HUMAN BEHAVIOR UNDER FIRE SITUATIONS PORTUGUESE POPULATION

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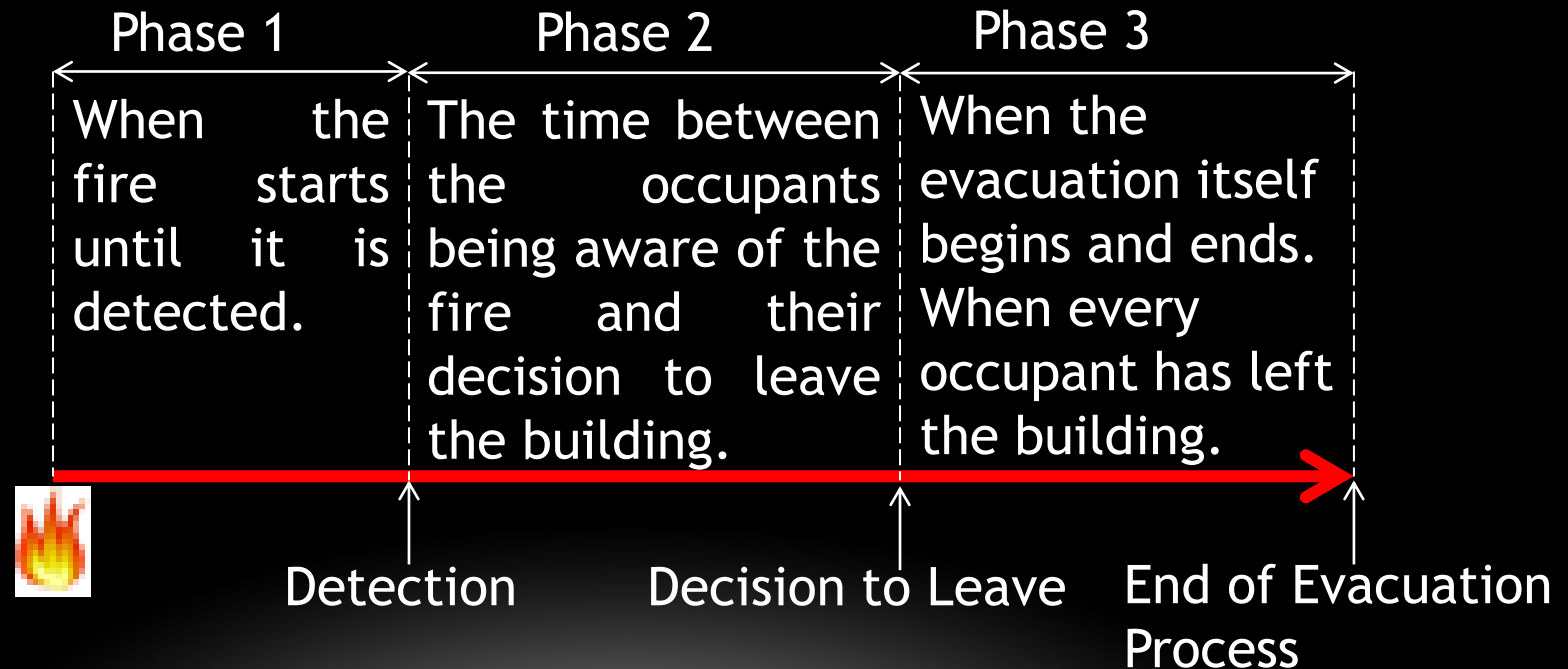
OUTLINE

- INTRODUCTION

- SUMMARY OF THE INVESTIGATION ANALYSIS

- THE CONTRIBUTION OF AI FOR HUMAN BEHAVIOR ANALYSIS

- CONCLUSION

- FURTHER STUDIES

- QUESTIONS

INTRODUCTION

- The study of the people's behavior under fire has been studied for several years.

  - Bryan - 1978
  - Canter - 1985
  - Chubb - 2002
  - Fahy - 2005
  - Keating - 1992

