

Exercise 2

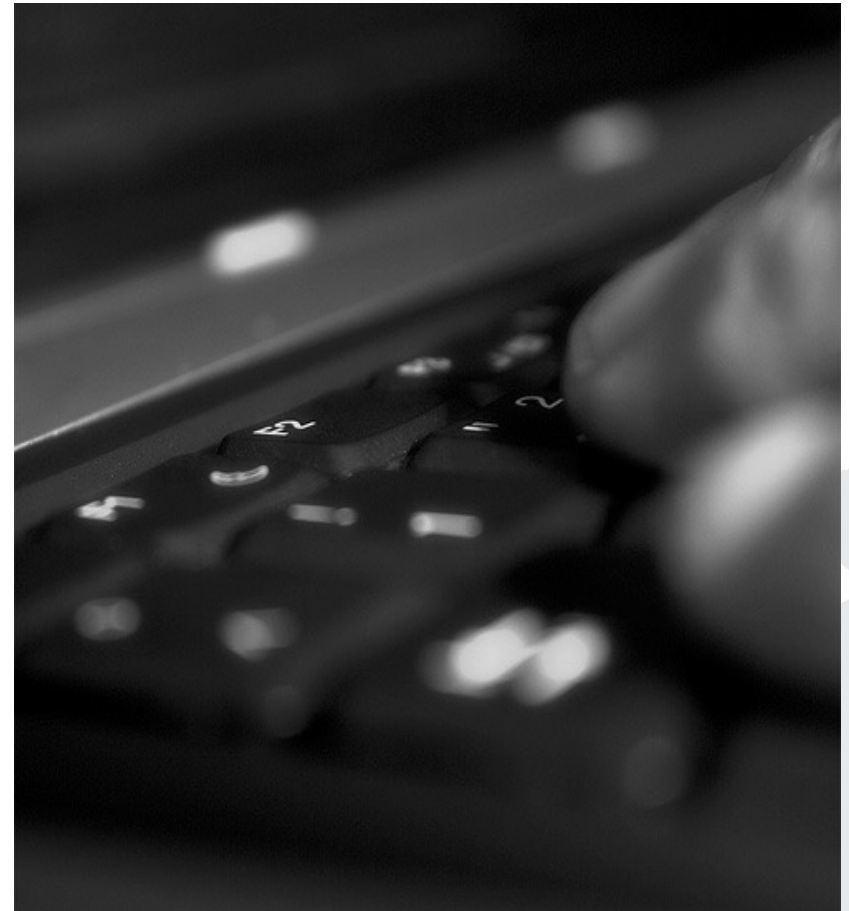
Business Informatics 2 (PWIN)

