D5 UNIT 2-B
ESTIMATION

Cost estimation

Miguel Alemán Flores

Introduction
Importance of software in the EU

Total* Value-Added GDP:
€910 billion
7.4% of GDP

Direct Value-Added GDP:
€249 billion
2% of GDP

Total[c] Value-Added GDP:
€1 trillion
Up from €910 billion in 2014, a **9.9% increase**

Direct Value-Added GDP:
€304 billion
Up from €249 billion in 2014, a **22.4% increase**

The Software Alliance
BSA

2018

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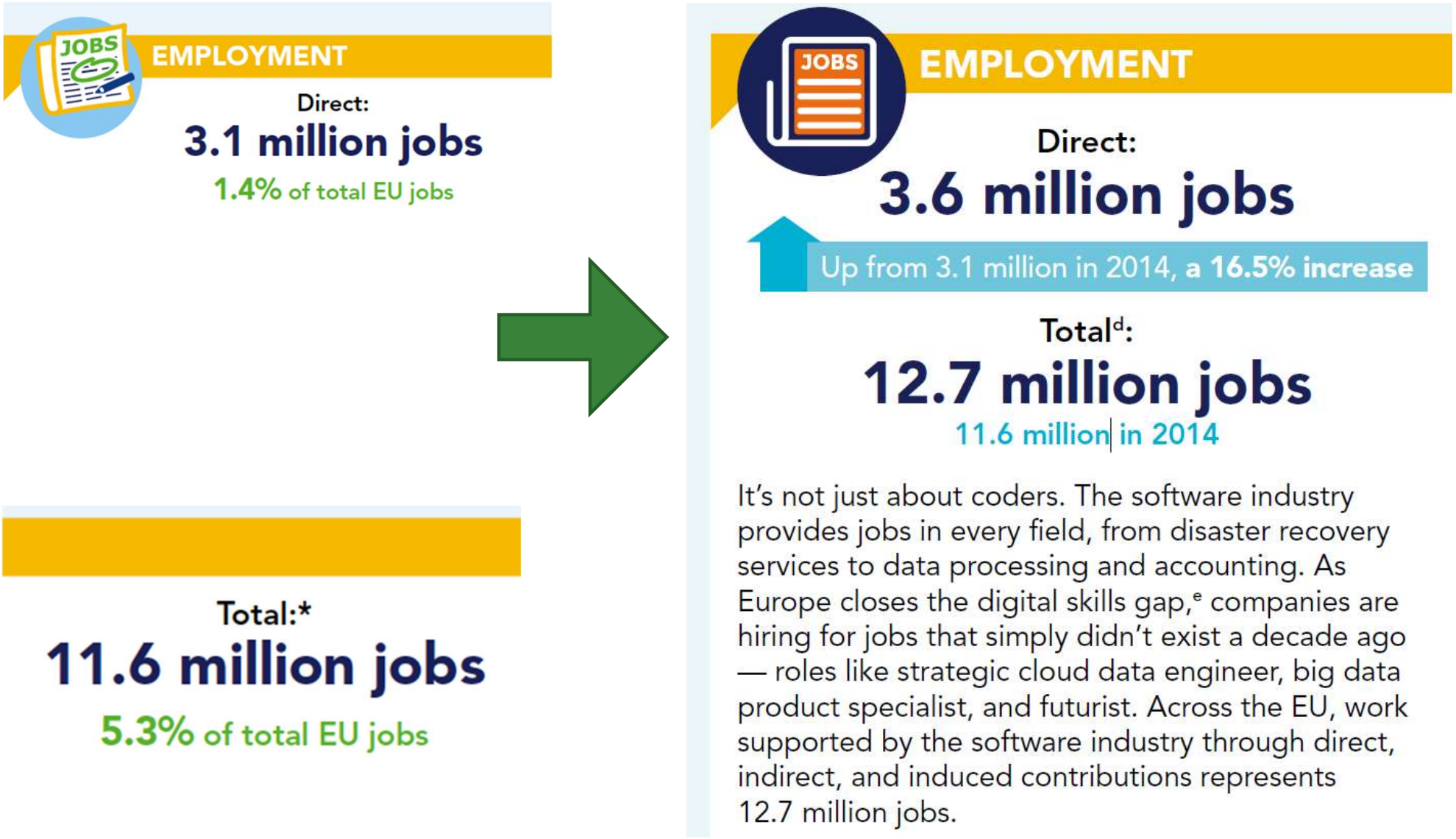
Importance of software in the EU



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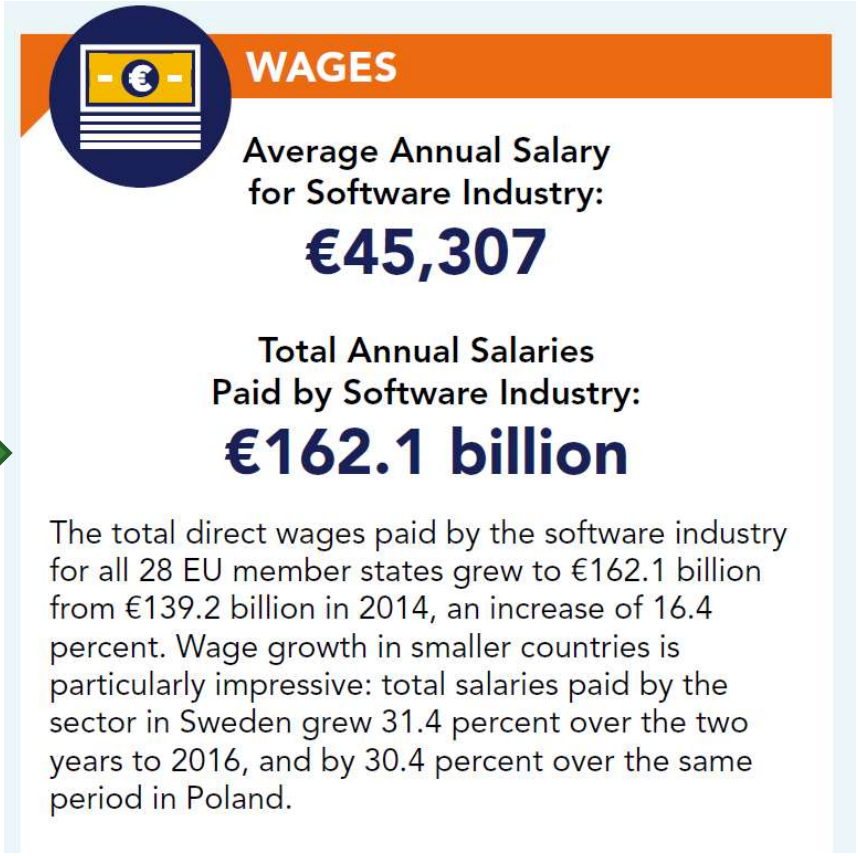

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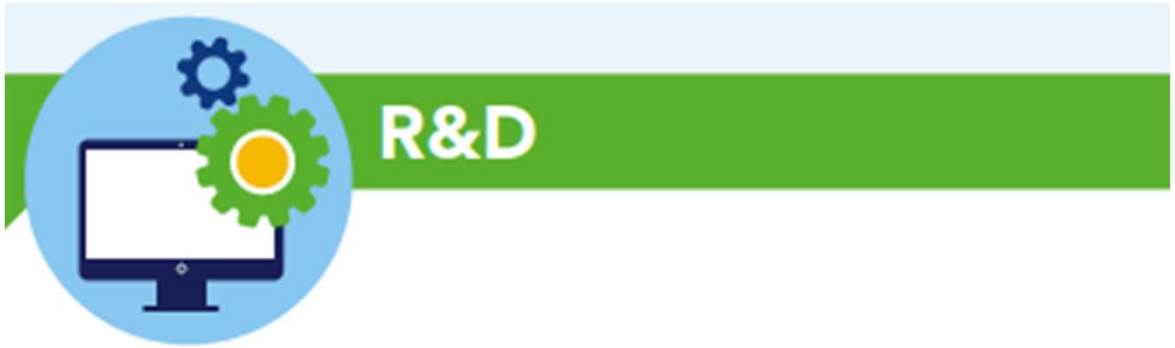

€12.7 billion

Software R&D expenditures[5]

7.3% of R&D expenditures
by business enterprise[6]

Software companies in the EU invest strongly in software R&D — almost €12.7 billion in 2013.

