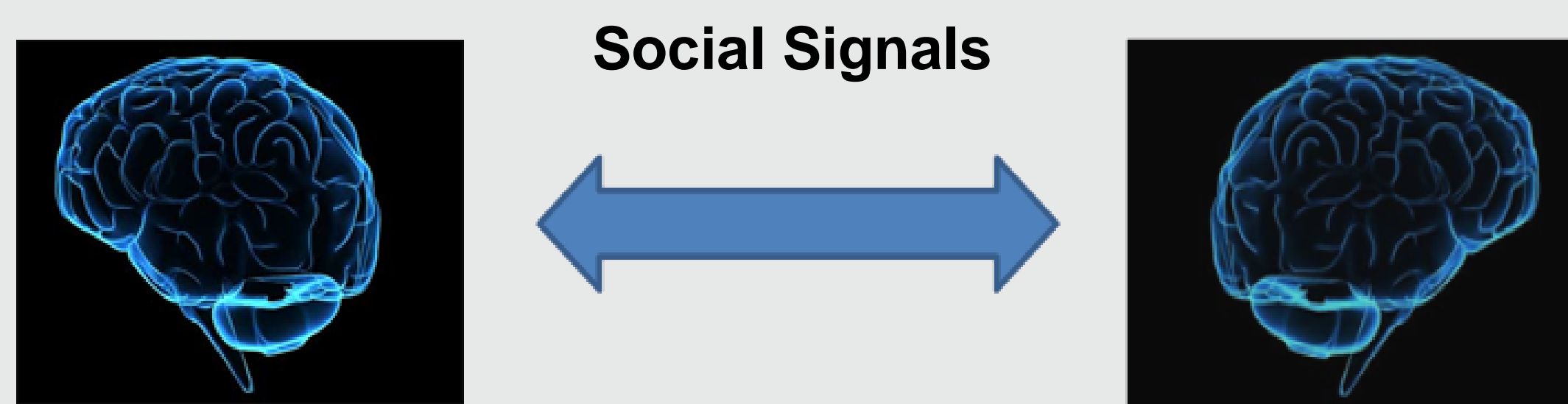


# Social Signal Analysis in Criminal Mediation Processes

## Motivation

- Automatic **analysis of human behavior** from **non-verbal communication** in **conversational processes**.
- **Criminal Mediation** is an specific scenario from the Justice area where two parts are involved (**offender** and **victim**) in order to achieve an agreement, helped by the figure of a **mediator**.



Provide high amount of important and hidden information of conversational processes. Difficult to be detected by human conscious.

- By observing and **quantifying the levels** of detected social signals in Criminal Mediation, one could be able to **estimate** more **precisely** the **agreement** between the parts to **predict** the **success** of the conversation.
- This analysis can provide an important **feedback** for improving the mediator skills.

## Problem Definition and System Proposal

- Some social signals can be defined as **psychological indicators** coming from the **observational methodology**.

