file later).***

Of course the involved body part will also determine the final consequence, but this information is already covered in one of the **INJP**-blocks.

The information of the final consequences of an injury which is recorded in GISAI must always be categorized in terms of non permanently injured or permanently injured. Sometimes, e.g. when incidents from other databases (e.g. LOC-incidents in TNO-FACTS database) are analysed, the recorded injury information might differ: x persons had a minor injury and y persons where severely injured. This type of information can not unambiguously be translated in the terms of (non) permanently injuries. This information can only be preserved by introducing extra final consequence SB-blocks:

- Severe injury (FOS-block)
- Minor injury (FOM-block)

In fig.3 the SB-diagram with **INJP**-blocks and extra **FO**-blocks are presented.

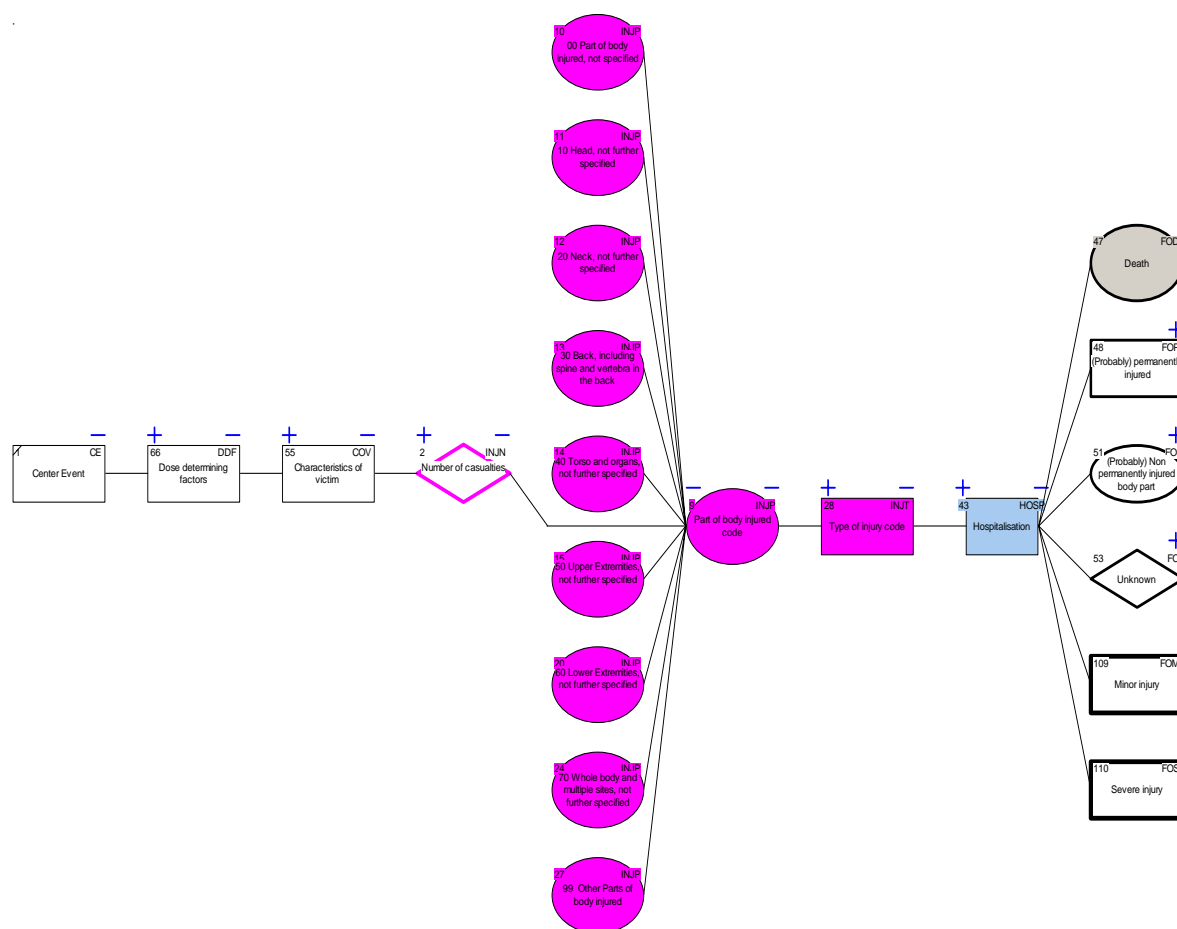


Fig.3 SB-diagram with the **INJP**-blocks and extra **FO**-blocks

When constructing **Barrier**-blocks in the RHS-diagram *during analysing* the incident descriptions, keep in mind that there is one general type of dose-response barrier which influence the final consequence: the adequacy of the medical attention or first aid. Of course there are more factors which determine this adequacy. But probably the response time is a factor which can be found in a part of the incident descriptions.