  - Proulx - 2003
  - Sime - 2004
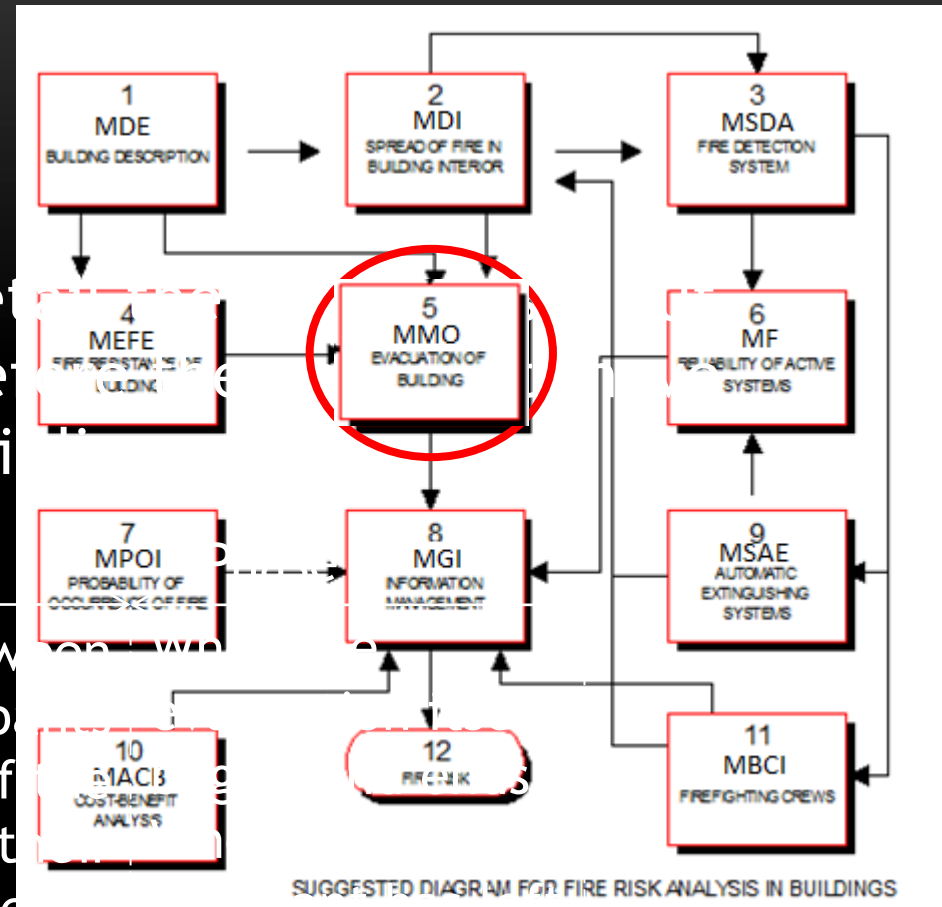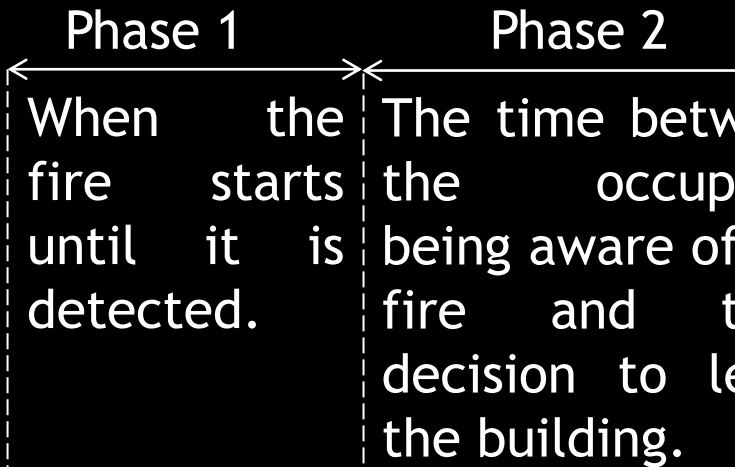 - S.M.Lo - 2009
  - Shields - 2000
  - Zhao - 2009

INTRODUCTION

- Process of a building evacuation:

  - Three distinct phases

Phase 1	Phase 2	Phase 3
When the fire starts until it is detected.	The time between the occupants being aware of the fire and their decision to leave the building.	When the evacuation itself begins and ends. When every occupant has left the building.

Detection   Decision to Leave   End of Evacuation Process

INTRODUCTION

- MARHE Buildings fire risk analysis model

The MARHE simulates the risk and ignores what happens between the fire and deciding to leave the building.

SUGGESTED DIAGRAM FOR FIRE RISK ANALYSIS IN BUILDINGS

Phase 1	Phase 2	
When the fire starts until it is detected.	The time between the occupant being aware of the fire and the decision to leave the building.	The time between when the occupant has left the building.

Detection   Decision to Leave   End of Evacuation Process

INTRODUCTION

- For the development of a simulation model that quantifies the time delay in the phase 2, it is necessary:

  - Understand the occupants behaviour under a fire situation.

- This study is the first step in Portugal towards such goal.

SUMMARY OF THE INVESTIGATION ANALYSIS

- 225 Respondents

  - Adjusted to the Portuguese reality

    - Gender - 50.2% of women and 49.8% of men;

    - Age group - with an average of 35.96 years - national average was 39.09 years old;

    - Fire safety training - 72 have training in fire safety and just 19 make an annual recycle.

