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Some financial concepts

Chris Roets
Guy Van Eeckhout

Investment against ongoing costs

Investment

- Cost that occurs one time
- Mostly at the beginning of the project of during change initiatives
- Fixed cost independent of the business volume or workload

Ongoing

- Reoccurring on a timely basis
- Aim to be variable depending on the business volume or workload

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Net present value

NPV = ∑ [cash flow / (1+i)^t] - initial investment. In this formula, "i" is the discount rate, and "t" is the number of time periods.

Net Present Value Calculator

Mostly related to investment

- The value of money over time
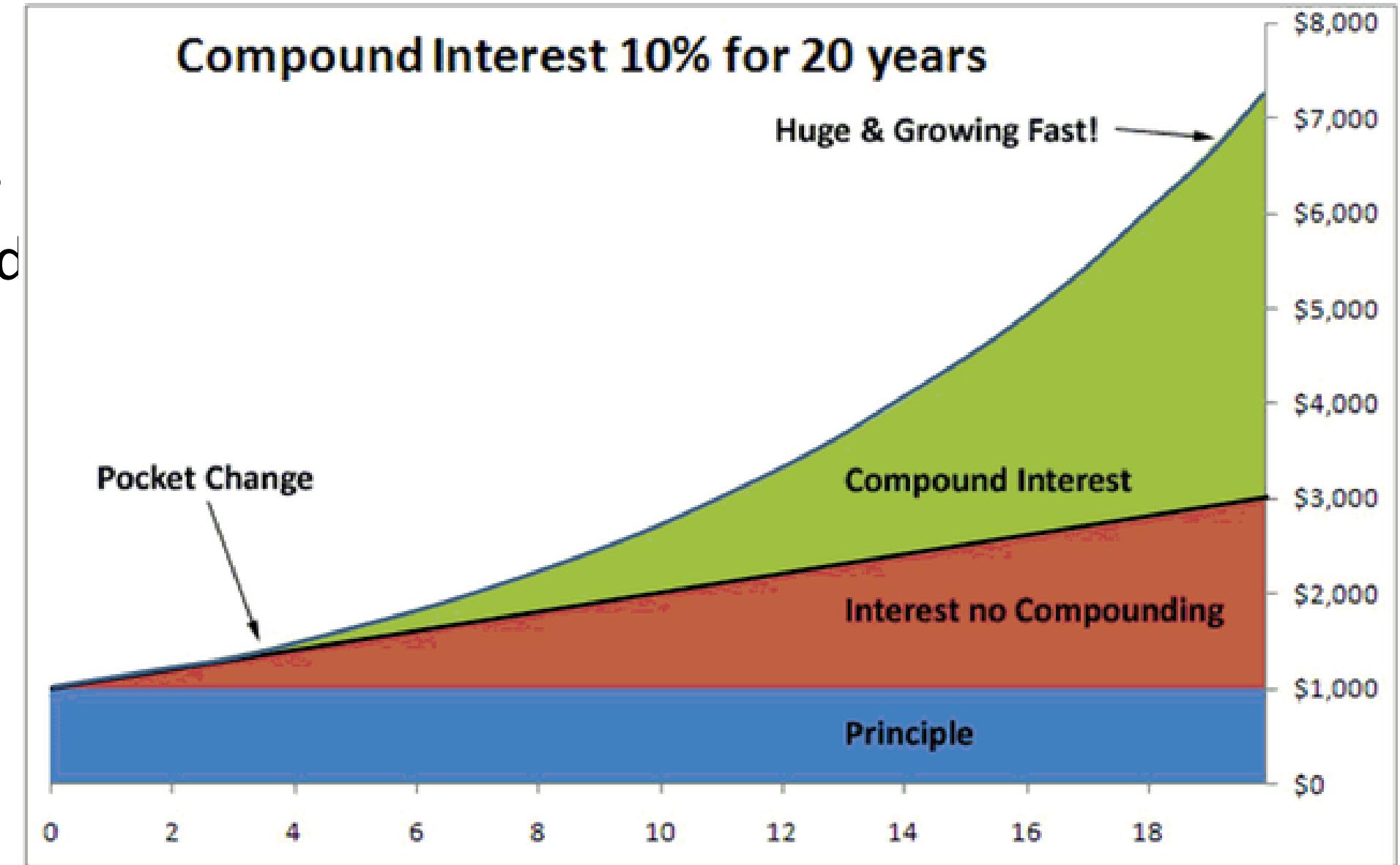- Influenced by inflation

Example : you buy a house

- Loss : y
  - you need to rent money and pays back a **fixed** amount of money over a number of years
  - You need to maintain the house, which is **variable**
- Profit
  - Your salary **increase** due to indexation
  - The value of your house is also **increasing** over time

Think of it :

- Every Euro you **spend later** gives you a return in the bank
- Every Euro you don't spend is worth less in the future

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Compound interest

- Compound interest is when you earn interest not only on your initial deposit or loan principal but also on the accumulated interest from previous periods.

