

# SOFTWARE ENGINEERING

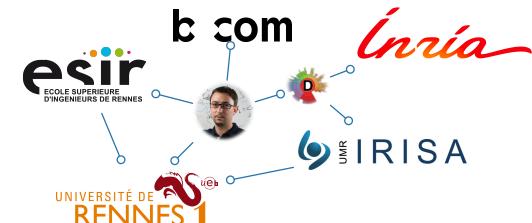
## *GENERAL INTRODUCTION*

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UNIV. RENNES 1, ESIR2, 2020-2021

BENOIT COMBEMALE  
PROFESSOR, UNIV. RENNES 1 & INRIA, FRANCE

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## WHO WE ARE?



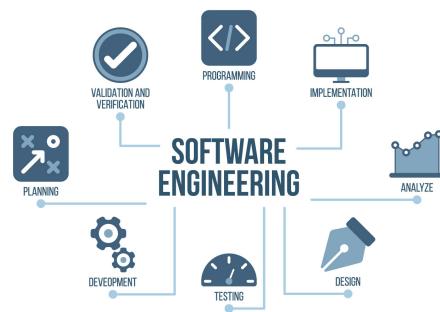
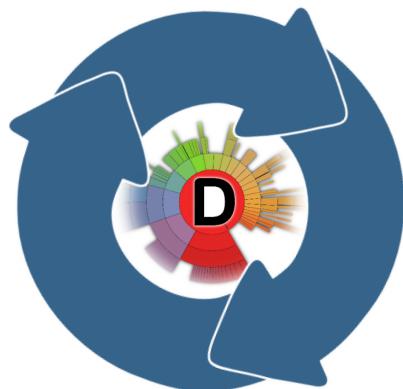
# The DiverSE team

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- Inria/IRISA project-team in **Software Engineering**
- Strong background in Model-Driven software/systems Eng.
- Software languages, architecture, simulation, variability, testing, resilience eng.
- Applied to smart, heterogeneous, and distributed CPS (e.g., IoT, Industry 4.0)
- 8 Prof. and Inria/CNRS researchers, 1 Inria RSE, ~20 PhD, 3 Post-doc, 3 SE
- Deductive and empirical scientific approaches
- Open source software development
- Strong contractual activity (esp. EU and industry projects)

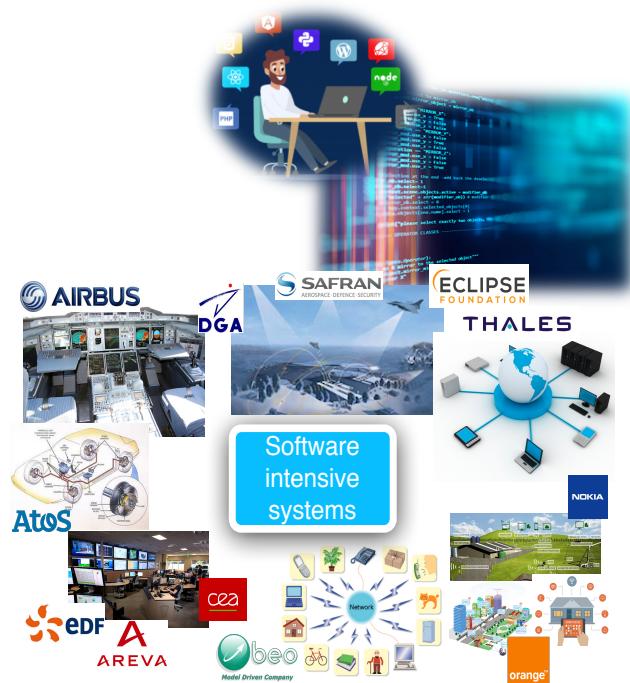
# The DiverSE team

## A Software Engineering Group



# The DiverSE team

## A Software Engineering Group



- Diversity of...
- stakeholders
- concerns
- configurations
- platforms
- environments
- requirements...