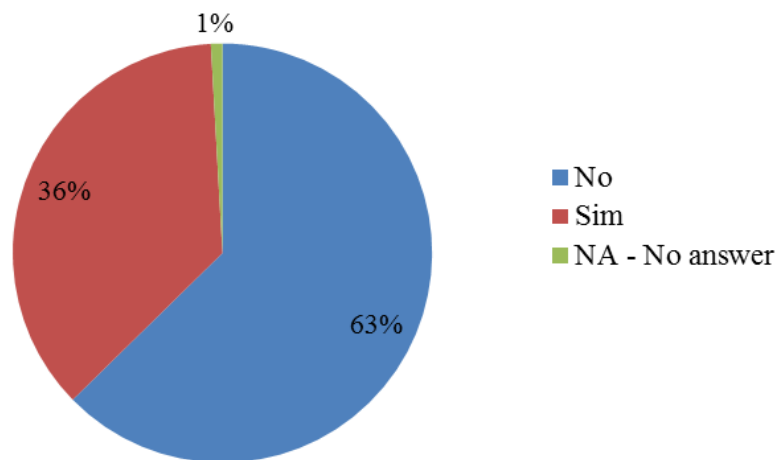# SUMMARY OF THE INVESTIGATION ANALYSIS

- INFLUENCE ON THE REACTIONS OF THE RELATION OF THE RESPONDENTS WITH THE BUILDING

Your reaction would be different if you would be in your own building?

- 3%
- 44% Yes
- 53% No
- NA - No answer
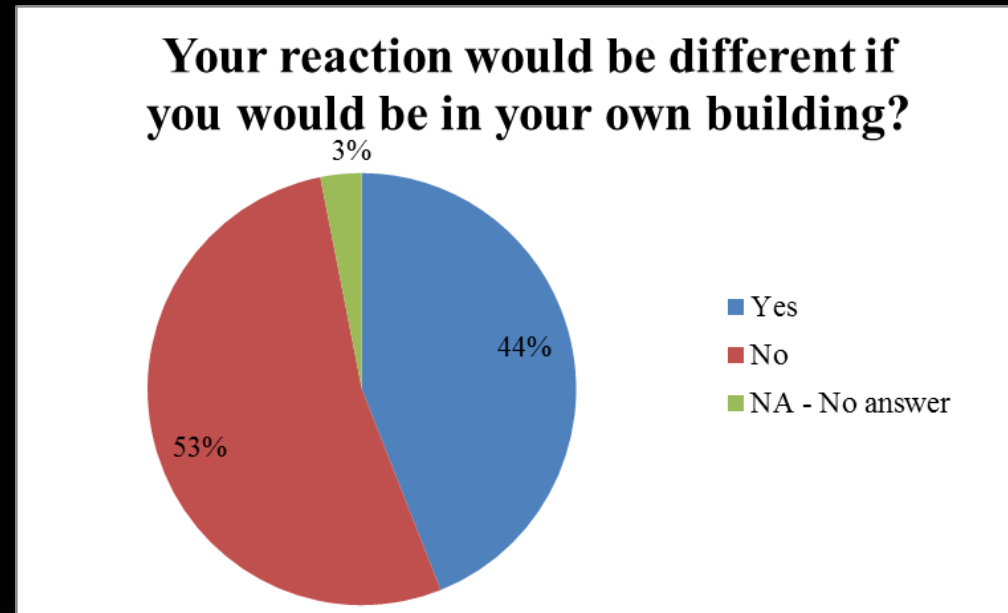
SUMMARY OF THE INVESTIGATION ANALYSIS

