R&D, Research, PhD, …

In Image/Graphics related fields

R&D, Research, PhD, …

1- I am sure I don't want to work in research-related fields

2- I am sure I want to work in research

3- I am not quite sure, I like R&D but maybe not research

Some questions

Where can you work if you want to do research ?

Who decide to accept or not a research publication ? Along which criteria?

How long is a PhD, what do you do during a PhD ?

Which diploma do you need to supervise PhD ?

What is a PostDoc ? What is a Maitre de Conférence ?

Is there differences b/w PhD in France or at International?

What is the difference between University Professor and CNRS Researchers ?

Types of companies/labs

Private structure

Almost all the companies:

Google, Thales, Dassault, Adobe, Unity, AMD, Disney, Intel, Ubisoft, Epic Games, BUF, Technicolor, Mikros, …

R&D organization is fully dependent of the company.

Public Research Labs.

- Labs of University

- CNRS, Inria

Standard research/teaching positions.

Standard "recruitment" process.

Public structures

- CEA, BRGM, IGN, …

Can have +/- standard research/engineering position.

Can be more focus on usage than research labs.

Research publication system

Academic publication: Main criteria of research dissemination & recognition
(more than: patent, software development, start-up creation, etc.)

Publication:
- Describing a new approach to tackle a problem.
- Novelty explains in term of "technical contribution".
- Explaining how it relates to other existing approach.
- Validate the method and/or compare to others.

Principle:
- Write the article (7-12 pages), submit it to journal or conference.
- The article is "reviewed" by other researchers (single/double anonymity), typically 3 to 5.
- Evaluate the article: contribution quality, evaluation, clarity of writing. Emit a recommendation (accept/reject).
- Consensus b/w reviewers: decision accept/revision/reject

Journal publication = Open to all calls. Regular issues of the revue.

Conference publication = Specific time of the year. Presentation at the conference + published in proceedings.

In CS & Graphics: Conference publication is mainstream (ex. SIGGRAPH, Eurographics, CVPR, etc).
In natural sciences: Journal publications are preferred.

French Organization (academia)