- This "interest on interest" causes your savings or debt to grow at an accelerating rate over time, essentially allowing your money to make more money

- $FV = PV \times (1+r)^n$

- *Start your pension saving right now!!!*

Cash flow

Let's say a company invests $100,000 in a project that generates the following cash inflows:

- **Year 1:** $30,000
- **Year 2:** $40,000
- **Year 3:** $60,000

Cumulative Cash Flows

- **Time 0:** -$100,000 (Initial Investment)
- **End of Year 1:** -$100,000 + $30,000 = -$70,000
- **End of Year 2:** -$70,000 + $40,000 = -$30,000
- **End of Year 3:** -$30,000 + $60,000 = +$30,000

Payback Period is 2.5 years and profit is +$30,000

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But

If you put $100,000 in the bank at 2 % , your returns is $100000*(1+2)^3== $106,120.80

If you put the money under your bed, your money is within 3 years 100000 - **$5,765.82=$**94234.18

With the previous cash-flow, The NPV of your investment is $124,397.86

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Cash flow 2

Let's consider following cash flow :

- **Year 1:** $25,000
- **Year 2:** $30,000
- **Year 3:** $55,000

Cumulative Cash Flows

- **Time 0:** -$100,000 (Initial Investment)
- **End of Year 1:** -$100,000 + $25,000 = -$75,000
- **End of Year 2:** -$75,000 + $30,000 = -$45,000
- **End of Year 3:** -$45,000 + $55,000 = +$10,000

Payback Period is 2.7 years and profit is +$20,000, but with NPV it becomes **5,172.60** Euro

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Business decisions for projects

- **Pay back period** : the time it takes to get you initial investment back

- **Return on investment** : the return you gain from your initial investment at the end

- **Risk vs. Profit**: The payback period helps assess risk and time to recoup funds, while ROI provides insight into the investment's overall earning potential.

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Profit against Margin

- Profit is the net amount you keep over at the end of the year
  - Profit defines dividend
  - Profit = Revenue – Cost
  - Sort term
- Margin is the **<u>percentage</u>** of profit against the cost
  - Margin defines value of shares and so the value of the company
  - Margin = (Revenue-Cost)/Revenue*100
  - Sustainability

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Examples

- Mergers decision are focused upon
  - Cost improvements
  - Market share and brand (allows more revenue to take and so increase margin)
    - In 1998 Compaq both Digital
      - Reason : market share and complementary offers
  - In 2001 HP and Compaq merged
    - Reason : cost savings through leverage of same offers

Revenue	Cost	Profit	Margin
120	100	20	17%
130	109	21	16%
110	90	20	18%

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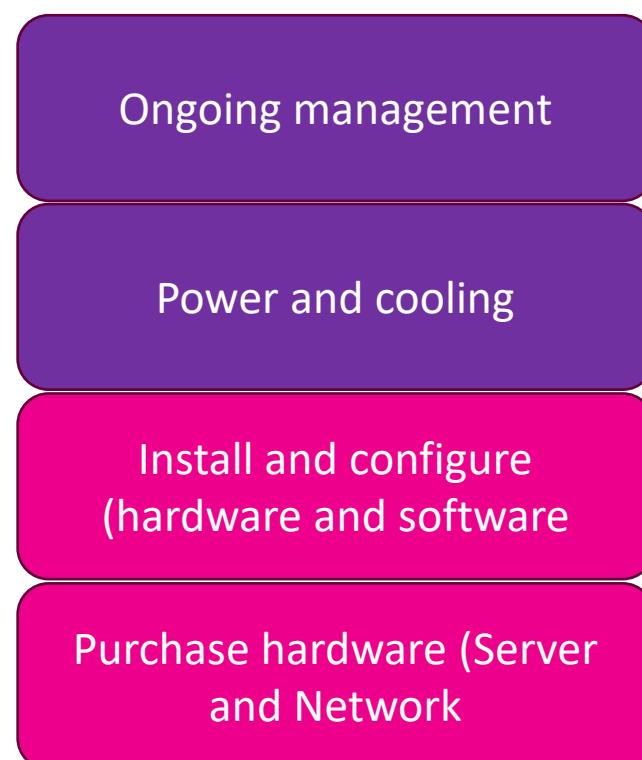
ICT infrastructure sourcing and costing

Chris Roets
Guy Van Eeckhout

Infrastructure sourcing

- Different ways of infrastructure sourcing
  - On-prem purchase and run a physical server locally
  - Collocation in a datacenter
    - Housing
    - Hosting
  - Public Cloud
    - IAAS
    - PAAS
    - SAAS