- KNOWLEDGE OF THE EVACUATION PLANS AND EMERGENCY EXITS
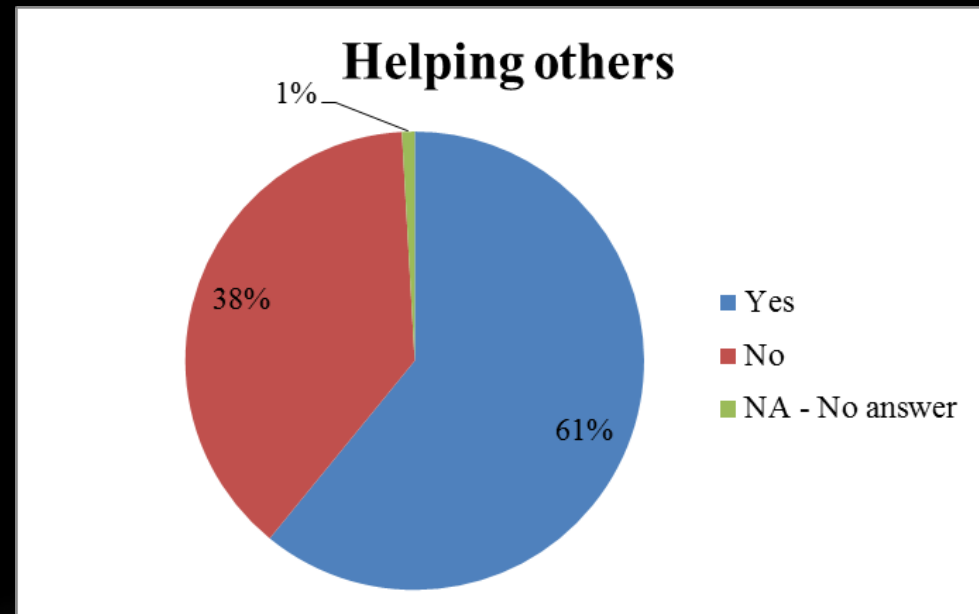

Knowledge of Evacuation Plans

- No
- Sim
- NA - No answer

1%
36%
63%

Identify the emergency exits

- No
- Yes
- NA - No answer

1%
2%
97%
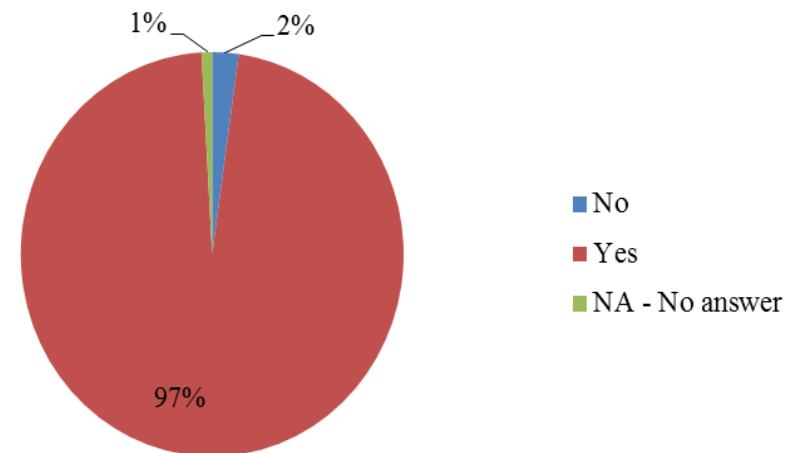
SUMMARY OF THE INVESTIGATION ANALYSIS

- CHANCE OF PANIC REFERRED BY THE RESPONDENTS

  - 93.33% of the respondents consider that in a fire situation there will be panic.

  - The influence of gender, education level and training in fire safety only slightly alter the percentage of responses prevails always, unmistakably, the conviction that the panic will be present.
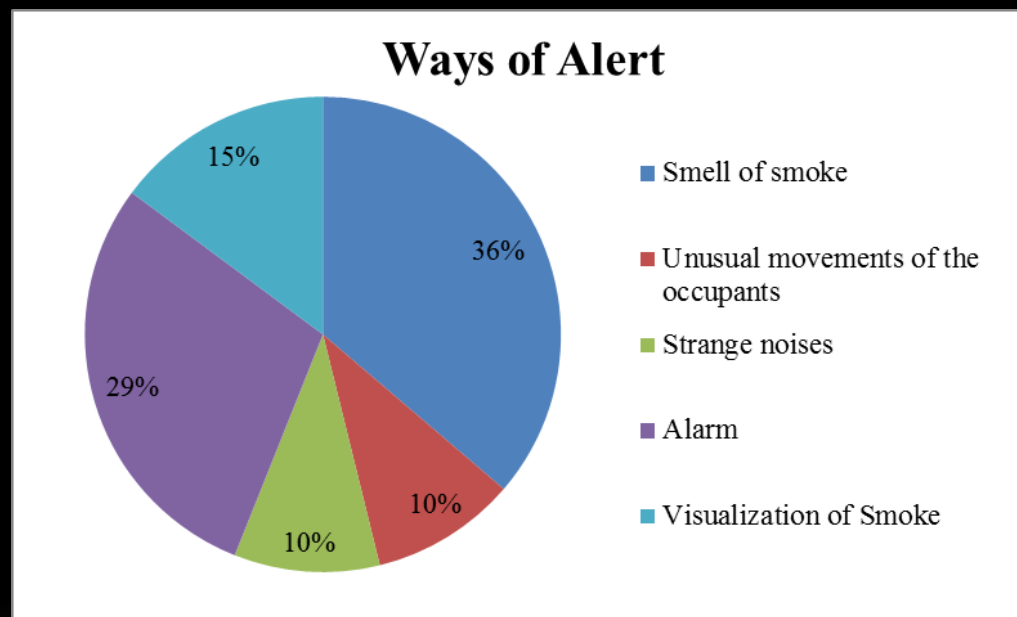
SUMMARY OF THE INVESTIGATION ANALYSIS
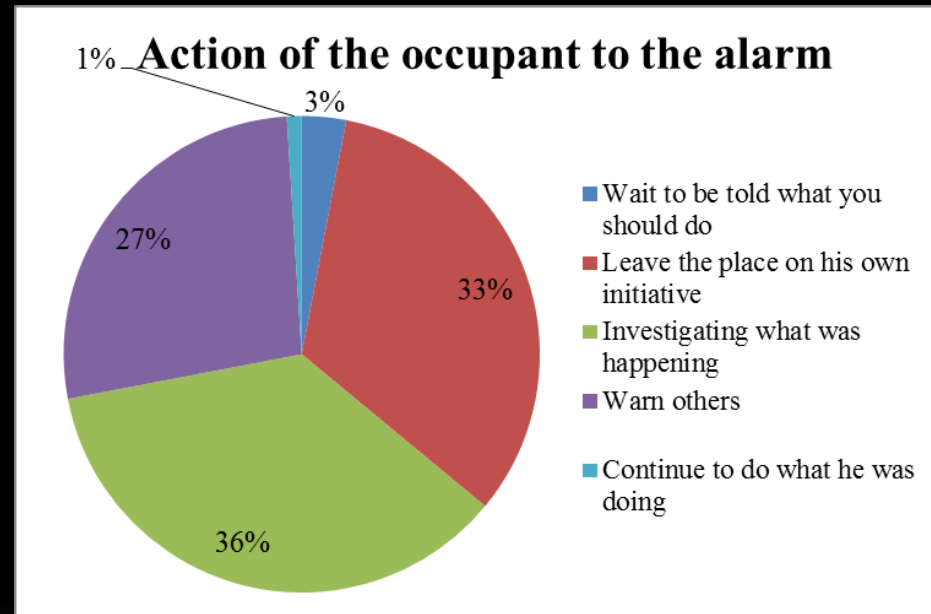
- SPIRIT OF HELPING OTHERS IN A SITUATION OF EMERGENCY