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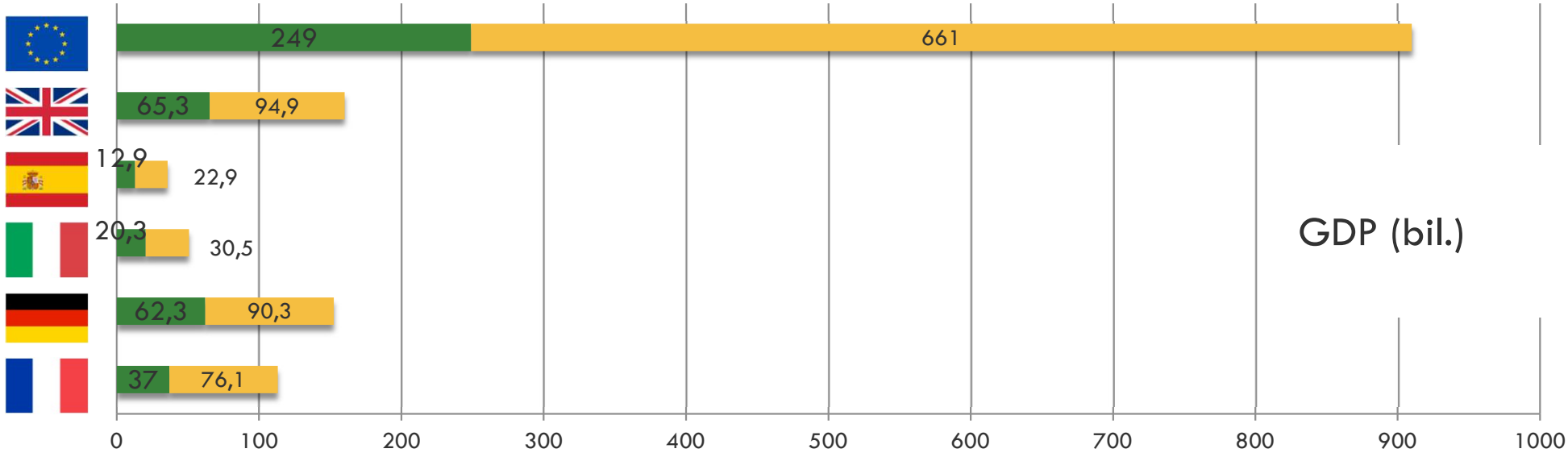

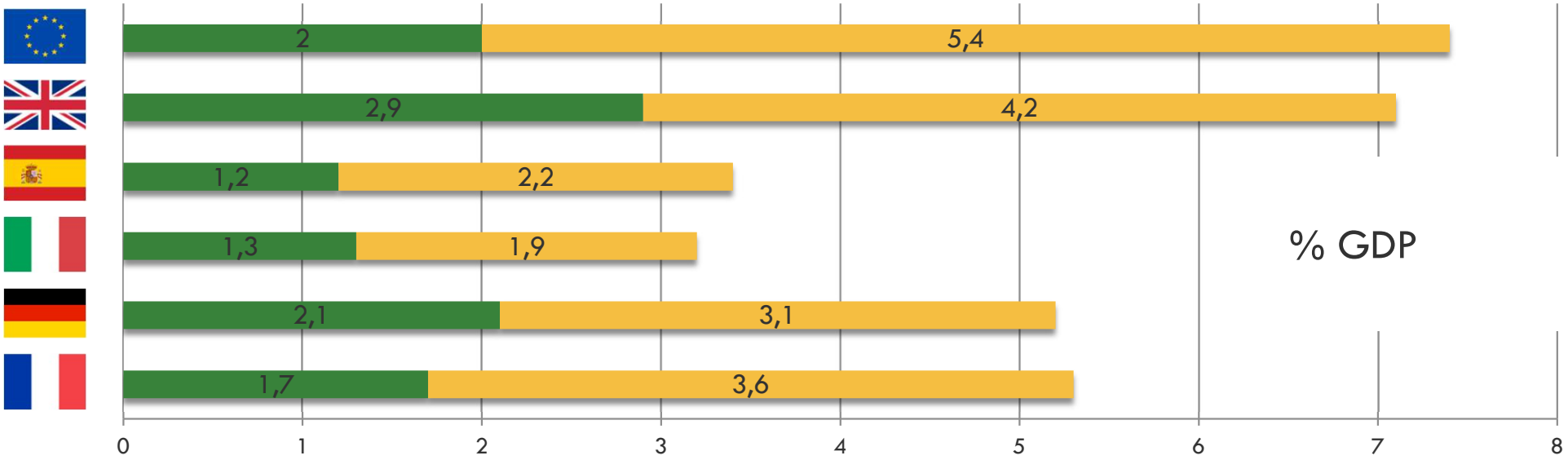

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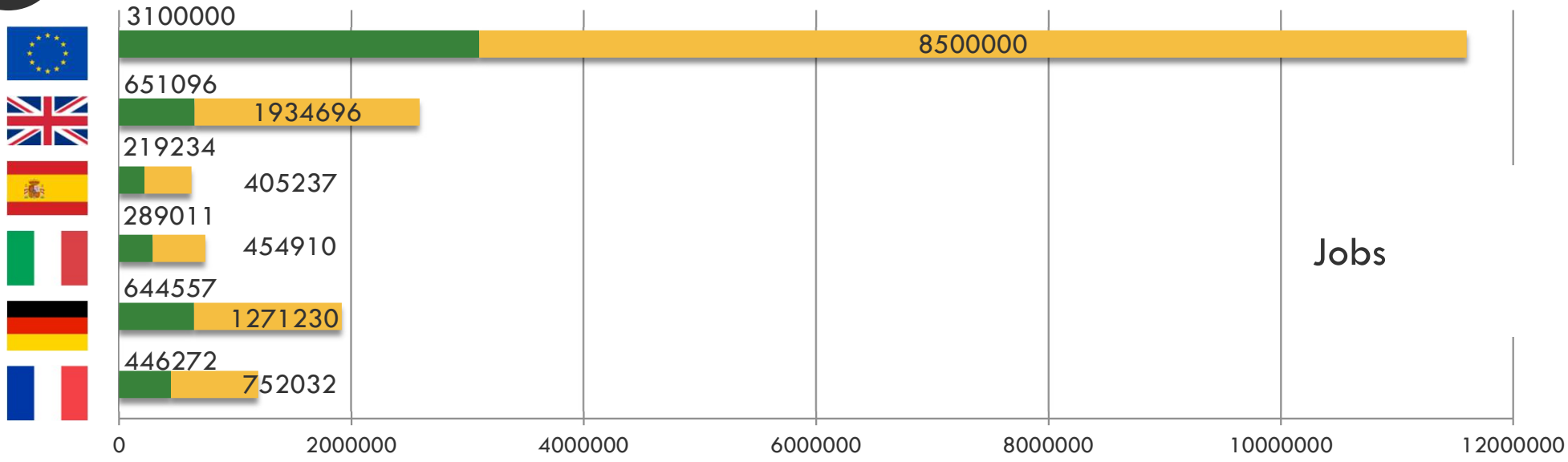