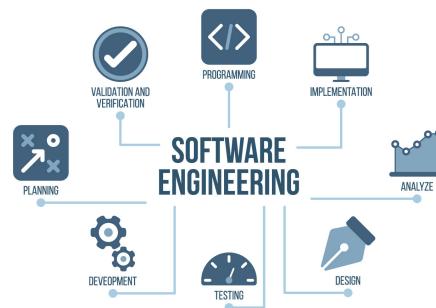
- Multi-engineering approach
- Domain-specific modeling
- High variability and customization
- Platform heterogeneity
- Openness and dynamicity

# The DiverSE team

## A Software Engineering Group



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# The DiverSE team

## *Software...*

*modeling, architecture, testing, variability, reuse,  
continuous deployment, adaptation and languages*



<https://www.diverse-team.fr>

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## WHY SOFTWARE ENGINEERING?

# Vous maîtrisez la programmation...



... oriéntée objet !

# **SOFTWARE INTENSIVE SYSTEMS**

*Autonomic Computing*

*Internet of Services*

*Pervasive Computing*

*Internet of Things*

*Ultra Large System*

*etc.*

*Embedded Systems*

*Real-Time Systems*

*Critical Systems*

```
#ifdef TRACE
    if (!fpm)
    {
        fprintf(stderr, "ERROR: Can't open \"TRACE.DOC\".\n");
        exit(2);
    }
#endif
/* allocate 'order1' elements
   'order1' is used to store the v
```

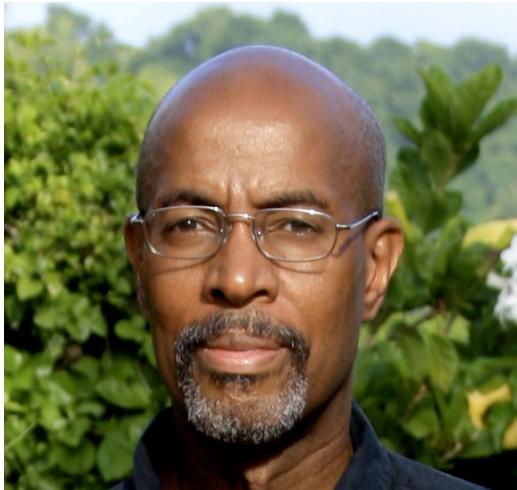
Et vous souhaitez passer  
de la technique à l'ingénierie...



From "Teaching Programming Students how to Model: Challenges & Opportunities"  
Prof. Robert B. France, EduSymp @ MoDELS, Oct. 2011