SUMMARY OF THE INVESTIGATION ANALYSIS

- WAYS TO KNOW ABOUT THE FIRE REFERRED BY THE RESPONDENTS

Ways of Alert

- 36% Smell of smoke
- 10% Unusual movements of the occupants
- 10% Strange noises
- 29% Alarm
- 15% Visualization of Smoke

SUMMARY OF THE INVESTIGATION ANALYSIS

- ## ACTION OF THE RESPONDENTS TO THE ALARM

Action of the occupant to the alarm

- 1%
- 3%
- 27%
- 33%
- 36%

- Wait to be told what you should do
- Leave the place on his own initiative
- Investigating what was happening
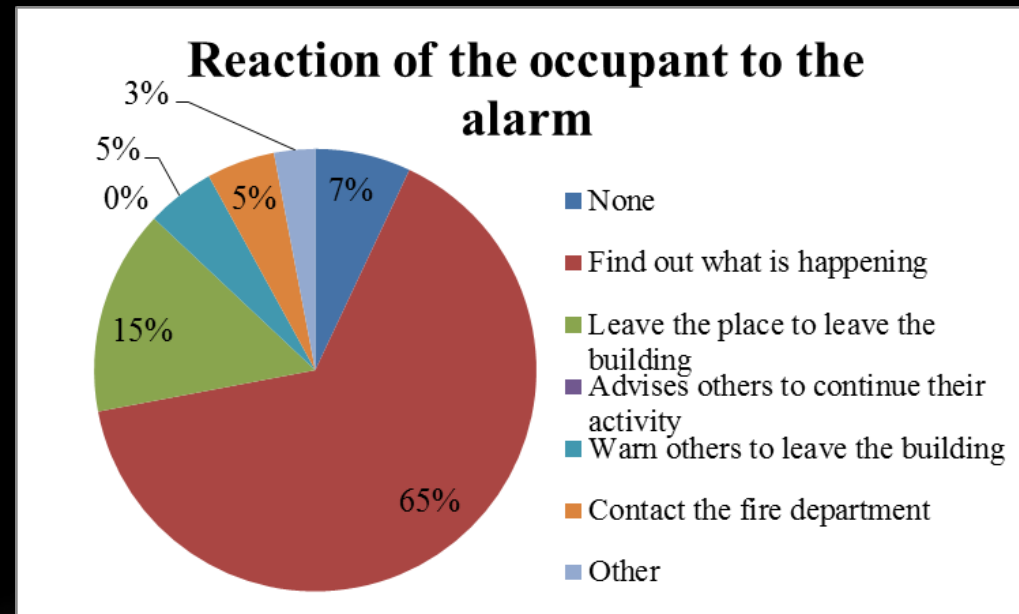- Warn others
- Continue to do what he was doing