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Costing drivers on-prem

Ongoing management

Power and cooling

Install and configure
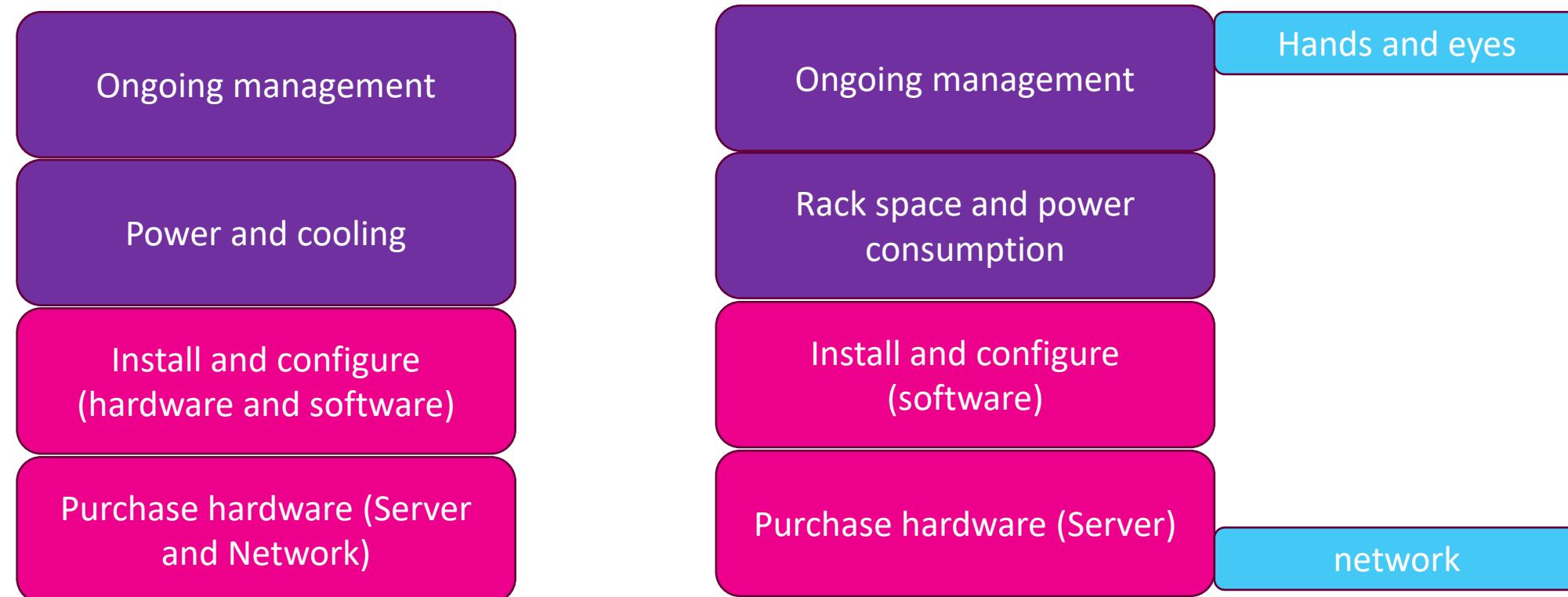(hardware and software

Purchase hardware (Server
and Network

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Pro and cons on-prem

- Pro
  - Total self control
- Con
  - Find suitable room
  - Sizing in a change business environment

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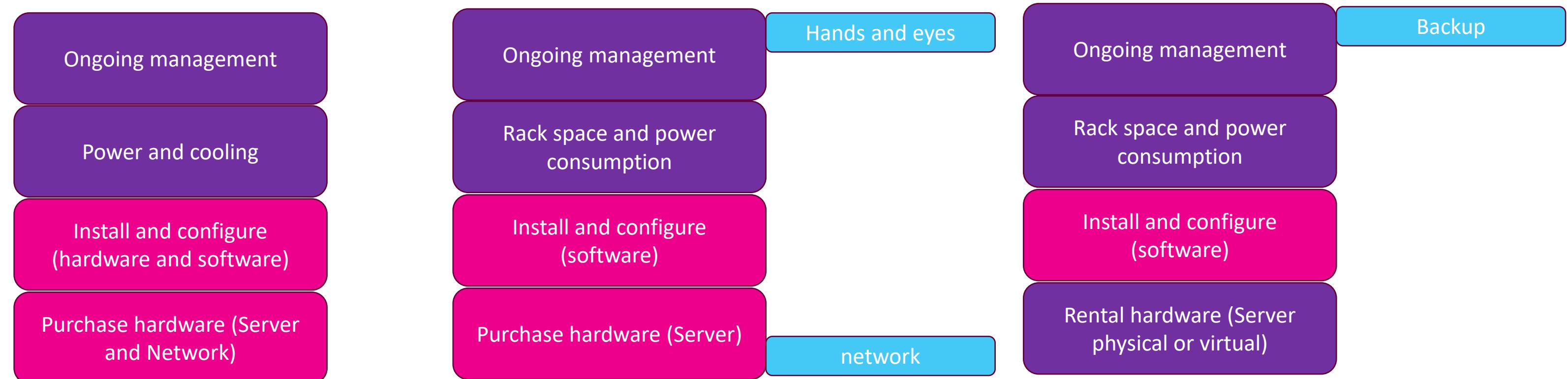hogeschool