Enseignant chercheurs

Role:
- Teaching *(about 50% time, 192h class per year)*
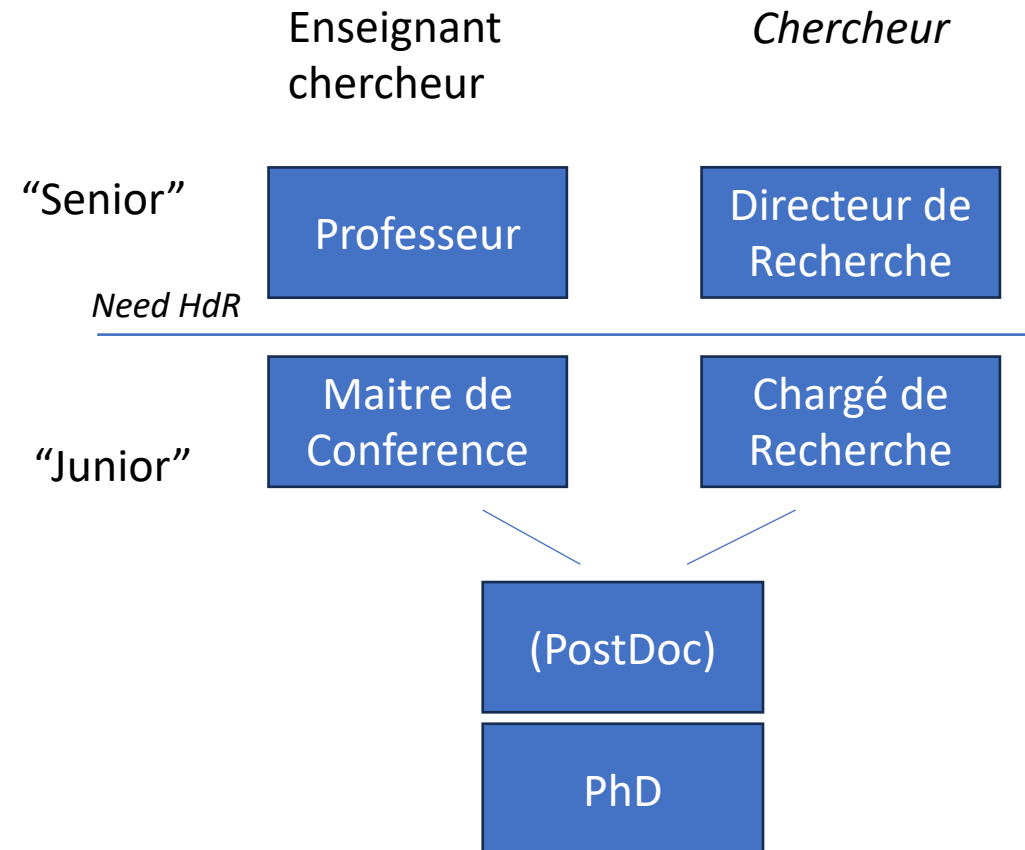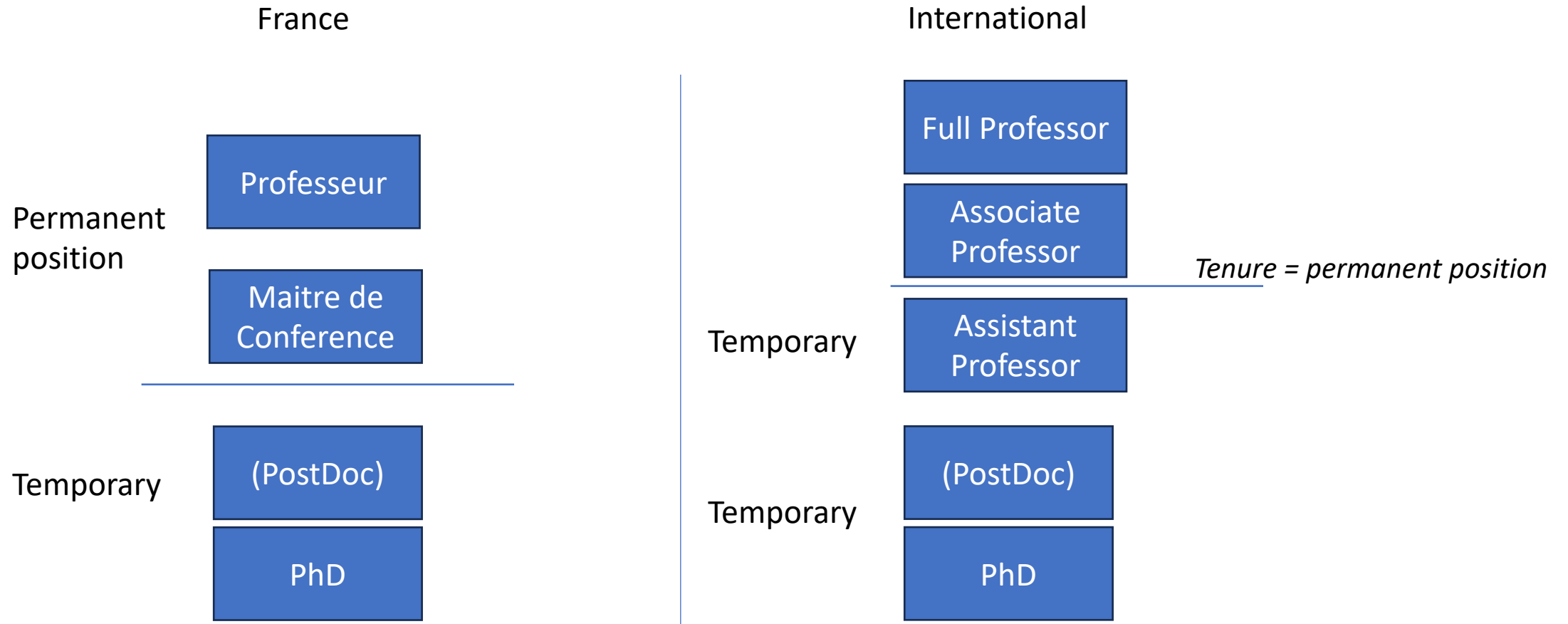- Research