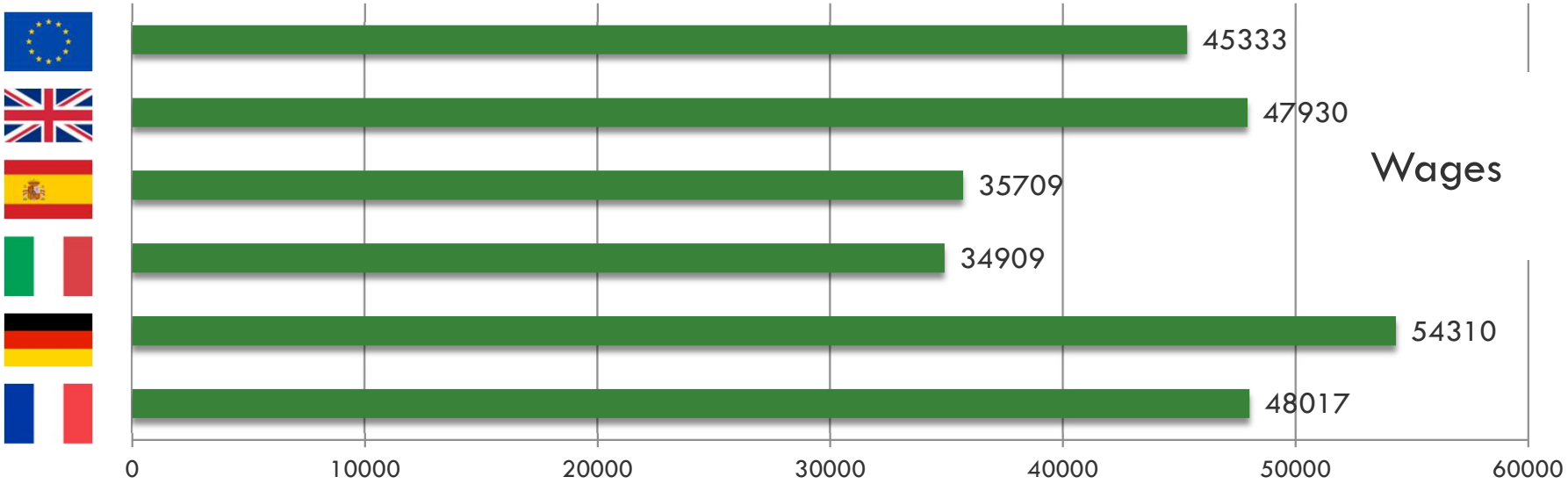

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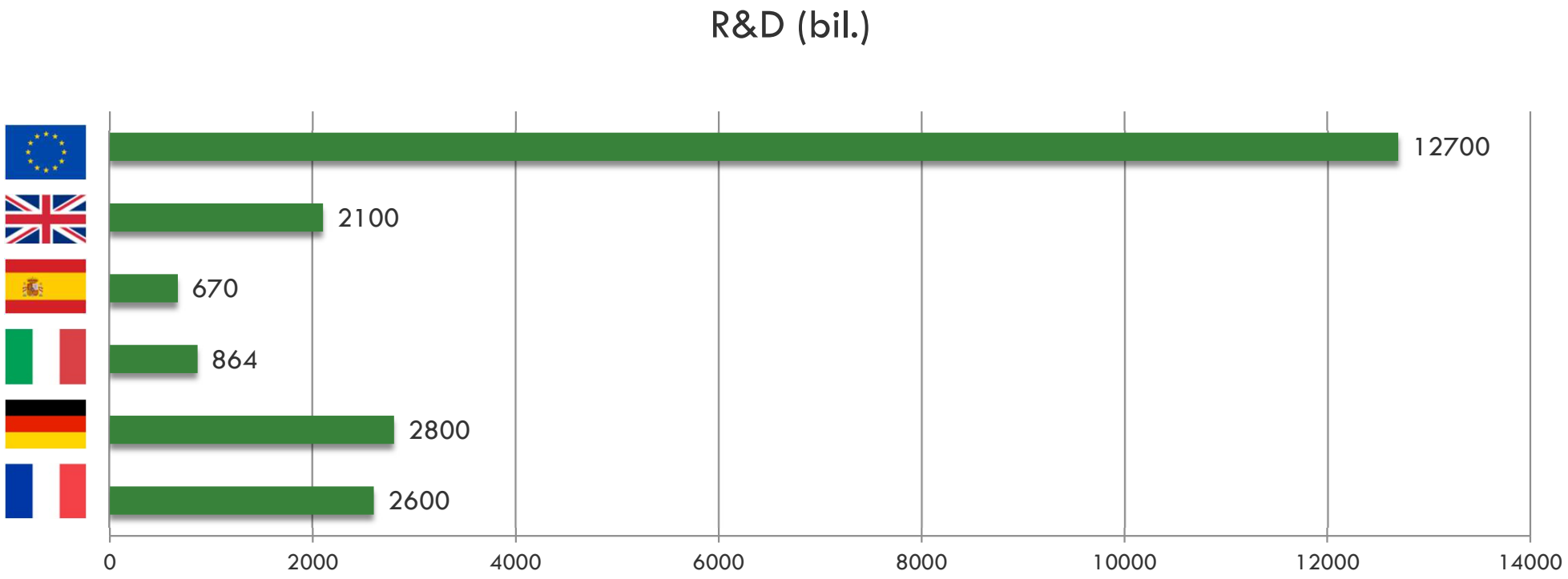


Cost and effort models
Objectives

- Estimate the cost of developing the software
- Control and manage incomes and expenses throughout the process to meet the estimations

Cost and effort models

Costs to be estimated

- Effort (staff)
- Hardware
- Software
- Travelling
- Training
- Office
- Supporting staff
- Nets and communication
- …
- Contingency buffer?

- Final Price = total cost + profit.

Cost and effort models
Cost estimation techniques

1. (Top-down):
   - The system is evaluated from its global functionalities.
   - Allows a better estimation of global aspects, such as integration and coordination.
   - Can be applied with fewer details in early stages.
   - Can underestimate internal costs of certain subsystems.
   - Not suitable to make decisions on individual components.

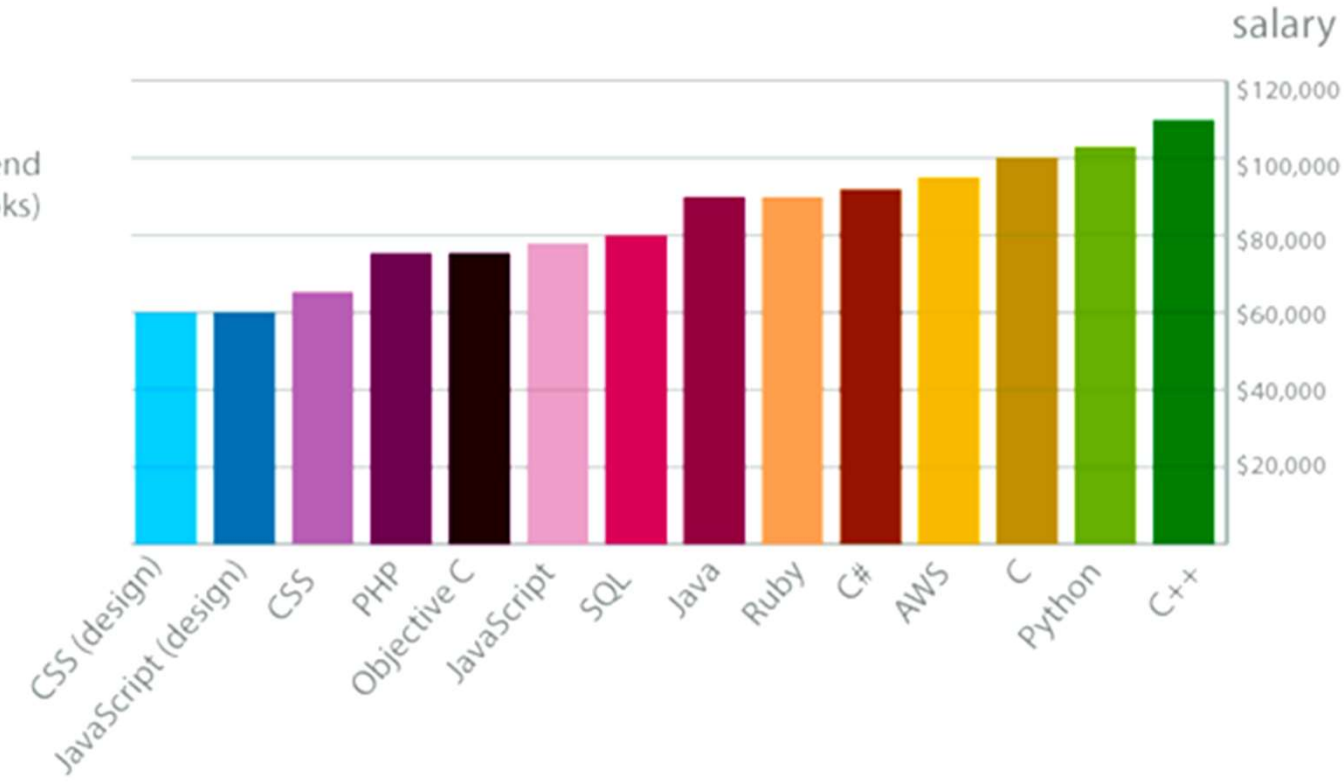
Cost and effort models
Cost estimation techniques

2. (Bottom-up)
   - Each component is estimated and then the global system is assessed.
   - Allows analyzing individual details of each component.
   - Usually more precise.
   - Can underestimate costs related to global activities.
   - Usually more expensive and requires a detailed structure.