Example pricing on-prem

Infra	price	CPU	CORE		MEM
specs		1		16	32
buy price	€ 5,714.85		https://www.bol.com/be/nl/p/serveur-hpe-proliant-dl325-gen11-rack-amd-epyc-9124-3-ghz-32-gb-ddr5-sdram-1000-w/9300000168510066/?Referrer=BEGOOFS&utm_source=google&utm_medium=free_shopping&gQT=2		
power consumption	€ 3,942.00	500	one average 500-Watt consumption (peak 1Kw)		
hard drives	€ 843.00	3	Seagate IronWolf ST12000VN0008 - Vaste schijf - 12 TB - intern - 3.5 - SATA 6Gb/s -... | bol		
internet	€ 1,541.16		https://www.proximus.be/nl/business/internet-abonnement?v1=paidsearch&v2=in2sea0021&v3=google&v4=generic&v5=na&v6=business%20internet&v7=sme-fix-copper_1p&gad_source=1&gad_campaignid=20670567105&gclid=EAIaIQobChMImp7DmZPNjgMVmPZ5BB3jRg0YEAAYASAAEgLoZvD_BwE		
price over 3 years	€ 12,041.01				
people		days	hourly rate		
your setup	€ 15,000.00		€	500.00	per day
you mainttenance	€ 172,500.00	125	€	500.00	per day
developer	€ 180,000.00	250	€	5,000.00	per month
labor cost 3 years	€ 352,500.00				

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Costing drivers Colocation (housing)

Ongoing management

Power and cooling

Install and configure (hardware and software)

Purchase hardware (Server and Network)

Ongoing management

Hands and eyes

Rack space and power consumption

Install and configure (software)

Purchase hardware (Server)

network

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Costing drivers Colocation (hosting)

Ongoing management	Ongoing management	Hands and eyes	Ongoing management	Backup
Power and cooling	Rack space and power consumption		Rack space and power consumption	
Install and configure (hardware and software)	Install and configure (software)		Install and configure (software)	
Purchase hardware (Server and Network)	Purchase hardware (Server)	network	Rental hardware (Server physical or virtual)	

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Pro and cons colocation

Pro
- Professional datacenter operations
- No hardware investment (hosting)
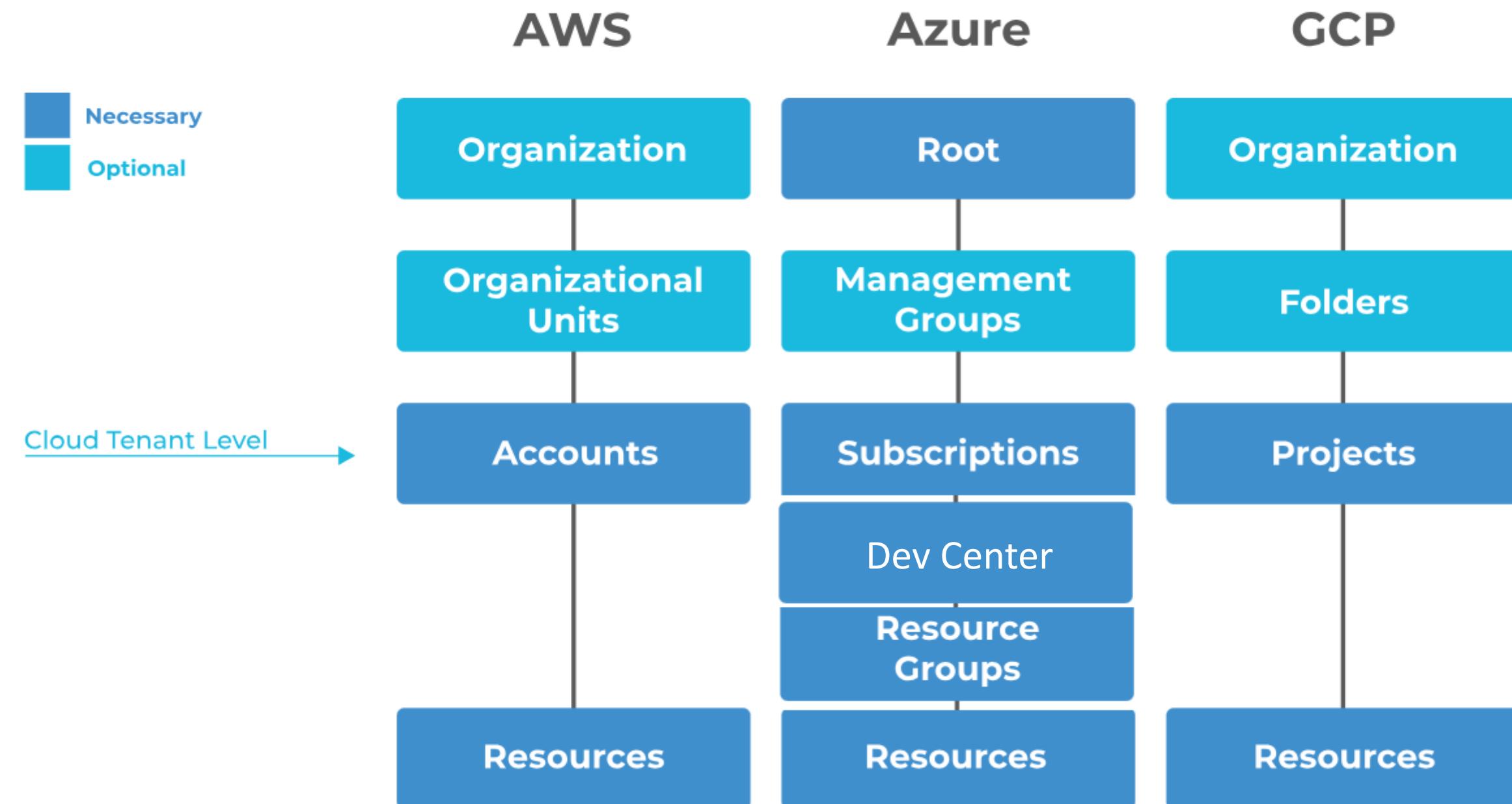
Con
- Still lot of management todo.
- SLA agreement needed for hands and eyes.
- Fixed to the hardware constraints