SUMMARY OF THE INVESTIGATION ANALYSIS

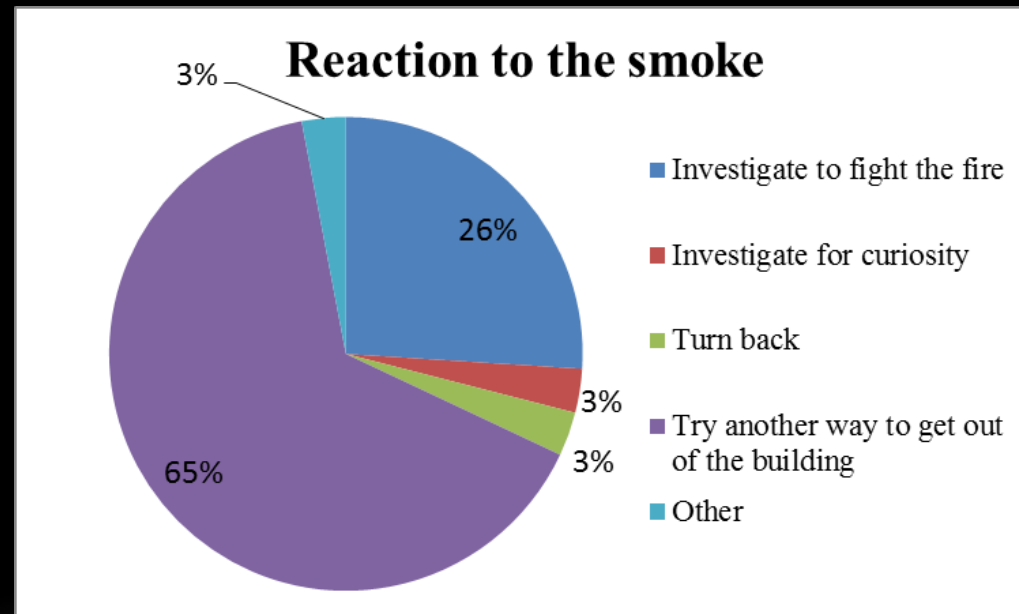- INTERPRETATION OF THE ALARM SIGNAL OF RESPONDENTS TO THE ALARM SIGNAL
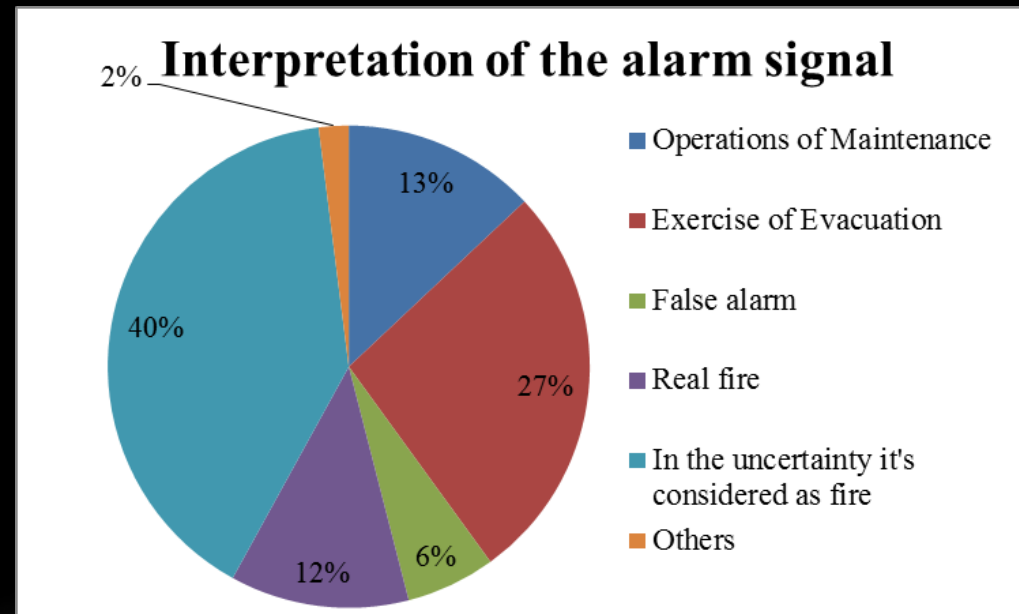
SUMMARY OF THE INVESTIGATION ANALYSIS
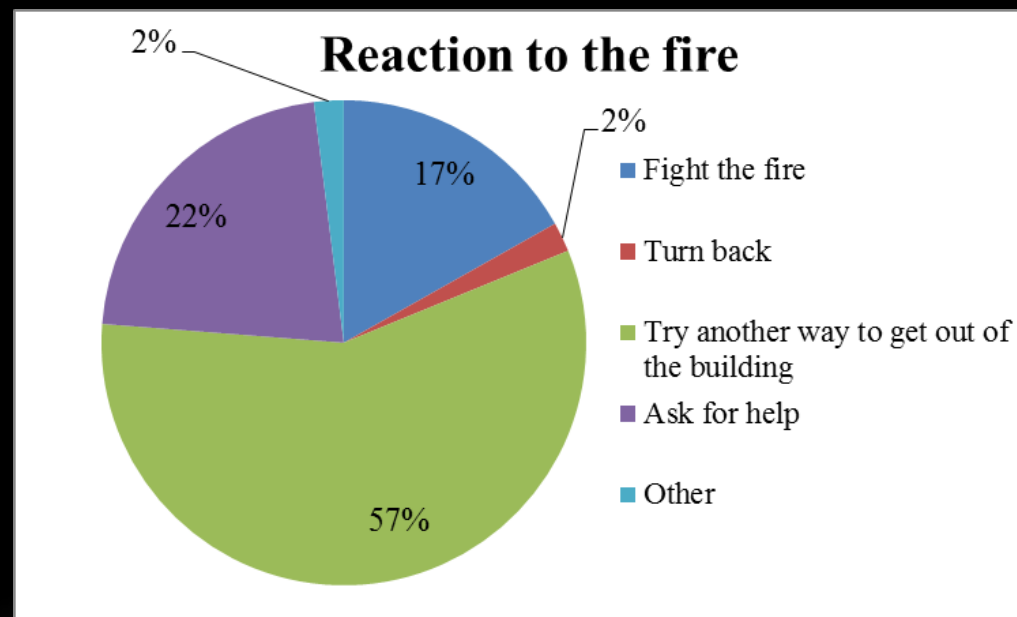
- REACTION OF RESPONDENTS TO THE ALARM SIGNAL