Employer: University

Chercheurs

Role:
- Research (100% time)
Can teach as supplement, no obligation

Employer: CNRS or Inria

Can work together in Laboratory "UMR CNRS"

	Enseignant chercheur	*Chercheur*
"Senior"	Professeur	Directeur de Recherche
Need HdR		
"Junior"	Maitre de Conference	Chargé de Recherche

(PostDoc)

PhD

France | International academic position

France

International

Permanent position

| Professeur |

| Maitre de Conference |

Temporary

| (PostDoc) |

| PhD |

| Full Professor |

| Associate Professor |

Tenure = permanent position

Temporary

| Assistant Professor |

Temporary

| (PostDoc) |

| PhD |

- France: Immediately hired in a permanent position. International, need to pass tenure.
- Teaching load is higher in France.
- Permanent researcher only (CNRS/Inria) doesn't have real equivalent international

Difference R&D vs public research work

Difference R&D vs public research work

*Mostly do the **same things on a scientific/technical aspect***
Slight different objectives

Shared methodology	**In a R&D company**	**In a R&D company**
- Definition of the scientific/technical problem	*Problem in the context of the company (not necessarily unsolved)*	*Must be an unsolved problem in research*
- Search/analysis of the different possible approaches in the state-of-the-art.	*Usually compare to concurrent*	*Compare to research publications*
- Choice of a solution, implementation(s) of some attempts.	*- The best w/r company criteria (cost, innovation on market, etc.)* *- Not necessarily new*	*- Must be new* *- Supposed to improve a criteria*
- Analysis of the results		
- Present your results	*- To your colleagues, director(s)*	*- To the scientific community (conferences, ...)*

Difference private R&D vs public research

Notes on some common "preconceived ideas"

In image/graphics fields!

- Research not necessarily more **theoretical** than in company

- Project not necessarily more **applied** in company than in research

- You are not working "**isolated**" in research
  - You have to exchange/share your work, almost all the time

- Being "**project manager**" is not limited to company
  - Actually, you necessarily have to be your own project manager in research

But some are usually true

- Public research provide lots of freedom + long term stability
  - *Main advantage of public research*

- Salary is often higher in private company

Do you want to work in research – some clues

Research-oriented

- You like test & explore your ideas

- You are motivated by novelty

- You like to focus on science & technics

- You like to be autonomous when developing your project

- You can be persevering on a project for a long time without losing motivation

- Having a proof-of-concept is enough for you

Company-oriented

- You like a clear path to follow and clear specification

- You are motivated by optimizing what you have.

- You like management, product life cycle, dealing with customers, market analysis, business, etc.

- You prefer to code in teams

- You prefer fast results and iterations. You like to change objectives.

- You prefer to see a complete packaged product

PhD – what is it

PhD formation is a:

- **Formation** to, and from, research

- A **professional experience** in research

- Leads to the production of **new scientific knowledge**

French definition
Arrété du 25 mai 2016

Note:
- It is not a "school continuation" to get a diploma
    - *It is a professional work from which you get your "first real" research experience*

- It doesn't mean that you need to continue in academic job after PhD
    - *In our field: a majority (~3/4) PhDs join private company after graduation*

PhD should you do it ?