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Example pricing collocation : FUSA - Home

housing	price		
rack space	€ 2,160.00	€ 60.00	per month
power usage	€ 1,440.00	€ 20.00	per 1/4 kwh
Total	€ 3,600.00		
Compare to power consumption server	€ 3,942.00		
hosting			
server	€ 5,580.00	€ 155.00	per month
		€ 35.00	
Total	€ 5,580.00		
compare to	€ 12,041.01		

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Cloud tenant Management

Cloud Resource Hierarchy

AWS	Azure	GCP

Necessary
Optional

AWS	Azure	GCP
Organization	Root	Organization
Organizational Units	Management Groups	Folders
Accounts	Subscriptions	Projects
	Dev Center	
	Resource Groups	
Resources	Resources	Resources

Cloud Tenant Level →

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Virtual Machines

Provision Windows and Linux VMs in seconds

Storage Accounts

Durable, highly available, and massively scalable cloud storage

Azure SQL Database

Build apps that scale with managed and intelligent SQL database in the cloud

App Service

Quickly create powerful cloud apps for web and mobile

Azure Cosmos DB

Build or modernize scalable, high-performance apps

Azure Kubernetes Service (AKS)

Deploy and scale containers on managed Kubernetes

Azure Functions

Execute event-driven serverless code functions with an end-to-end development experience

Azure AI services

Add cognitive capabilities to apps with APIs and AI services

Microsoft Cost Management

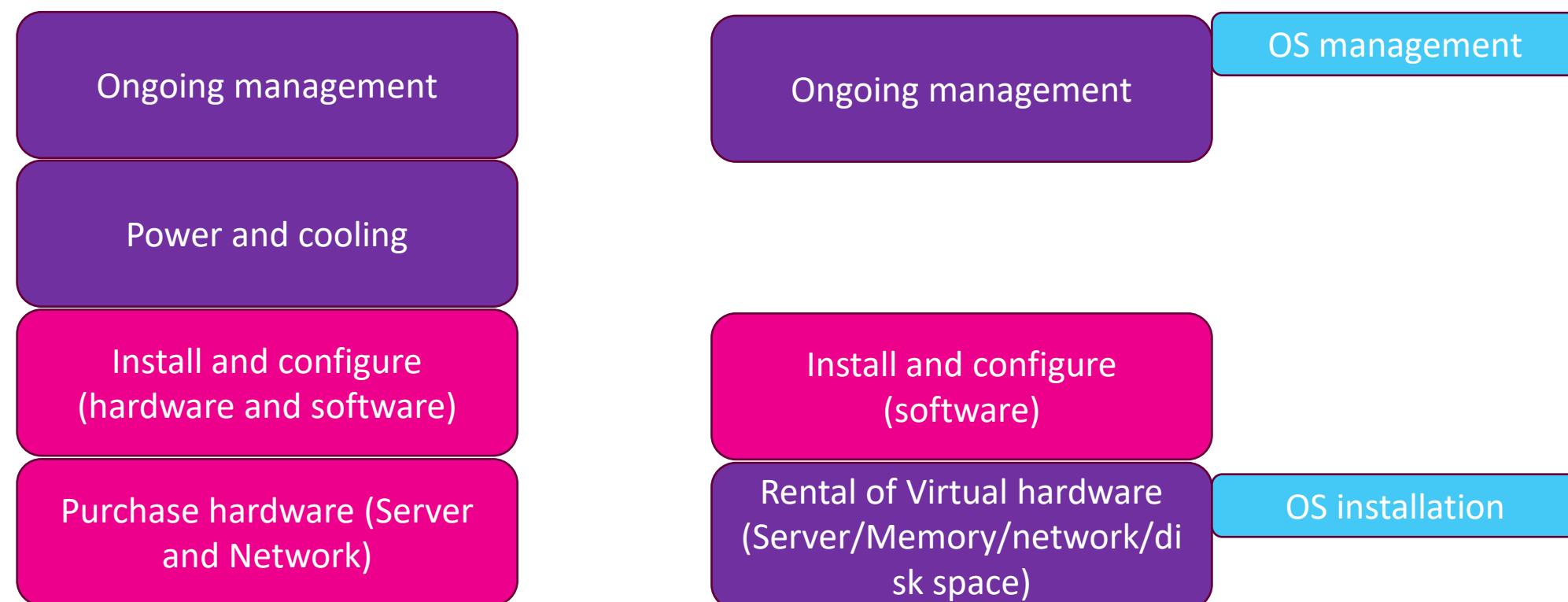Monitor, allocate, and optimize cloud costs with transparency, accuracy, and efficiency

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Popular resources :

- Virtual machine
  - Compute
  - Managed disks
  - Storage transactions
  - Bandwidth
  - Support
- Storage
- Network

Popular
Compute
Networking
Storage
Web
Mobile
Containers
Databases
Analytics
AI + machine learning
Internet of Things
Integration
Identity
Security
Developer tools
DevOps
Management and governance
Media
Migration
Mixed reality
Hybrid + multicloud

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Cloud pricing models

- Pay as you go
  - You pay only when the system resource ip up and being used

- Saving plan
  - Save money across select compute services globally by committing to spend a fixed hourly amount for one or three years, unlocking lower prices until you reach your hourly commitment.