**"Use of modeling techniques distinguishes a software engineer  
from a software developer (or programmer)"**



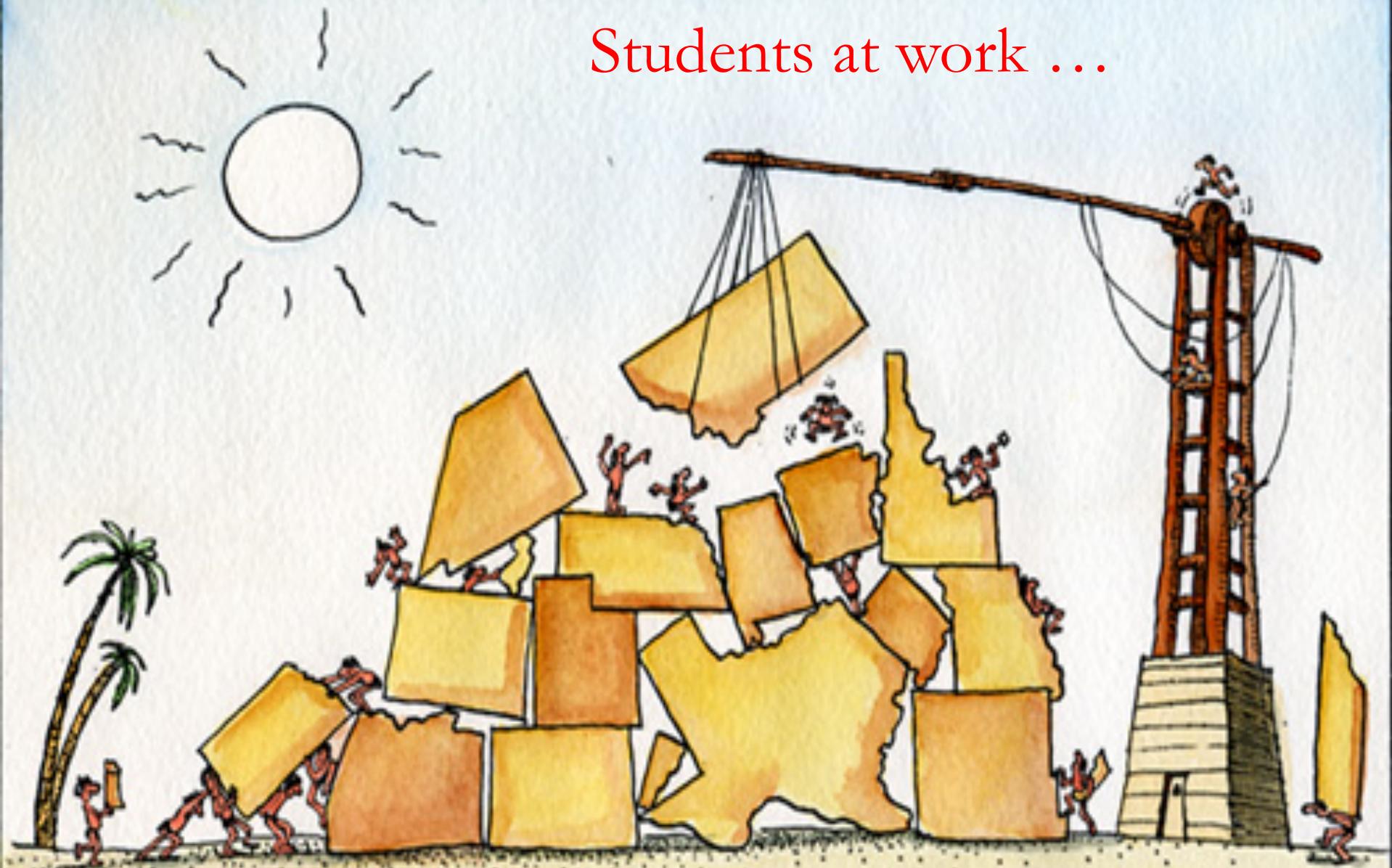
**"The earlier you start to code the longer it takes  
to complete the program"**

**"A good modeler is a good programmer;  
a good programmer is not always a good modeler"**

**"Learning a programming language is easy,  
learning how to program is difficult"**

**Prof. Robert B. France**  
Colorado State University  
<http://www.cs.colostate.edu/~france/>

# Students at work ...



# Principles, Techniques, Methods, and Tools for Software Engineering

Basics!