1- I am sure I don't want to work in research-related fields

- Dealing with market/investments/business, customers, etc.
- Specific professional technical orientation (game-designer, cameraman, technical director, …)

=> Maximize your practical experience in industry and products

2- I am sure I want to work in research

- Dealing with research orientation/direction in company
- Becoming researcher, and/or teaching at University level

=> PhD is obligatory

3- I am not quite sure, I like R&D but maybe not research …

- Scientific software development, new technologies, …

=> Depend on cases, not a unique "best way"

Should you do a PhD ? Good/wrong reasons

- ***No other choice if you want to***
  - *work in public research, University-level teaching*
  - *work in a company and take research directions (research funding, ANR contract, etc)*

- ***Probably good reasons***
  - *You are passionate by your scientific/technical domain, and aim at improving it*
  - *You want to work in R&D in multi-national company*
  - *You want to do you're a technical career at international (North America, North Asia)*

- ***Wrong reasons to do a PhD***
  - *You'll be more paid (in France)*
  - *It looks good on the CV*
  - *Enjoying simplicity of teacher's connection/offer*

Wrong reasons to not do a PhD

- *I don't want to do 3 more years of studies, I want to start working.*
- *I don't want to do only theory*

Research internship/PhD: France vs International (US, Germany)

- **In France:**
  - Commonly part of the study with regulation (6 months, 3 years, etc). Full time only.
  - The supervisor proposes a topic (usually his responsibility), and provide the grant.
  - Regular follow up – Role of supervisor: help toward learning and provide feedbacks.
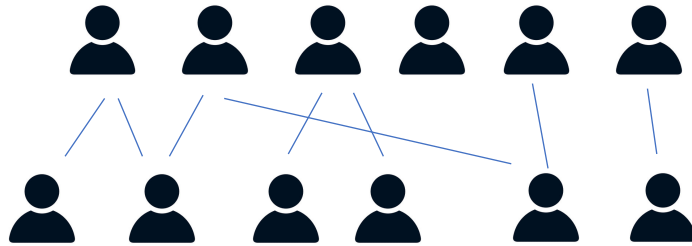   - Selective process at the entry level (class selection, etc.)

- **US-system:**
  - Time period and salary is open. "Research assistant". Can be full time/part time.
  - Student may be expected to come with a research topic, and apply for a University grant.
  - Supervisor follow up may be less regular – Role: provide support for writing articles.
    - Strong autonomy expected.
    - You have to prove that you can do research.

Research organization: France | US-like

France, mostly "flat hierarchy"
Team in a larger Laboratory

US-like, Hierachical organization around Academic Professor.
Laboratory in a larger Department

Permanents: Mix Prof & Researchers (CNRS/Inria)

Non Permanents: PostDoc, PhD

Professor (Associate/Full)

Assistant Prof. Young/Sc. Researchers

Non permanents

PhD

Research Assistants

1-to-1 supervision Professor/PhD (Ms)
Co-supervision is common
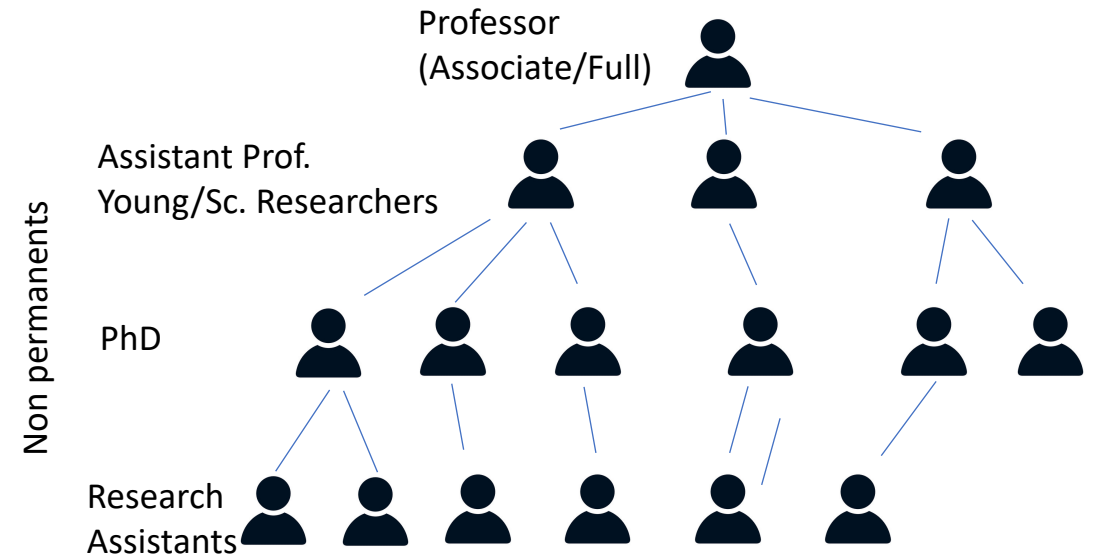
Closer to company-like organization
Can lead to very-high publication/visibility at top level
"Bottom level" can be harder to live.