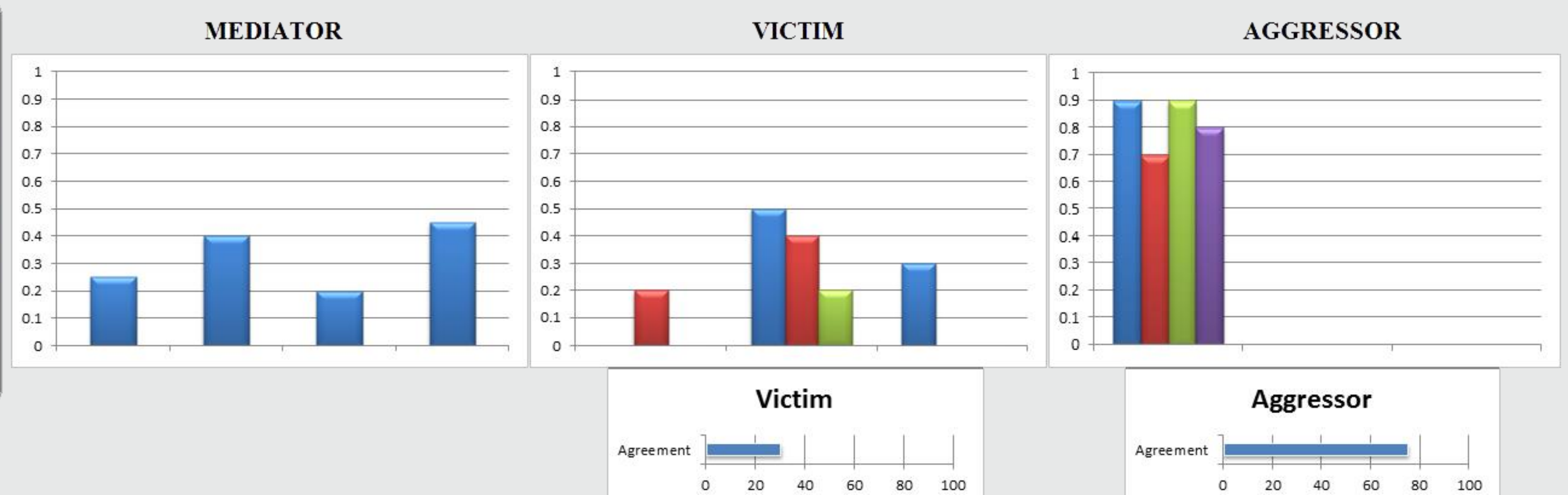
Low level indicators	High level indicators
Body parts detection (head, chest, superior arm, inferior arm, and hands).	Comfort: keep hands visible.
Quantifying the degree of body parts activity (agitation).	Activity: talking time, interruptions to other people, emphasis.
Self-interaction of body parts (hand touches the head).	Stress: quantity of body agitation.
Computing body parts positions (tilt, head position).	Involvement: look to the eyes, agitation while talking.

- **Visual indicators** are provided by both analyzing the **depth** information and the expert observation. **Multi-modal sensors** such as Microsoft Kinect™ device provides depth information.
- Indicator levels are defined as the probability distribution function  $P(I_a|S)$ , where given a gesture sequence  $S$ ,  $P$  is the probability of having a certain indicator  $I$  from an actor  $a$  (mediator, victim or offender).
- **Experts feedback** is useful for obtaining a **correlation** between their **subjective** observations, **objective** information from the mediation itself, and the **system's observations** in order to predict more precise indicator levels for the final solution.