SUMMARY OF THE INVESTIGATION ANALYSIS

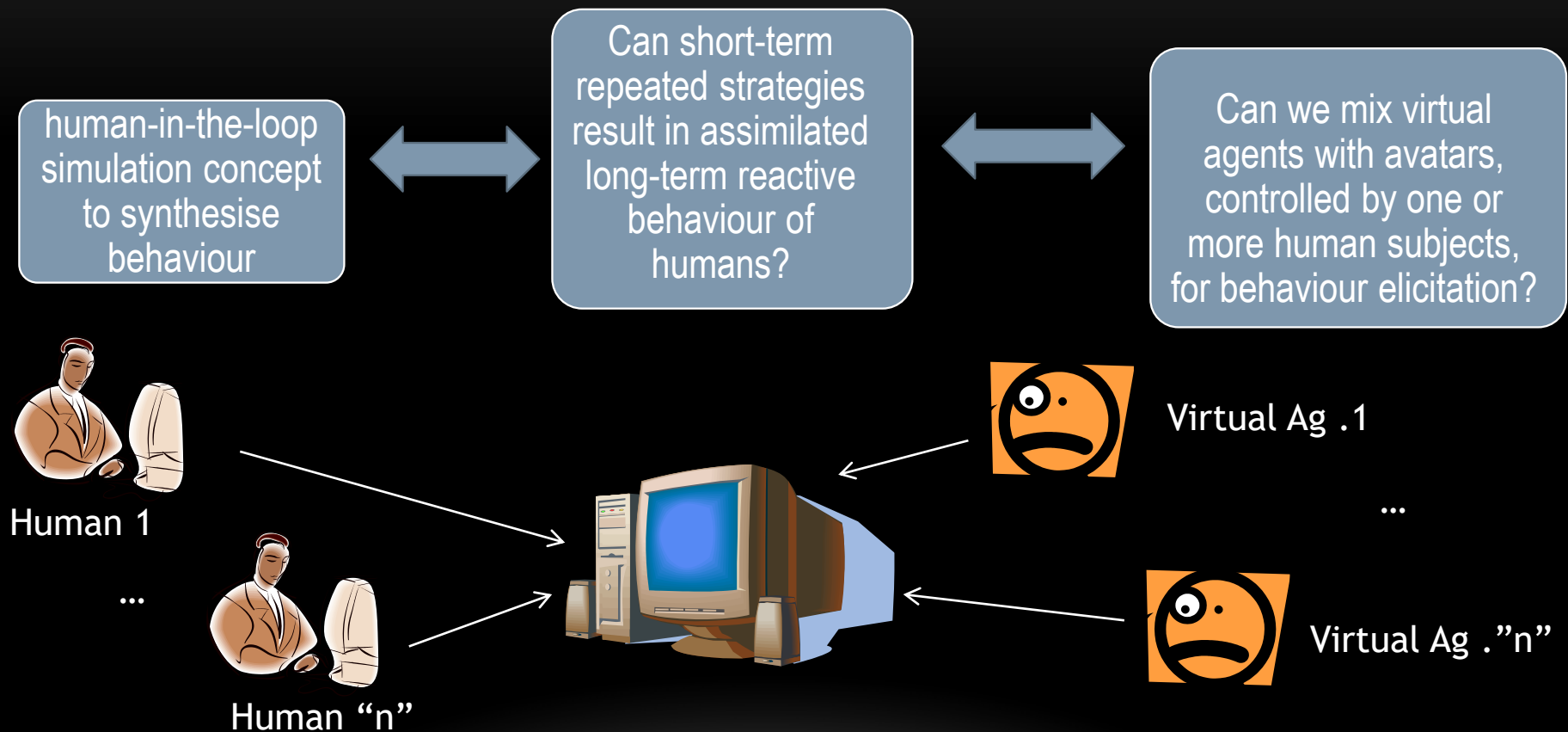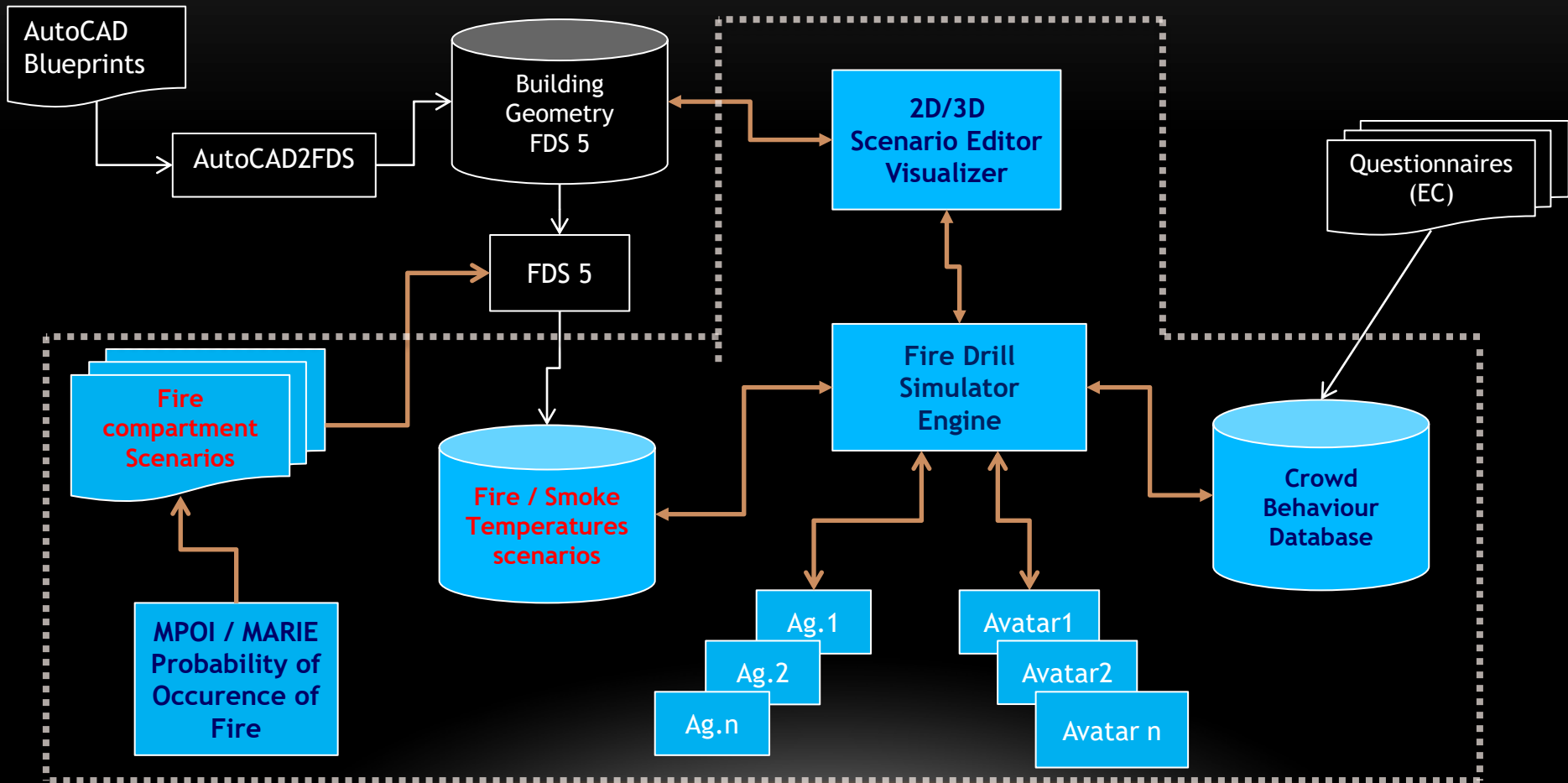- REACTIONS OF RESPONDENTS DUE TO THE PRESENCE OF SMOKE

Reaction to the smoke

- 3%
- 26%
- 65%
- 3%
- 3%

Legend:
- Investigate to fight the fire
- Investigate for curiosity
- Turn back
- Try another way to get out of the building
- Other

SUMMARY OF THE INVESTIGATION ANALYSIS

- REACTIONS OF RESPONDENTS FACE TO A DIRECT CONTACT WITH THE FIRE

Reaction to the fire

2%

2%

17%

22%

57%

- Fight the fire
- Turn back
- Try another way to get out of the building
- Ask for help
- Other

CONCLUSION

- Probability of panic occurring during a fire.

- Little influence of fire safety training:

  ➤ on the knowledge of evacuation pathways.

  ➤ on the choice of evacuation pathways during a fire.

  ➤ on certain reactions by occupants during a fire.

- Little influence of previous experience with a fire.

FURTHER STUDIES

- Expand the universe of analysis, with the development of new campaigns (schools, hospital, hotels) for data acquisition, based on fire drill to quantify the time of the actions/reactions.

- Develop a evacuation model that consider the 3 phases.

- Another study is being developed, in Portugal, based on multi-agent systems.

THANK YOU!