How to choose a PhD? What should you check?

How to choose a PhD? What should you check?

"preconceived ideas" – common answers

- "Prestige" : PhD value = "University recognition"

- "Place" : PhD in USA will be better than in France

- "Subject": You need to select the subject on which you are expert – same than your master specialty

How to choose a PhD? What should you check?

"preconceived ideas" – common answers

- "Prestige" : PhD value = "University recognition"

  Does not count for academic career. Your PhD will be judged on your individual publications, not on the institution prestige.
  (Can play for non-research focus industry who may be impressed by a "PhD from Stanford")

  + During a PhD you can easily collaborate/spend some month at other international universities.

- "Place" : PhD in USA will be better than in France

  Take care to the differences:
    In North America: PhD ~ 5 years "PhD track" (starts with classes – like a master, before active research)
    In France: PhD = 3 years, start directly pure research (you need a Master to start it).

- "Subject": You need to select the subject on which you are expert – same than your master speciality

  *The general topics is important. You need to **want to spend time on it**.*
  You don't have to be specialized on this specific title, your class background can vary.
  (phd title can be adapted)
  Primarily cause of PhD failure: lack of motivation (not subject too hard)

Looking for PhD, what should be checked

- Suggestion:

  - 1- **The General Topic & Spirit of the work**

    You need to remain motivated 3 years on this project (the hardest part at the end)

  - 2- **Your supervisor & team**

    You will have to "work" with your supervisor for 3 years! Better that you like discussing with him, enjoy his way to work.

    Human criteria (no purely good/bad supervisor): too much/not enough present, too strict/too vague, etc.

    A good & active team can compensate for a quasi-absent supervisor. A nice supervisor can compensate for a distant, lack of team spirit.

    $\Rightarrow$ Doing 6 months master with your possible supervisor helps a lot to know where you "enroll yourself".

  - The rest is less important, still look at it:

    phd precise title, university, environment, material condition, ...

A few info about PhDs

- You need a supervisor + a funding plan.

- 3 main ways fundings types (in France)

  Ideal situation: you do your master project with your future supervisor

  - **Ministère** de la recherche (or ENS/X)

    Need to candidate (with your supervisor & subject) around April/May to the Ecole Doctorale. Highly based on your Master grade (classement).

    (+) Free subject; (-) Highly selective, preference to labs linked to your master

  - **Funded project** (ANR, European, …)

    All along the year, need to apply to it as any job. Check the mailing lists (afig, vis., GDR IGRV, etc.). Selection from the supervisor.

    (+) Majority of the PhD openings; (-) Subject is linked to the project

  - **Industrial PhD/CIFRE**

    Need to be in a company enrolled as engineer (<9 months) + find an interested lab.

    (+) Good to pursue in R&D in companies; (-) Less for academic pursuit (beware of the company constraints or behavior)