

## THÈSE DE DOCTORAT

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Doctorat d'Intelligence Artificielle

par

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Titre en français

Subtitle

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**DOCTORAL THESIS**  
**OF BELFORT-MONTBÉLIARD UNIVERSITY OF TECHNOLOGY**

Doctoral School #37  
Physical Sciences for Engineering and Microtechnologies

Doctor in Artificial Intelligence

by

FIRSTNAME LASTNAME

Title in English

Subtitle

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# ACKNOWLEDGEMENTS



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## RÉSUMÉ LONG



You must write here a long summary of your PhD thesis in French language. According to the SPIM rules, the length of this long summary must be of minimum 3 pages for people who is not native-french speaker, and of minimum 20 pages for who is native-french speaker.



# ACRONYMS

- **MAS:** Multi-Agent System





## CONTEXT AND ISSUES



# 1

## INTRODUCTION

This is an acronym: Multi-Agent System (MAS). This is the same acronym: MAS.

### Research Question 1 (RQ1) – a name

Description of the research question.

### Objective 1 (O1) – a name

Description of the objective.

### Contribution 1 (C1) – a name

Description of the contribution.

### 1.1 Context

This template describes some elements that can help you write your thesis. A typical outline for a scientific thesis is also proposed.

### 1.2 Thesis Objectives

The main objective of your thesis can be highlighted using the environment below:

Propose a model that does something!

1.3 **Thesis Outline**

---



# 2

## STATE OF THE ART

2.0

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To help you write your thesis, several tools are described below. Many other macros are available in the  $\text{\LaTeX}$  package set `tex-upmethodology` on which the style of this thesis is based. Examples include environments for automatically creating subfigures and macros for defining unnumbered sections that appear in the table of contents.

## 2.1 Propose a Definition

Definition 1 illustrates the proposal of a definition.

### Definition 1: A Thesis

Document presented to a university jury for obtaining a doctorate.

## 2.2 Include a Figure

Including a figure is done using standard  $\text{\LaTeX}$  tools (environment `figure`, `\includegraphics`, etc.).

We propose a macro to simplify the inclusion of a figure.

```
\mfigure[position]{options}{filename}{title}{labelid}
```

This is equivalent to (note the addition of `fig:` as a prefix to the label):

```
\begin{figure}[position]
  \begin{center}
    \includegraphics[options]{filename}
    \label{fig:labelid}
    \caption{title}
  \end{center}
\end{figure}
```

Referencing the figure can be done using the macros:

```
\figref{labelid}
\figpageref{labelid}
```

## 2.3 Include a Table

Including a table is done using standard  $\text{\LaTeX}$  tools (environment `table`, environment `tabularx`, etc.).

We propose a macro to simplify the inclusion of a table.

```
\begin{mtable}[options]{width}{numberofcolumns}{columnspec}{title}{labelid}
  content
\end{mtable}
```

This is equivalent to (note the addition of `tab:` as a prefix to the label):

```
\begin{table}[options]
\begin{center}
\begin{tabularx}{width}{columnspec}
  content
\end{tabularx}
\label{tab:labelid}
\caption{title}
\end{center}
\end{table}
```

Referencing the table can be done using the macros:

```
\tabref{labelid}
\tabpageref{labelid}
```

### 2.3.1 Example 1

Table 2.1 is an example of a table with 4 columns, with a title added at the top.

<i>Col1</i>	<i>Col2</i>	<i>Col3</i>	<i>Col4</i>
a	b	c	d
e	f	g	h

Table 2.1: Table Title

### 2.3.2 Example 2

Table 2.2 is an example of a table with 5 columns, with the table title also added at the top.

Col1	Col2	Col3	Col4	Col5
a	b	c	d	x
e	f	g	h	z

Table 2.2: Table Title

*Source: This is a source*

## 2.4 Inline Enumeration

You can enumerate elements in a paragraph: *(i)* element 1, *(ii)* element 2, *(iii)* element 3; and continue your text.

## 2.5 Description

The description environment provided by  $\LaTeX$  has been extended:

- **Element 1:** Text 1
- **Element 2:** Text 2
- **Element 3:** Text 3

Omitting an item header is not a problem:

- **Element 1:** Text 1
- Text 2
- **Element 3:** Text 3

## 2.6 Enumeration

The enumerate environment provided by  $\LaTeX$  has been extended to combine the advantages of the enumerate and description environments in a single  $\LaTeX$  environment:

1. **Element 1:** Text 1
2. **Element 2:** Text 2

### 3. Element 3: Text 3

You can specify the type of enumeration by switching to Arabic numerals:

**1Element 1:** Text 1

**2Element 2:** Text 2

**3Element 3:** Text 3

Or in Roman numerals:

**iElement 1:** Text 1

**iiElement 2:** Text 2

**iiiElement 3:** Text 3

Or in alphabetical numerals:

**aElement 1:** Text 1

**bElement 2:** Text 2

**cElement 3:** Text 3

Omitting an item header is not a problem:

**1. Element 1:** Text 1

**2.** Text 2

**3. Element 3:** Text 3

You can place text <sup>as a superscript</sup>. You can place text <sub>as a subscript</sub>.

You can highlight **text**, or highlight it **even more**.

You can format people's names uniformly, for example STÉPHANE GALLAND (other macros are available).

## 2.8 Mathematical Symbols

- $\mathbb{R}$
- $\mathbb{N}$
- $\mathbb{Z}$
- $\mathbb{Q}$
- $\mathbb{C}$
- $\mathcal{P}_a$
- $\text{sgn}(a)$
- $\min(a, b)$
- $\max(a, b)$

## 2.9 Theorems

You can define your own environment to describe a theorem, lemma, etc. This type of environment must be declared in the preamble of your document with the macro `\declareupmtheorem` (see the example in the preamble of this template).

### My Theorem 1: Some Theorem

This is the description of this theorem.

*This is my optional source*

At the end of your document, you can then add a chapter listing the theorems present in your document: `\listofmytheorems`

## 2.10 Conclusion



## CONTRIBUTION





# 3

## CONTRIBUTION

3.1 Introduction

3.2 Details of the Contribution

3.3 Conclusion



# 4

## IMPLEMENTATION

4.1 Introduction

4.2 Presentation of the Implementation

4.3 Experimental Results

4.4 Conclusion





## CONCLUSION



# 5

## GENERAL CONCLUSION

5.1 Summary

5.2 Perspectives





## LIST OF FIGURES



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# LIST OF DEFINITIONS

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# IV

## APPENDICES







## **FIRST APPENDIX CHAPTER**



# B

## SECOND APPENDIX CHAPTER