What to do to earn more

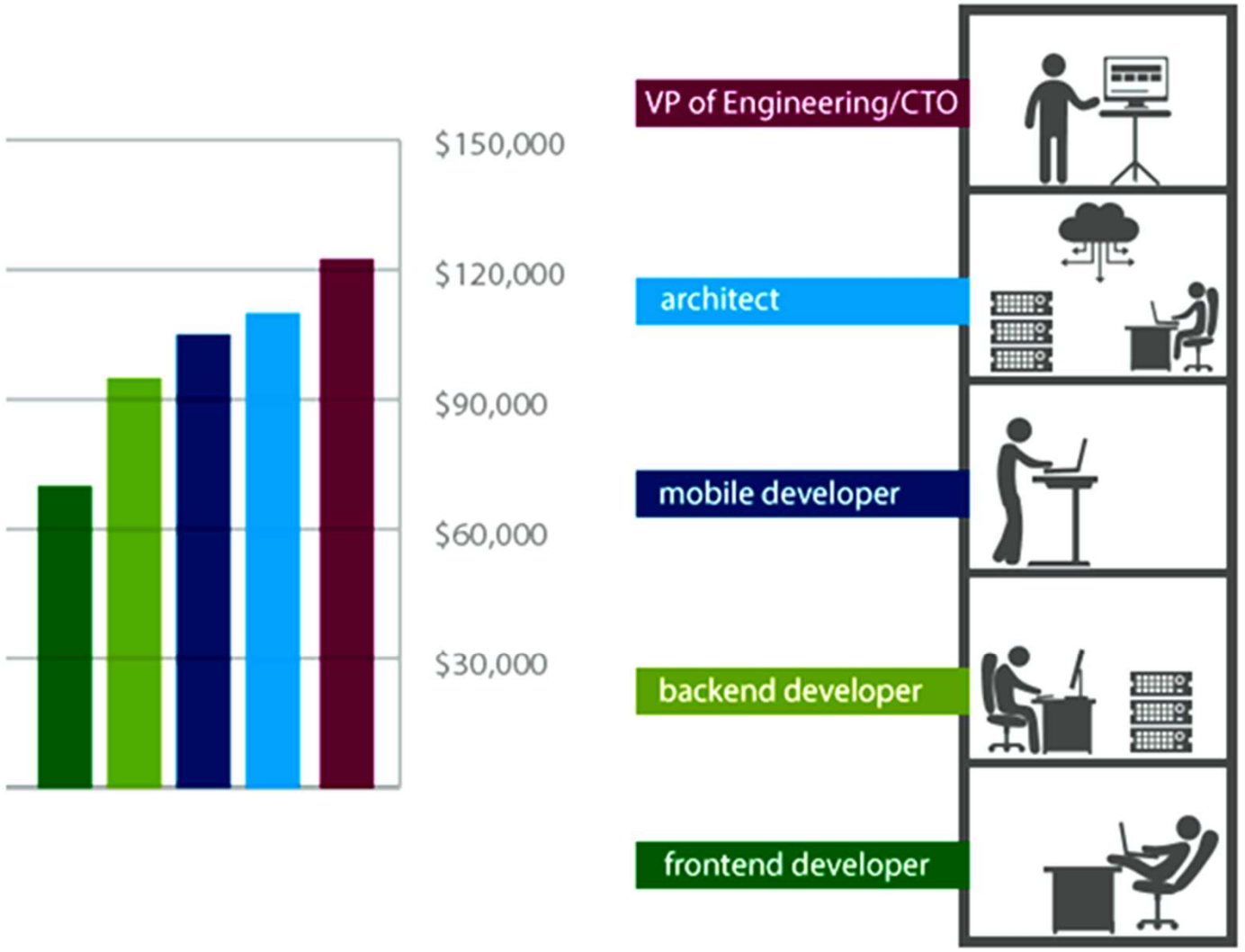
Language	Role	Business	N. of employees	Experience	Place
AWS	SW architect	Freelance	<10	0-1	Australia
C++	CTO	Startup	11-20	1-6	Brazil
CSS	Backend dev.	Traditional	21-50	7-10	India
Java	Frontend dev.		>50	1-15	Mexico
PHP	Mobile dev.			>15	UK
Python					Ukraine
Ruby					EU
SQL					USA

What to learn?

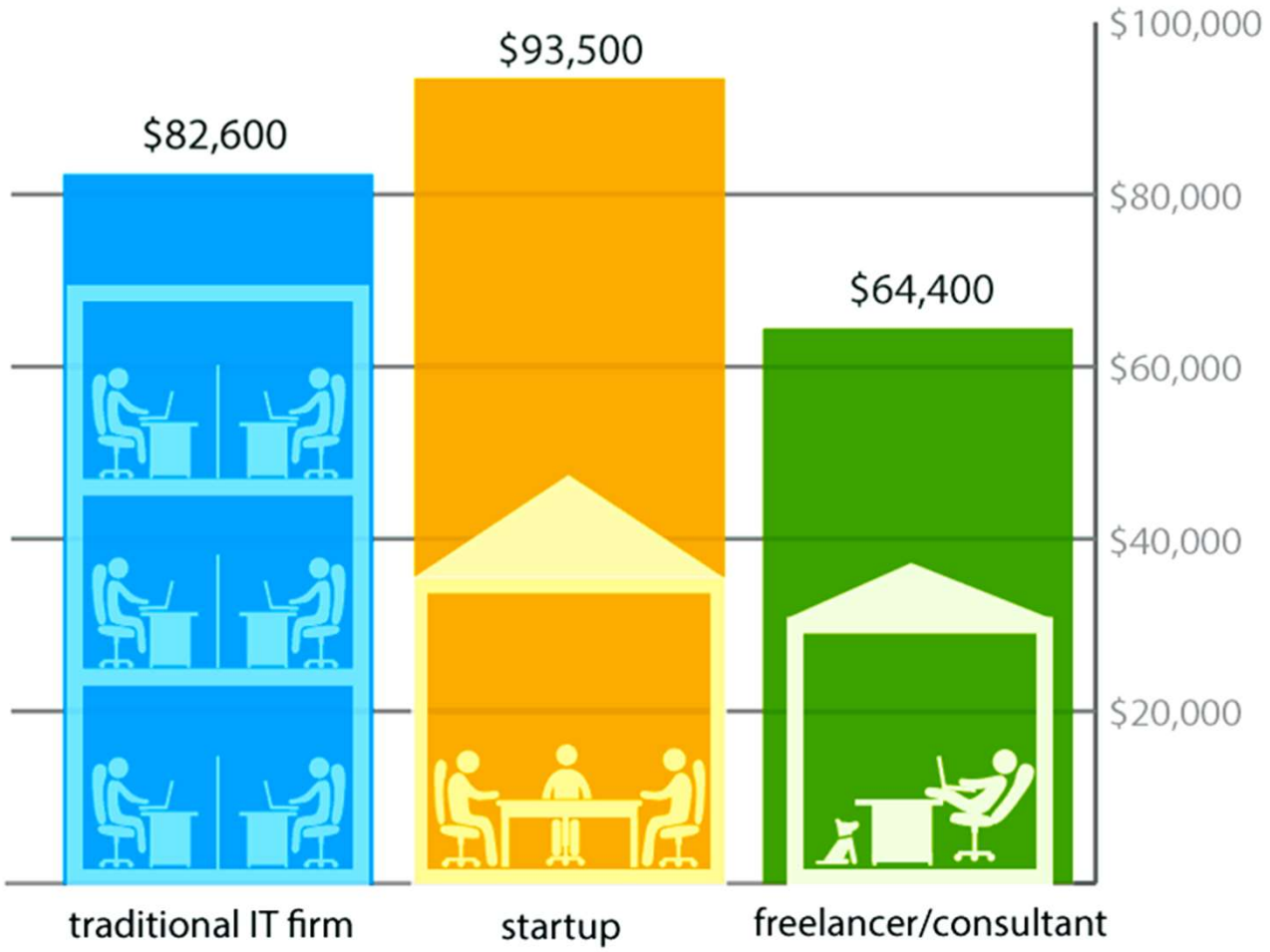


By Ana Vital at
https://blog.adioma.com/software-engineer-salary-2014-infographic/

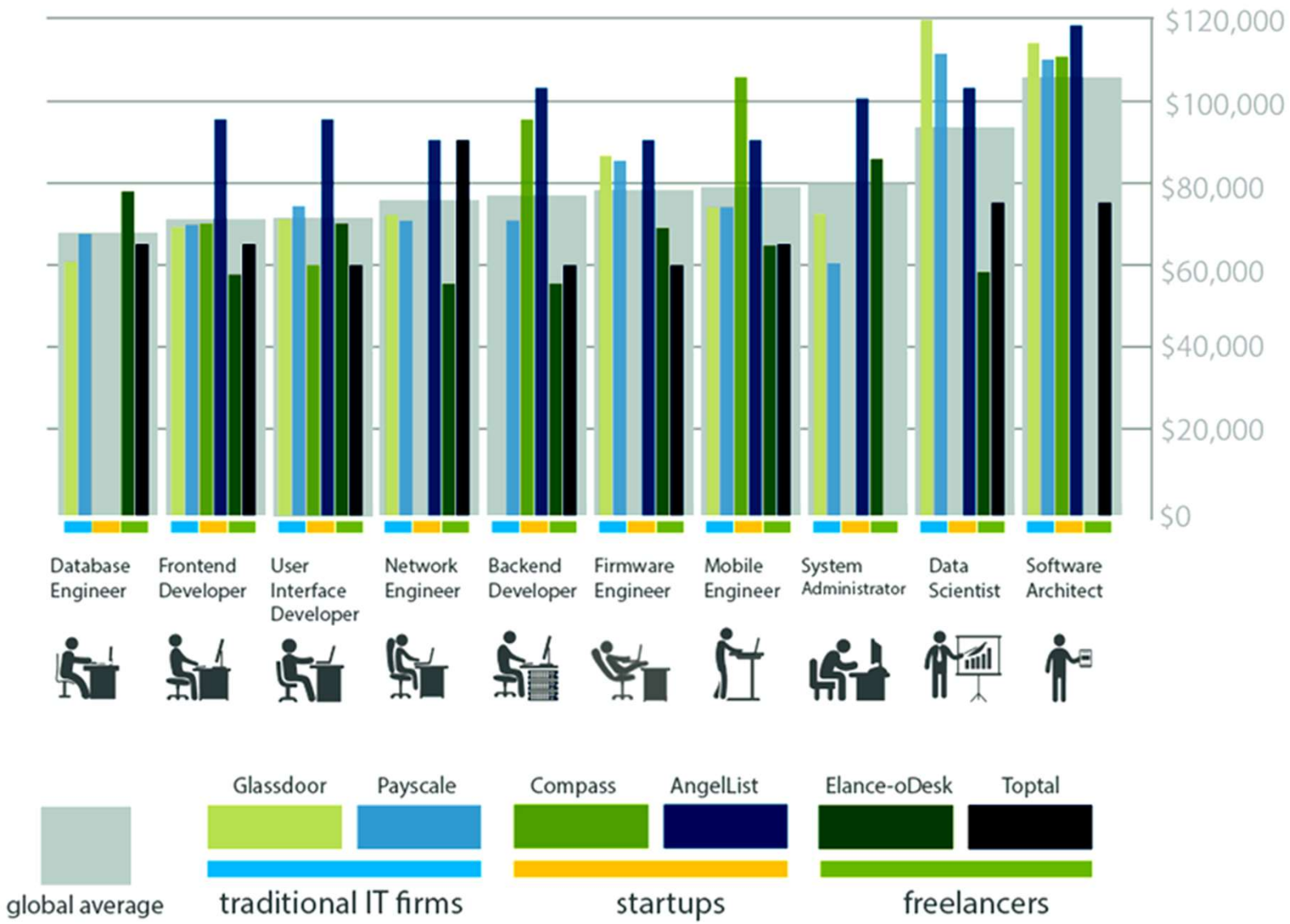
Which role to play?