# Software Engineering

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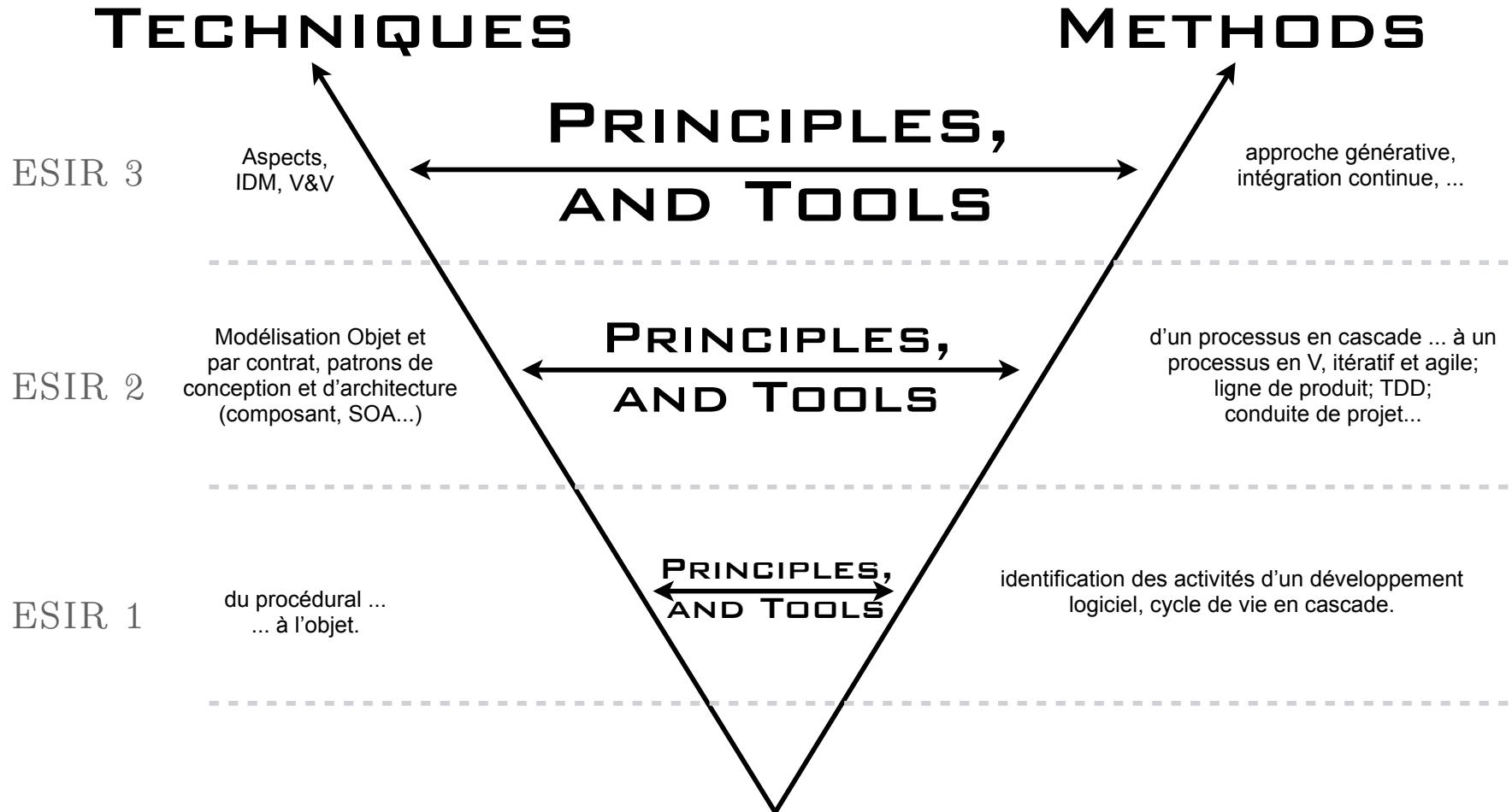
The production of operational software satisfying defined standards of quality...

... includes programming, but is more than programming!

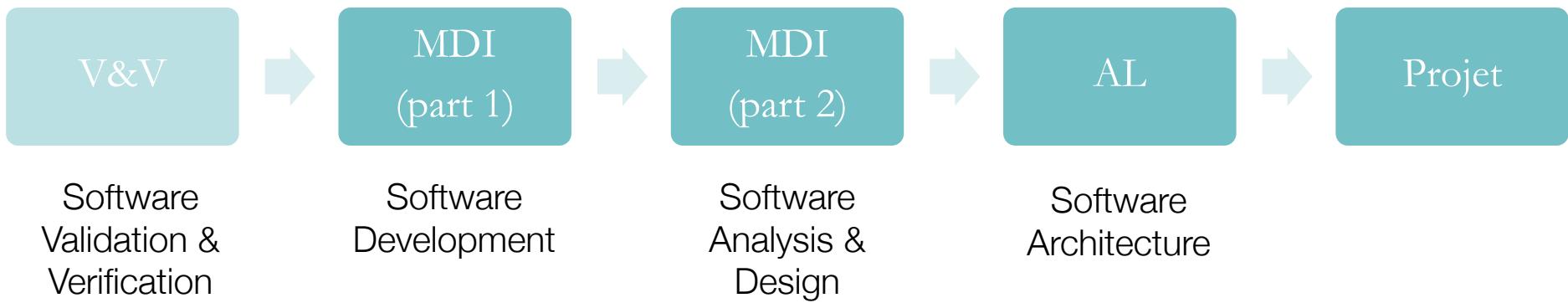
The five components of Software Engineering [Meyer]:

- **Describe:** *requirements, design, specification, documentation...*
- **Implement:** *modeling, programming*
- **Assess:** *testing and other V&V techniques*
- **Manage:** *plans, schedules, communication, reviews*
- **Operate:** *deployment, installation...*

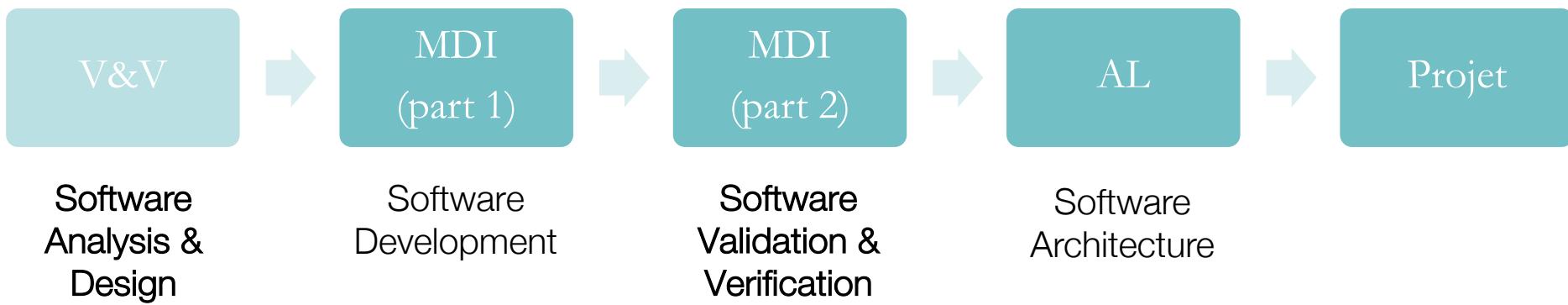
# Software Engineering @ ESIR



# Enseignements en ESIR2



# Enseignements en ESIR2



✓ Anticipe le nouveau curriculum pour un meilleur flot



# Objectifs du module VV

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- Appréhender la totalité d'un projet et son processus de développement dans le domaine du numérique
- Comprendre les fondamentaux de la modélisation, sa continuité tout au long du processus (exigences, analyse, conception, développement, test et vérification)
- Acquérir les connaissances techniques pour mettre en œuvre une modélisation efficace dans un projet de système informatique
- Acquérir les connaissances spécifiques à la gestion de projet pour les systèmes informatiques

# Organisation du module VV (2020-2021)

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- Tous les cours et TD/TP sont asynchrones
- Heures dans l'emploi du temps dédiés aux *office hours*
  - Cours: pour poser des questions sur le cours, évoquer des difficultés, discuter des exemples concrets, etc.
  - TD/TP: pour vous aider dans la réalisation des 2 TP notés.
- Page du cours : <http://combemale.fr/course/esir/esir2> (VV)
- Equipe sur TEAMS: W2020, MDI2020, AL2020, ProjetSI2020

# Evaluation du module VV

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- 2 travaux pratiques :
  - La médiathèque : analyse/conception (25%)
  - Mini-éditeur : conception / implémentation (75%)
- binôme/asynchrone/résultats adaptables/autonomie
- Un conducteur donnant des éléments de solution sera distribué le jours de chaque *deadline*.

*Have fun!*

# How to contact professors

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- Preferably during office hours, on the Teams' team
- Otherwise by sending an email with:
  - Your **academic email** (or a comprehensible one)
  - An **explicit object** starting with “[ESIR2-VV] ...”
  - A **full signature** including your name, specialty, group/partners (for issues related to the lab sessions), etc.
  - A **comprehensible description** of your issues
  - The **related files** (diagram, workspace...)
    - Ex: to export an Eclipse project, use the dedicated facility:
      - » Project's contextual menu (by right clicking) > export > Archive File...

Compliance with these rules implies a guaranteed response  
*compliance\_with\_these\_rules => a\_guaranteed\_response*