- Reserved (Azure only)
  - Reduce costs on select Azure services by forecasting your resource needs and paying for them in advance.

- Volume discount (AWS only)

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Public Cloud : IAAS

Ongoing management

Power and cooling

Install and configure (hardware and software)

Purchase hardware (Server and Network)

Ongoing management

OS management

Install and configure (software)

Rental of Virtual hardware (Server/Memory/network/disk space)

OS installation

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Pro and cons IAAS

Pro
- Professional datacenter operations
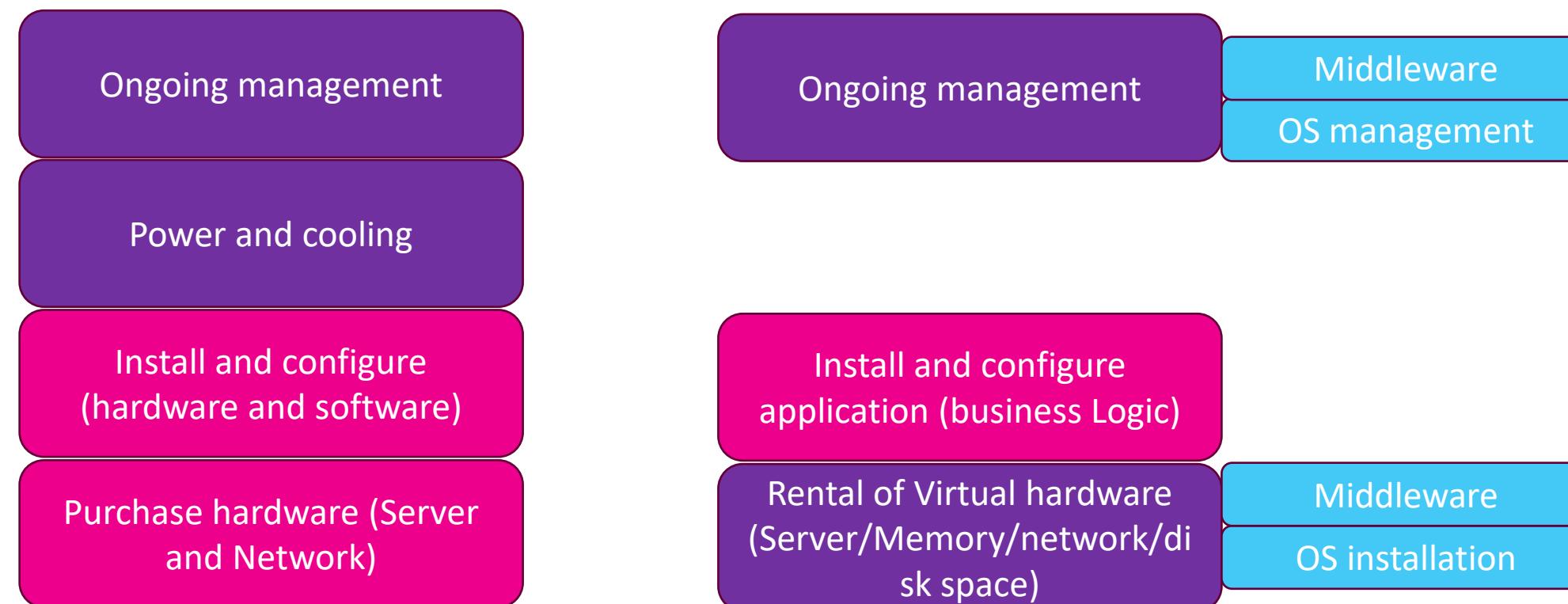- No hardware investment
- Flexible horizontal scaling

Con
- Still lot of management todo.
- SLA agreement needed for service.
- Predefined resources (CPU/MEM/Disk).
- Vendor lock in

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Example pricing IAAS : Pricing Calculator | Microsoft Azure

Azure		month	3 years	
	pay as you go	€ 634.69	€ 22,848.84	
	saving plan	€ 351.31	€ 12,647.16	
	reserved	€ 242.00	€ 8,712.00	
compare to				
one prem			€ 12,041.01	
collocation			€ 10,157.85	
Cloud Backup		capacity	3072.00	Pricing – Azure Backup | Microsoft Azure
Service		€ 75.40	€ 2,714.49	12.5671
storage		€ 9.52	€ 342.84	0.0031
Total Backup			€ 3,057.33	
	egress	55.296	8626.176	Pricing - Bandwidth | Microsoft Azure
	Synology NAS		843	https://www.coolblue.be/nl/product/966407/synology-ds925.html?cmt=c_a,cid_21499771600,aid_166730493042,tid_pla-295359531350,gn_g,d_c&utm_source=google&utm_medium=cpc&utm_content=shopping&gad_source=1&gad_campaignid=21499771600&gclid=EAIaIQobChMI6pTIoJbNjgMVxKFoCR1mKQscEAQYASABEgJaVfD_BwE
	hard drives		843	
backup to local			€ 10,312.18	

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Public Cloud : PAAS

Ongoing management

Power and cooling

Install and configure
(hardware and software)

Purchase hardware (Server
and Network)

Ongoing management

Middleware

OS management

Install and configure
application (business Logic)

Rental of Virtual hardware
(Server/Memory/network/di
sk space)

Middleware

OS installation

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Public Cloud : PAAS PRO's

Faster Development Time

Pre-built components and development tools accelerate application development.