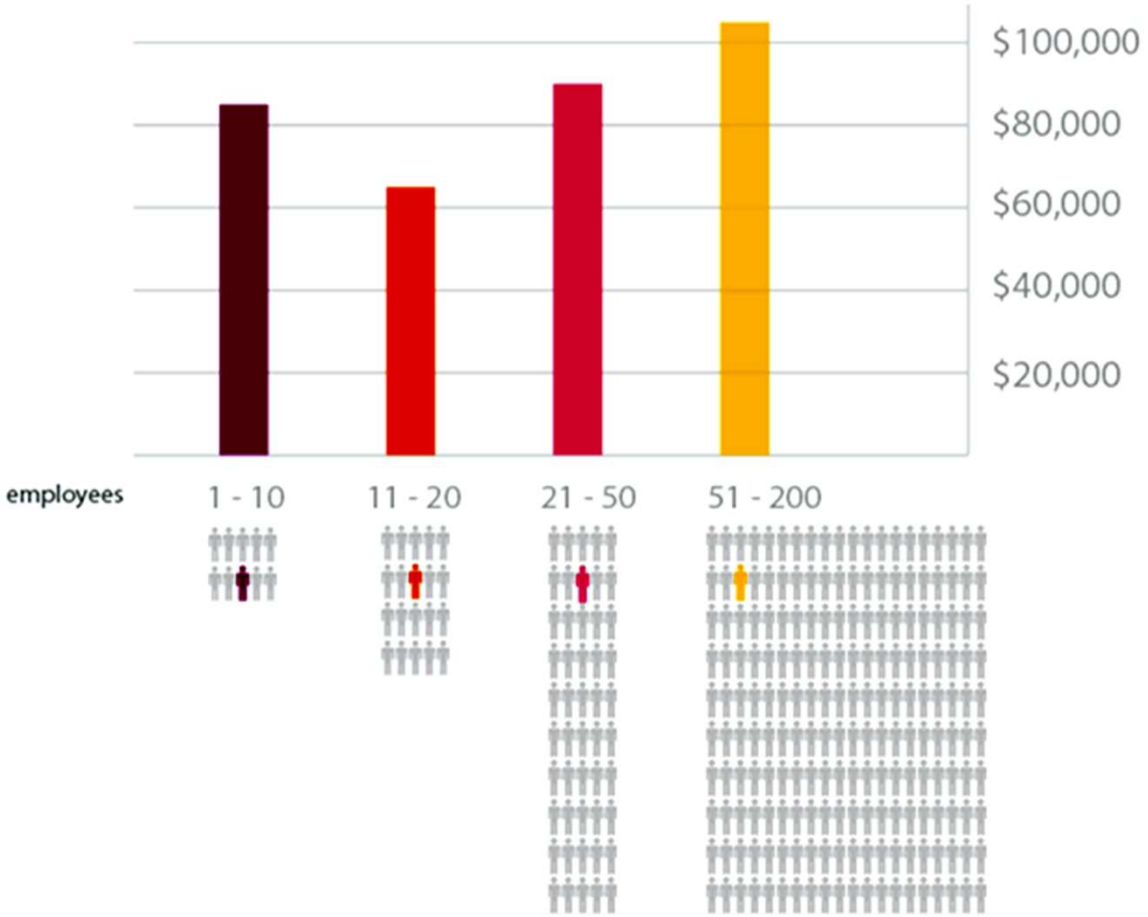
Startup or not?



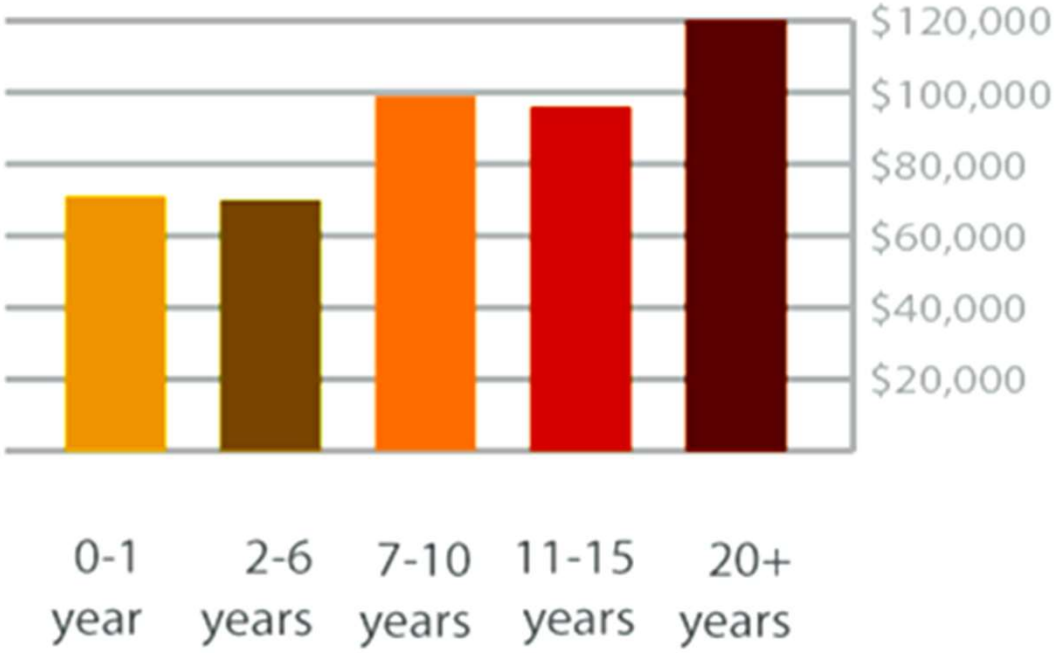
What are the options?



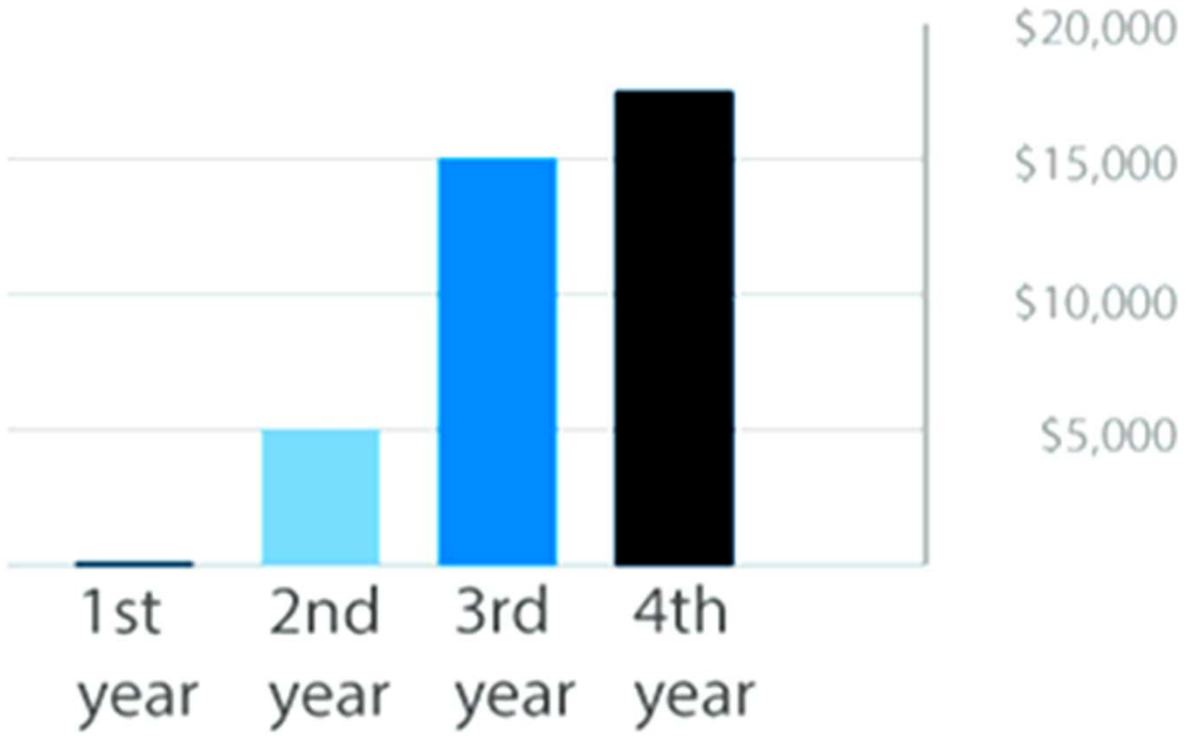
Big or small startups?