## Proposed System Overview

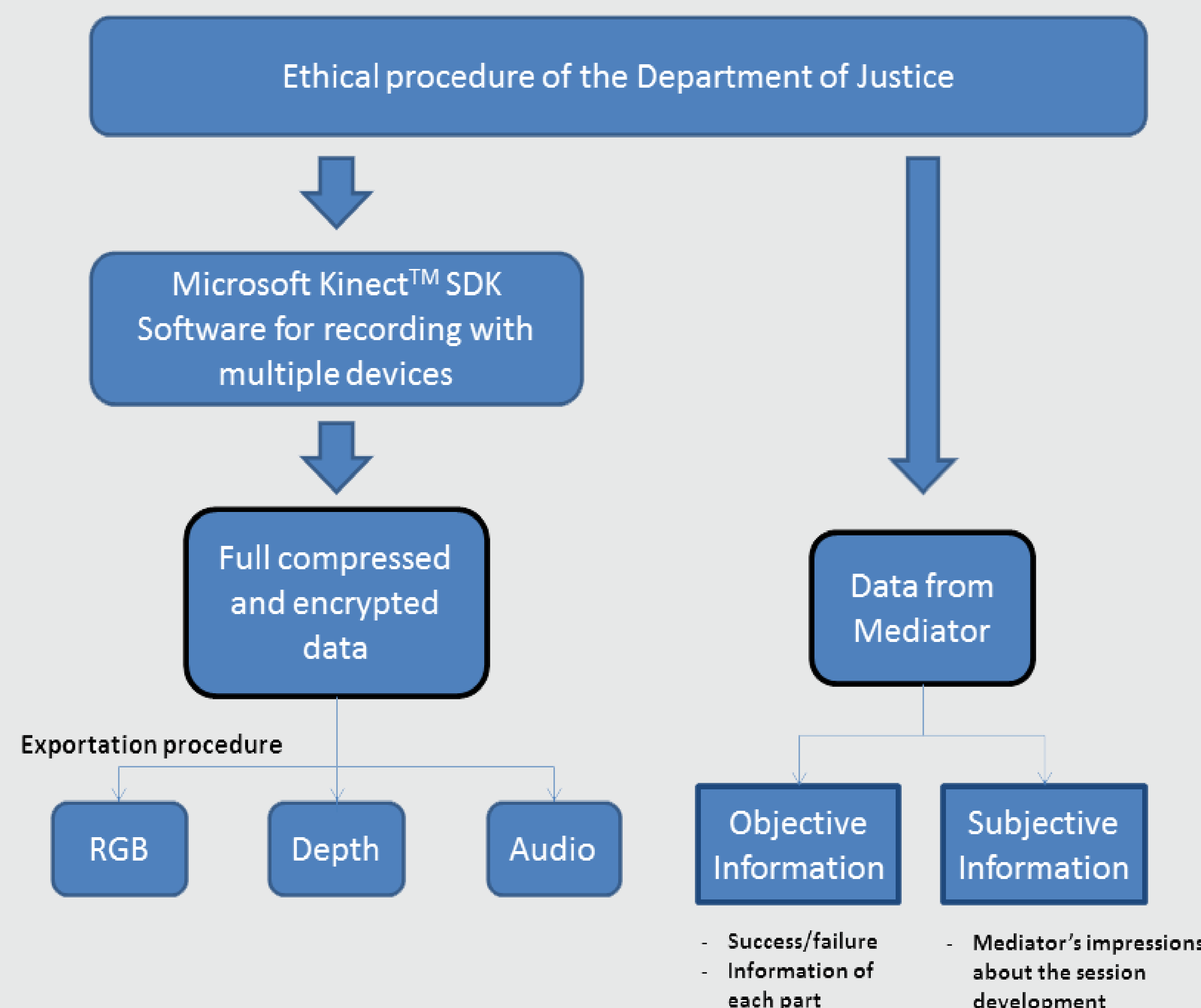


Success Prediction



## Achievements

- **Data base** has been built recording with **multiple Microsoft Kinect™ devices** during different criminal mediation sessions.
- About **25 sessions** has been recorded, each one of **1 to 3 hours** depending on the session itself. Each session captured data from multiple Microsoft Kinect™ sensors (from 1 to 3), depending on the **number of actors**.



## Discussion

- Automatic analysis of **human behavior** is a **hard** task due to the high amount of **subjective information** that one can consider -specially psychologists or other experts in the area of observational methodology-. However, as we deal with **quantitative indicators** described and used in many **social contexts** [1], we can guide this process towards an **objective evaluation** of these **social signals**, obtaining **confident values** for predicting the success of the mediation process.
- **Gesture sequences** from recorded people in the data is the **most significant** information to perform an analysis of the **non-verbal communication**. In this way, we need to deal with such sequence processing in order to detect and analyze the **fragments** containing a gesture **composed** by a certain defined vocabulary.
- We are planning to use different **temporal clustering** techniques such as [2], and hence a proper **discretization** in order to learn and define our **vocabulary**.
- In the future, other information contained in our data such as the **speech** can be also analyzed as signals from the audio in order to integrate it in a **full framework for human behavior analysis in conversational situations**.