Reduced Infrastructure Management

No need to manage servers, storage, or networking. The provider handles the infrastructure.

Scalability (both horizontal and vertical scaling)

Easily scale applications up or down based on demand, with the platform handling resource allocation.

Cost-Effective

Pay-as-you-go pricing means you only pay for what you use; reduces upfront hardware/software costs.

Built-in Tools

Comes with integrated development environments (IDEs), version control, testing tools, analytics, etc.

Focus on Development

Developers can focus on coding and logic, rather than DevOps and hardware concerns.

Cross-Platform Support

Many PaaS solutions support various programming languages and frameworks.

Public Cloud : PAAS CON's

Limited Control

You have less control over the underlying infrastructure and environment configurations.

Vendor Lock-In

Migration to another platform can be complex and costly due to proprietary services and APIs.

Security & Compliance

Security is partly managed by the provider, which might not align with your organization's requirements. Compliance with certain standards (like HIPAA or GDPR) can be challenging.

Customization Limits

You might be restricted in terms of customizations, especially with how middleware and runtimes are handled.

Performance Issues

Multi-tenant architectures can lead to performance variability depending on other users' activities.

Compatibility Issues

Not all legacy systems or custom apps can be easily migrated to or integrated with a PaaS platform.

Dependency on Internet

Continuous internet access is required to interact with cloud-hosted platforms and services.
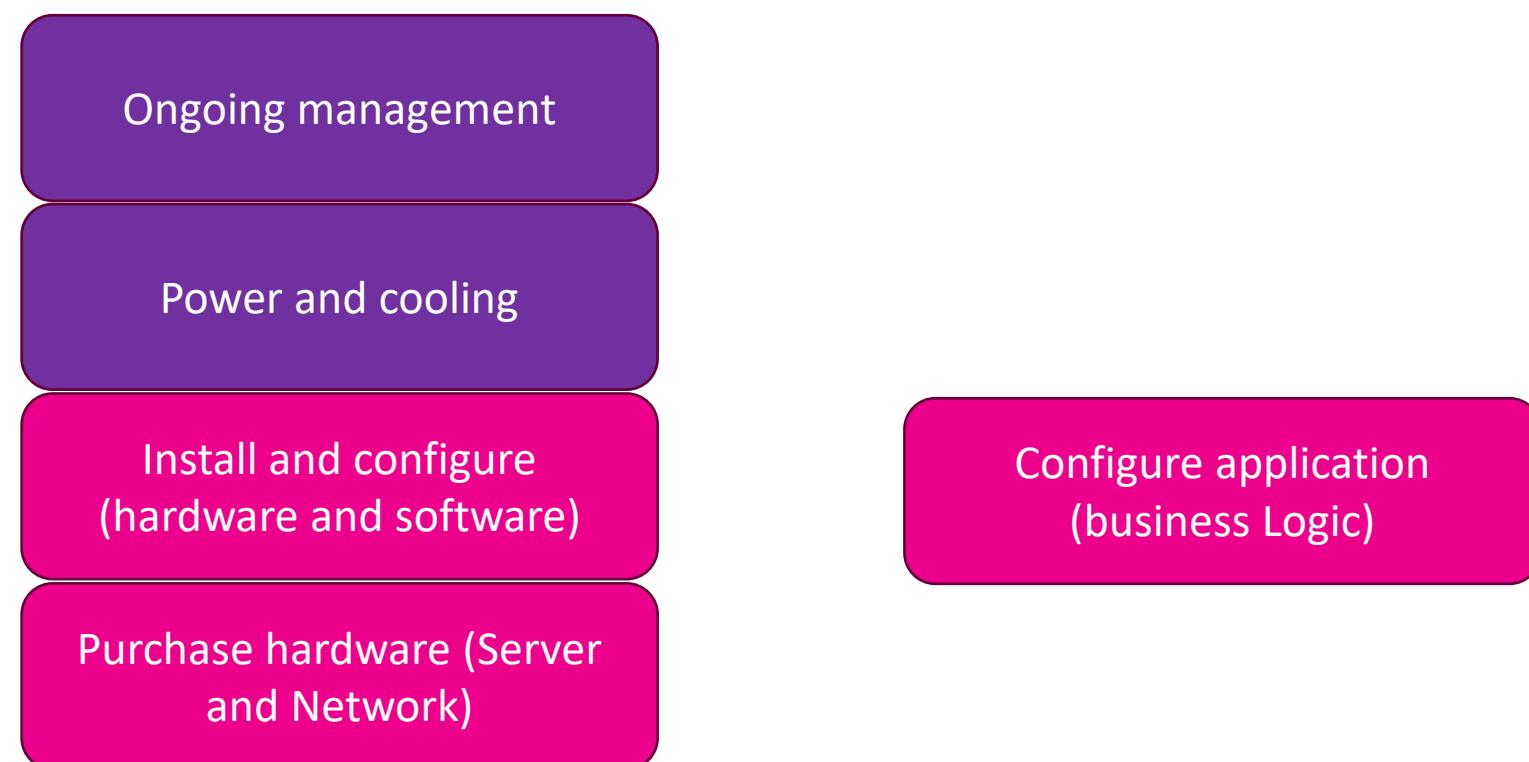
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Example pricing PAAS

How much does it really save :

- In Time
- In Money

- What management tasks are still left over ?