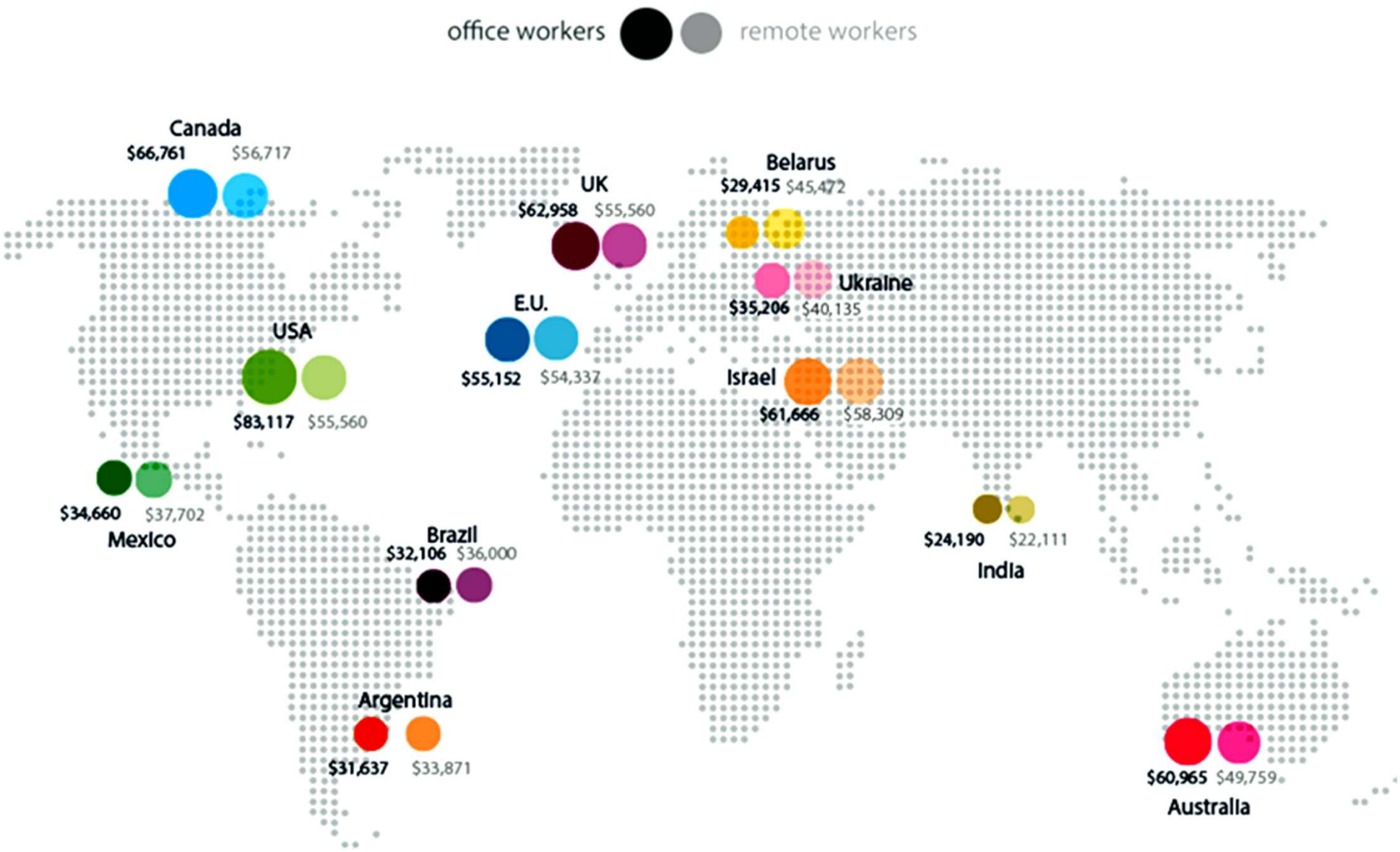
Does experience matter?



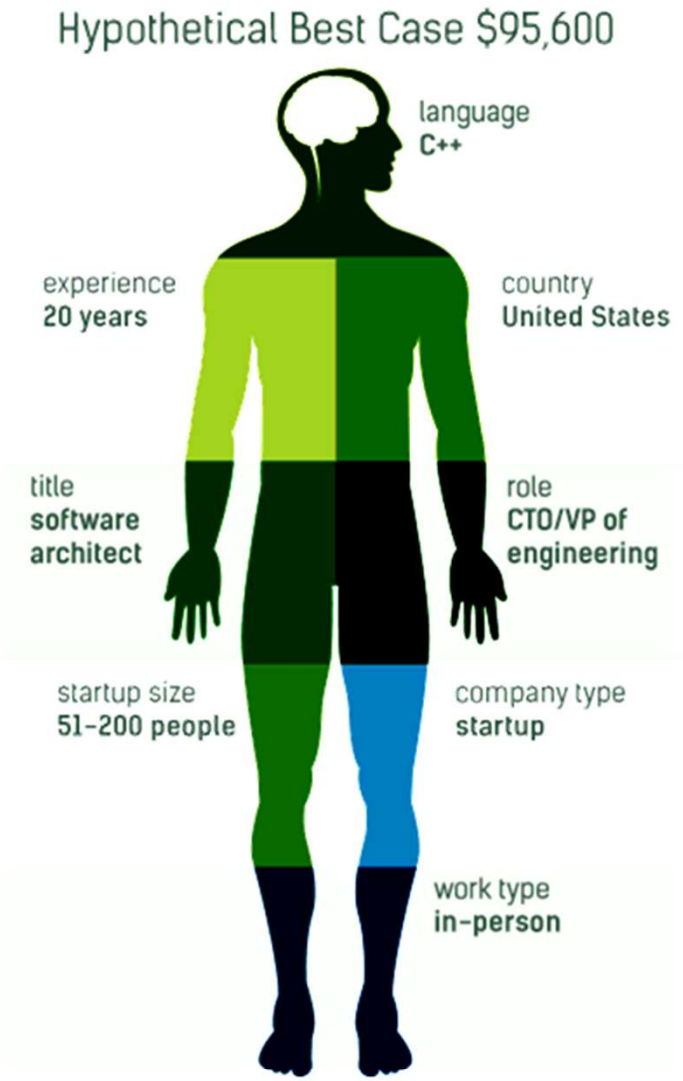
How about a raise?

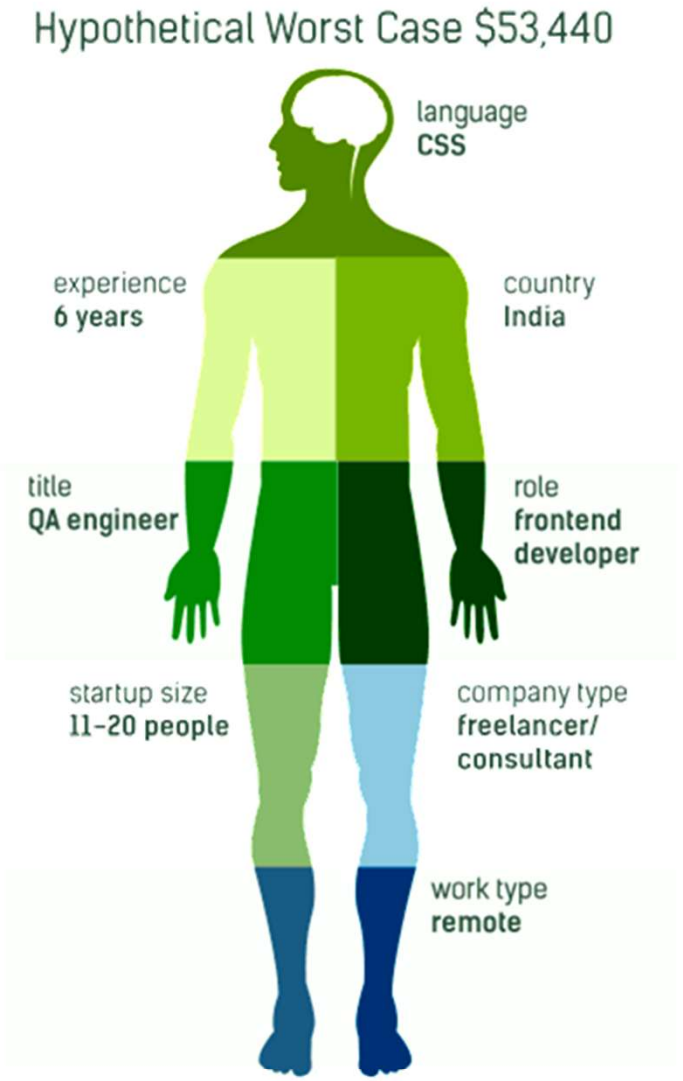


Does location matter?

