# 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

# 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.*

# 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**

- Definition of the scientific/technical problem
- Search/analysis of the different possible approaches in the state-of-the-art.
- Choice of a solution, implementation(s) of some attempts.
- Analysis of the results
- Present your results

**In a R&D company**

*Problem in the context of the company (not necessarily unsolved)*

*Usually compare to concurrent*

- *The best w/r company criteria (cost, innovation on market, etc.)*
- *Not necessarily new*

- *To your colleagues, director(s)*

**In a R&D company**

*Must be an unsolved problem in research*

*Compare to research publications*

- *Must be new*
- *Supposed to improve a criteria*

- *To the scientific community (conferences, …)*

# Difference private R&D vs public research

## *Notes on some common "preconceived ideas"*

- 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

*In image/graphics fields!*

## *But some are usually true*

- Public research provide lots of freedom

  *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*

# 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.

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

- 3 main ways fundings types (in France)
  - **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)