- What will the system manager do with the freed time ?

  - Other tasks in case of an employee
  - Less time spend in case of a consultant

Pay as you go per hour	$1.12	$29,433.60	€ 25,018.56
one year contract	$8,399.00	$25,197.00	€ 21,417.45
Storage per month	$1,843.00	$5,529.60	€ 1,843.20
Total	€ 23,260.65		
compare to			
on prem	€ 12,041.01		
collocation	€ 10,157.85		
hosting	€ 5,580.00		
IAAS	€ 3,057.33		
management	€ 172,500.00		

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Public Cloud : SAAS

Ongoing management

Power and cooling

Install and configure
(hardware and software)

Configure application
(business Logic)

Purchase hardware (Server
and Network)

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Public Cloud : SAAS PRO's

- **Ease of Use**
  - No installation or setup required — just sign in and use the software from any device with a browser.

- **Lower Upfront Costs**
  - No need to buy hardware or licenses. Pay-as-you-go or subscription models reduce capital expenditure.

- **Automatic Updates**
  - The provider handles updates, patches, and new features — no manual maintenance required.

- **Scalability**
  - Easily add or remove users or features based on business needs.

- **Accessibility**
  - Accessible from anywhere with an internet connection — great for remote work and global teams.

- **Integration Options**
  - Many SaaS apps offer APIs or built-in integrations with other popular tools (e.g., CRM, email, calendars).

- **Security & Backup**
  - Providers often offer enterprise-grade security, regular backups, and disaster recovery as part of the service.

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Public Cloud : SAAS CON's

- **Limited Customization**
  - SaaS apps are typically "one-size-fits-most" — fewer options for deep customization or tailoring to niche use cases.

- **Dependence on Internet**
  - A stable internet connection is required. Downtime or slow connections can interrupt access.

- **Vendor Lock-In**
  - Moving to a different SaaS provider may involve data migration issues, API changes, or lost custom settings.

- **Data Security & Privacy Concerns**
  - Sensitive business data is stored offsite — potential risks around compliance, privacy, and control.

- **Subscription Costs Over Time**
  - While cheap upfront, long-term subscription fees can add up and may exceed the cost of a traditional license.

- **Less Control**
  - Users have no control over software updates, server locations, or performance tuning.

- **Limited Offline Functionality**
  - Most SaaS apps don't work without internet access unless they provide a dedicated offline mode.

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Example pricing SAAS :

- How much does it really save :
  - Billing automation
  - Tailor standard package to your needs
  - How about data confidentiality

			0.85
Basic	$ 22.00	$ 792.00	€ 673.20
Grow	$ 69.00	$ 2,484.00	€ 2,111.40
Advanced	$ 289.00	$ 10,404.00	€ 8,843.40
Plus	$ 2,300.00	$ 82,800.00	€ 70,380.00
Total	€ 70,380.00		
on prem	€ 12,041.01		
collocation	€ 10,157.85		
hosting	€ 5,580.00		
IAAS	€ 3,057.33		
management	€ 172,500.00		
developer	€ 180,000.00		

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Conclusion

- No one solution fits all

- ICT infra sourcing is not a technical decision but depends on the business strategy of the company

  - Resource allocation (people/products/processes)

  - Market analyses

    - Time to market

    - Risks

    - Growth

  - Company Culture

    - Values (ecology, politics, etc..)

  - Legal constraints

    - Data privacy, …

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Examples of business strategies:

- **Differentiation**: Focusing on creating unique products or services that stand out from the competition.

- **Cost Leadership**: Aiming to be the lowest-cost producer in the industry.

- **Market Focus**: Targeting a specific niche market with specialized products or services.

- In essence, a business strategy is a dynamic and evolving plan that guides a company's journey towards success.

- While in the past ICT was a driver for the company success, it now support the company success

  - That's why CTO will most of the time report to the CFO, decision is made by money, not technology.

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Global tendances

- Public Cloud
  - Startups
  - Rapidly changing environment

- Collocation
  - Stable SMB company's

- On-prem
  - Large company's

- PAAS
  - Focus on development, infra is a burden

- Saas
  - None Core business Apps (office365, etc…

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Ask Chatgpt

Your Need	Choose This
You want full control over environment	IaaS
You want to build/deploy apps quickly	PaaS
You just want to use a tool (like Gmail/CRM)	SaaS
You're migrating legacy systems	IaaS
You need a flexible dev environment	PaaS
You want zero maintenance responsibilities	SaaS

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