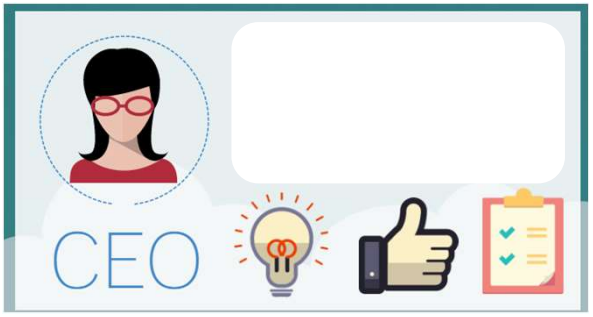


Highest-paid vs lowest-paid case





CEO-COO-CMO-CFO-CIO-CTO-CCO



Chief Executive Officer

IEBS Mireia More

https://www.iebschool.com/blog/ceo-cfo-cio-cto-digital-business/

Cost vs Price

- Cost: How much money is necessary to carry out the project.
- Price: How much money the customer will have to pay.

Pricing models
Cost-plus pricing

- Is considered fair pricing.
- The organization accounts for all the costs and adds reasonable profit to the final cost.

Pricing models
Opportunity pricing

- Pricing depends on the opportunity presented by the purchaser.
- If the customer has no other choice, the price is high.
- If there is much competition, the price is low.
- It may even price the project at a loss.
- Variants:
  - Introductory/Penetration pricing: a new entrant to a market already overflowing with existing providers.
  - Skimming pricing: An early bird in an emerging market charges a higher price before competition enters, then lowers the price.

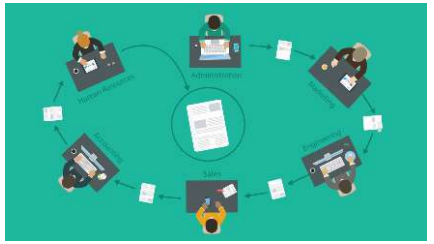
Pricing models
Going rate pricing

- Organizations in fields where there is plenty of competition and the price is well known to purchasers.
- The organization envisages the price other suppliers are offering.

Pricing models
Monopolistic / Oligopolistic pricing

- Monopolistic pricing—The seller plays up some unique feature and prices the product either higher or lower than the going rate.
- Oligopolistic pricing—Only a limited number of suppliers are present in the market and they collaborate to establish a fixed price.

Pricing models
Transfer pricing



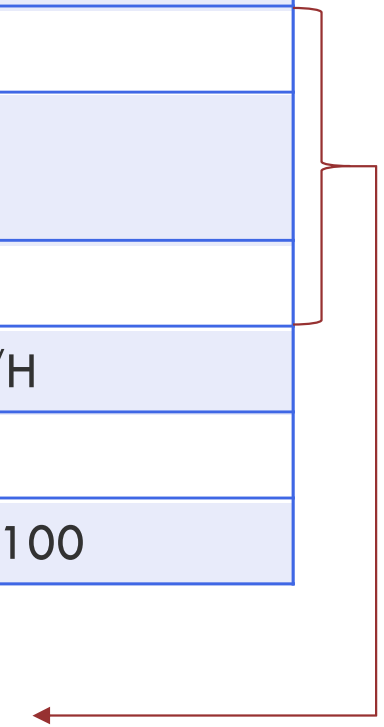
- Between two departments within the same organization.
- Only actual cost is transferred.

Pricing models
Loss leader pricing

- Trying to lure clients away from their current vendors.
- Provides products or services at a loss.
- They speculate that this loss will be offset.

Per-person-hour cost
Overhead

Yearly cost of direct staff (persons who do not "produce" are not incuded)	C
Cost per person-hour (H≈1920)	K=C/H
Yearly cost of indirect staff	I
Yearly cost of fixed costs (e.g. rent)	F
Yearly cost of variable expenses (e.g. electricity)	V
Other yearly costs not specific to the project	M
Overhead cost per person-hour	O=(I+F+V+M)/H
Per-person-hour cost	T=K+O
Overhead percentage	P=(I+F+V+M)/C*100



Per-person-hour cost
Overhead

Ref. no.	Staff category	Estimated hours Best case	Estimated hours Worst case	Rate per hour	Amount Best case	Amount Worst case
1	Programmers	100	125	15	1,500	1,875
2	Database administrators	25	30	20	500	600
3	Module leaders	30	40	30	900	1,200
4	Graphic designers	10	15	40	400	600
5	Business analysts	30	45	50	1,500	2,250
6	Application experts	15	20	60	900	1,200
7	Total direct effort cost	210	275		5,700	7,725
8	Overhead @ 25 percent				1,425	1,931
9	**Total effort cost**				7,125	9,656

Other costs to estimate

- Travel
- Special software tools needed for the project
- Special hardware
- Special training
- …

Other costs specific to the project

Ref. no.	Item	Best-case scenario	Worst-case scenario
1	Effort cost	7,125	9,656
2	Travel cost	1,500	1,700
3	Special software tools cost	600	750
4	Special hardware cost	400	500
5	Miscellaneous expenses	100	150
6	**Total cost**	9,725	12,756

specific to the project

How much does an employee cost?

- What is the gross salary?
- How much does the employee receive?
- How much is paid to the State?

How much does an employee cost?

Case 1: 1500 € gross monthly salary (indefinite contract)

- The company pays another 501€ to the Seguridad Social (Social Security):

354,00 €	(23,6 %)	Contingencias comunes: pensions.
82,50 €	(5,5 %)	Unemployment.
52,50 €	(3,5 %)	Eventual work accidents or professional illness (% depends on the workplace).
9,00 €	(0,6 %)	Trainig.
3,00 €	(0,2 %)	FOGASA, severance pay after dismissal of companies in bankruptcy.

- Total cost for the company: 2001€

How much does an employee cost?

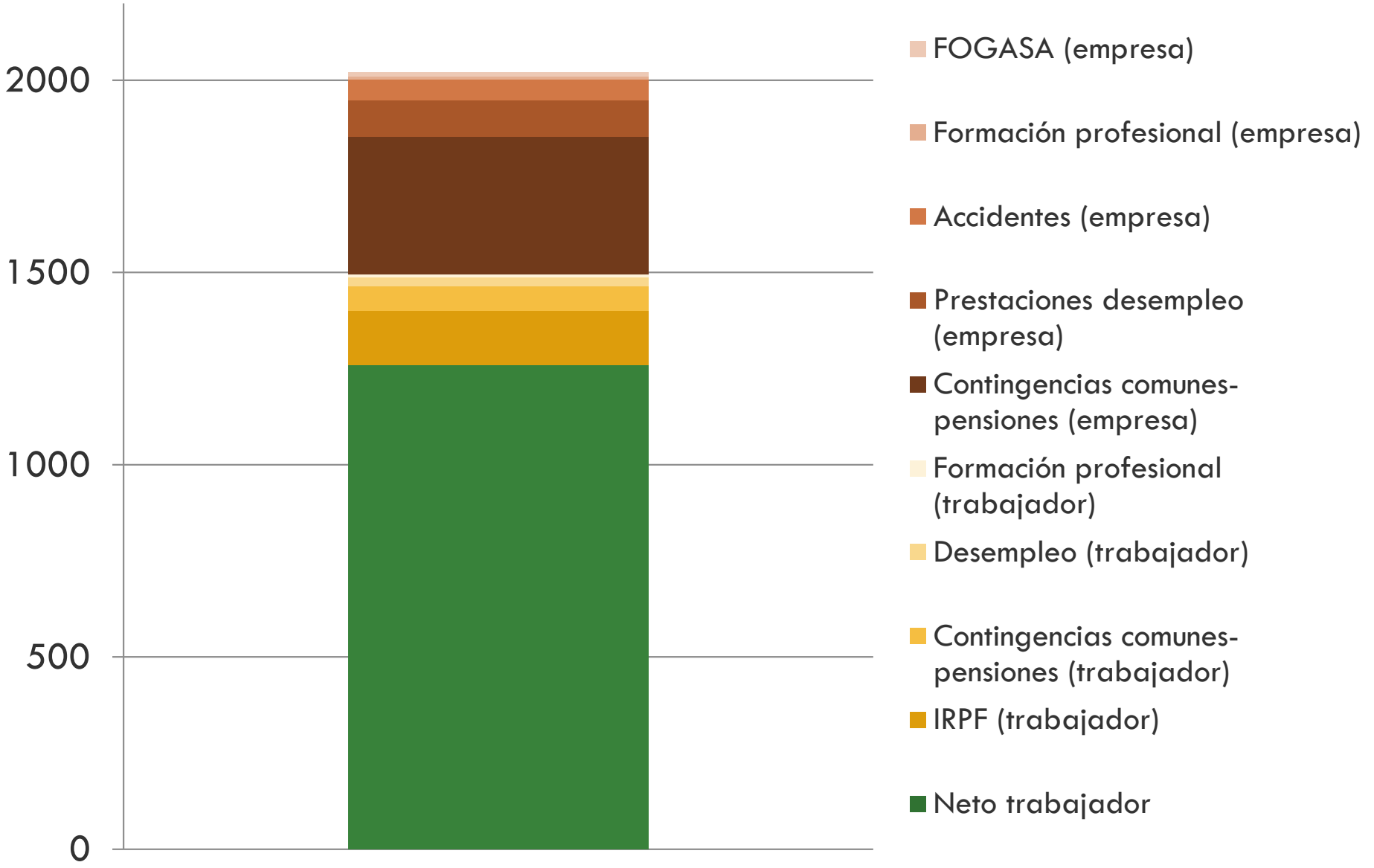
Case 1: 1500 € gross monthly salary (indefinite contract)

- The employee pays 256,25 € from their salary

161,00 €	(10,75 %)	IRPF. This % can change according to family status and type of contract.
95,25 €		Seguridad Social, that can be divided into
70,50 €	(4,7%)	Contingencias comunes (mainly pensions).
23,25€	(1,55%)	Unemployment.
1,50 €	(0,1%)	Training.

- Net salary: 1243€

How much does an employee cost?



How much does it cost to be self-employed?

- Seguridad social (flat rate)

50,00 €	first 6 months
275,00 €	later

- Finance minist. (trimestral) % of net income

IRPF to pay= (Income – expenses) x (0,07 – 0,15 – 0,19 – …)

7%	Professional first 3 years
15%	Professional later
19%	Non profesional

- VAT(IVA)/IGIC (was never yours)

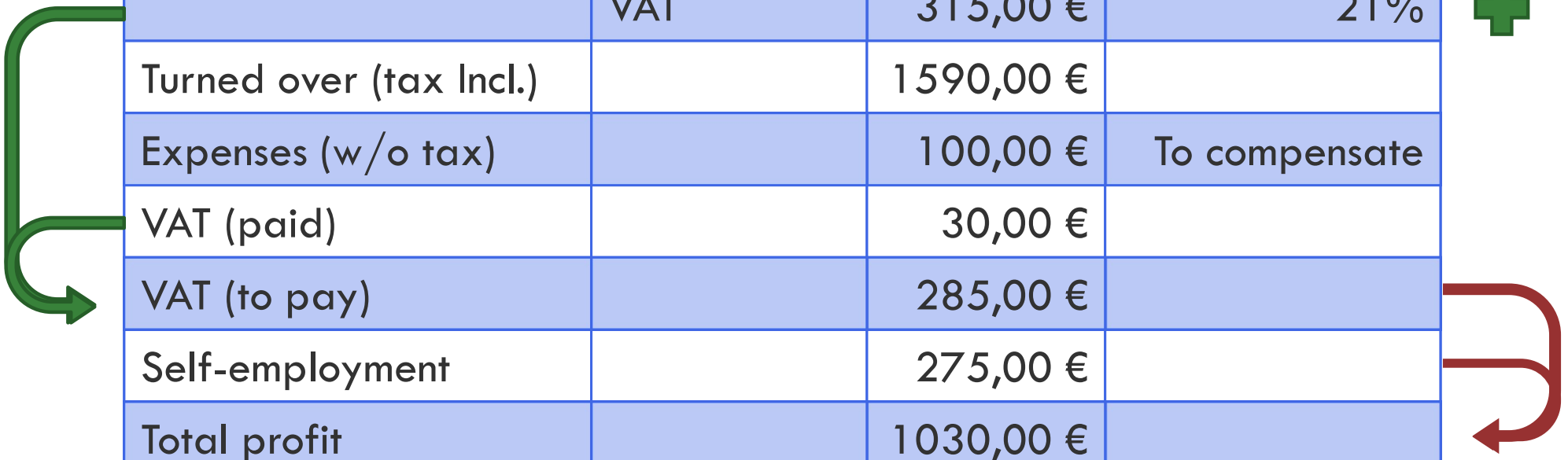
How much does it cost to be self-employed?

Other expenses

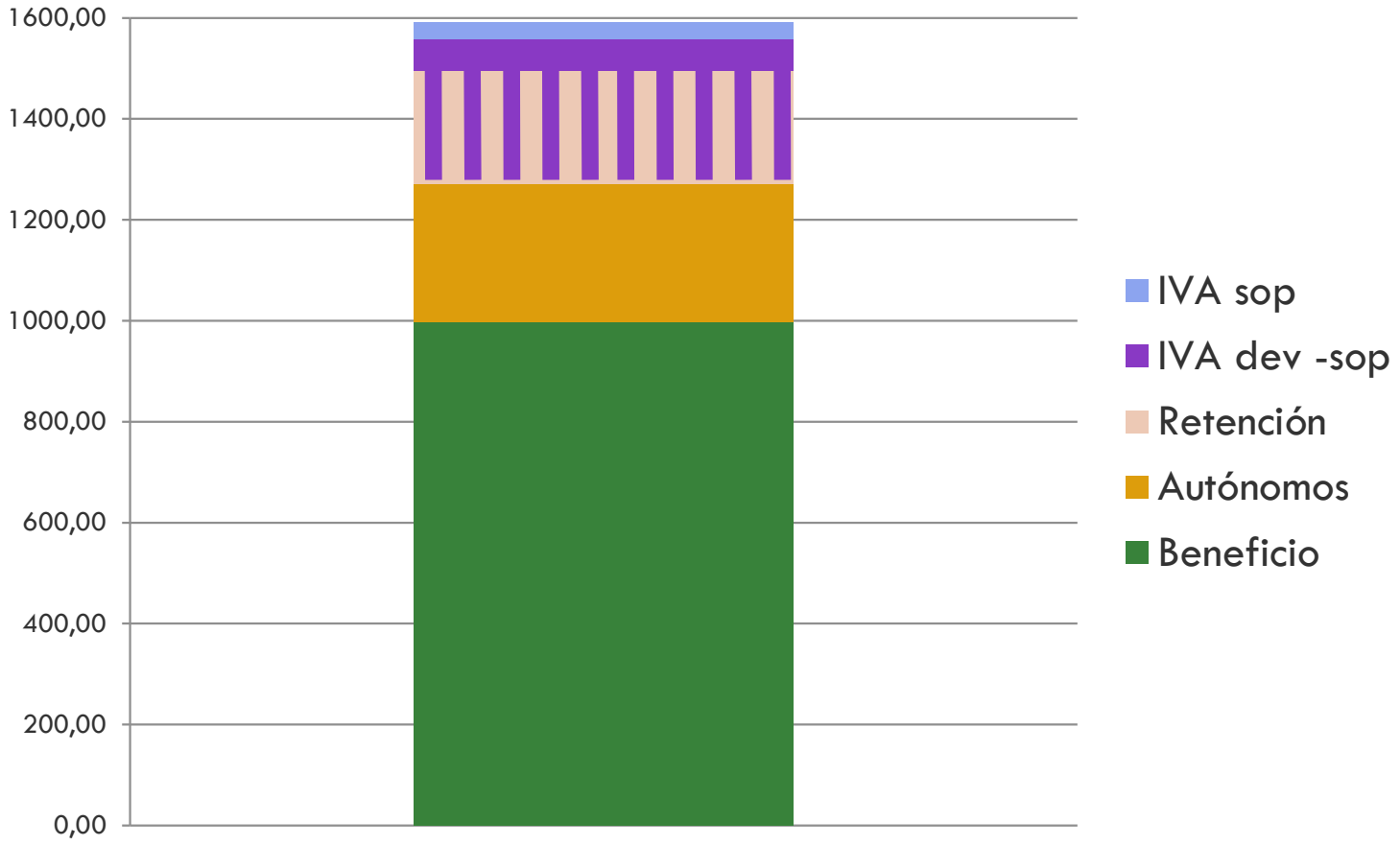
- Consultant
- Office rent
- Vehicle
- Communications
- Employees

How much does it cost to be self-employed?

Tax base		1500,00 €	
	Withholding	225,00 €	15%
	VAT	315,00 €	21%
Turned over (tax Incl.)		1590,00 €	
Expenses (w/o tax)		100,00 €	To compensate
VAT (paid)		30,00 €	
VAT (to pay)		285,00 €	
Self-employment		275,00 €	
Total profit		1030,00 €	



How much does it cost to be self-employed?



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