Information Systems II & III

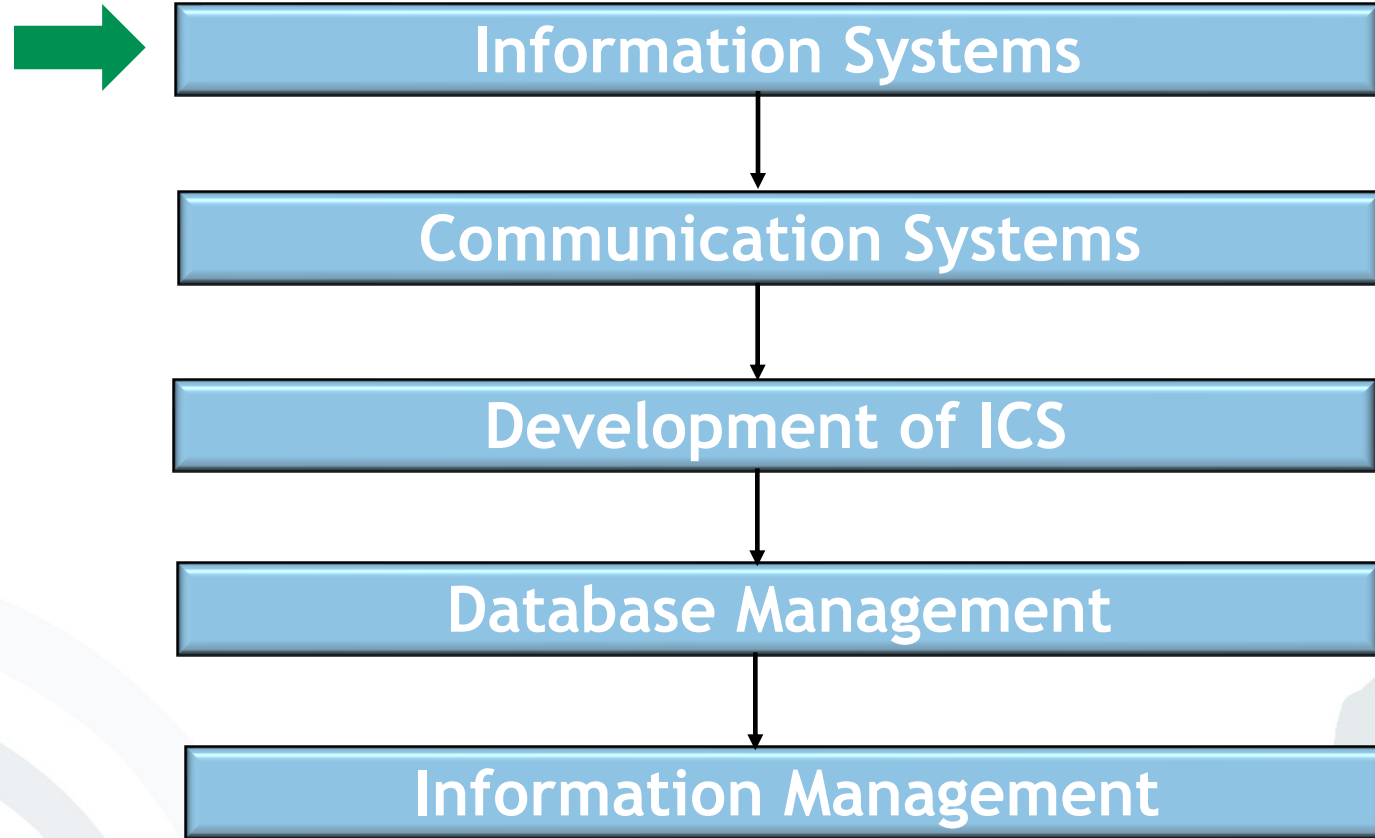
WS 2023

Frédéric Tronnier

www.m-chair.de



Jenser (Flickr.com)



Components of the Course

Information Systems

Purpose of and Research on Information Systems ✓

Enterprise Modelling ✓

Architectures of Information Systems

Mobile Information Systems

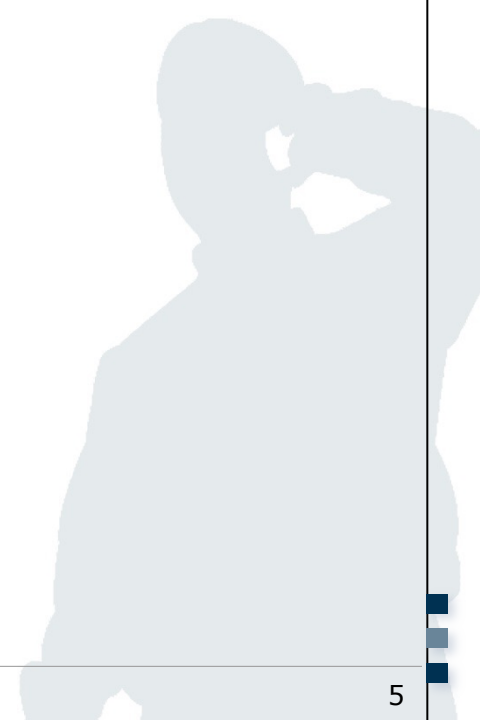
By now you should be able to:

- Define an Information and Application System and explain the difference
- Know the difficulties that come with isolated systems and how they can be overcome
- Know what a model/enterprise model is and what abstracting mechanisms there exist
- Understand the basics of the ARIS model

→ Apply your knowledge!

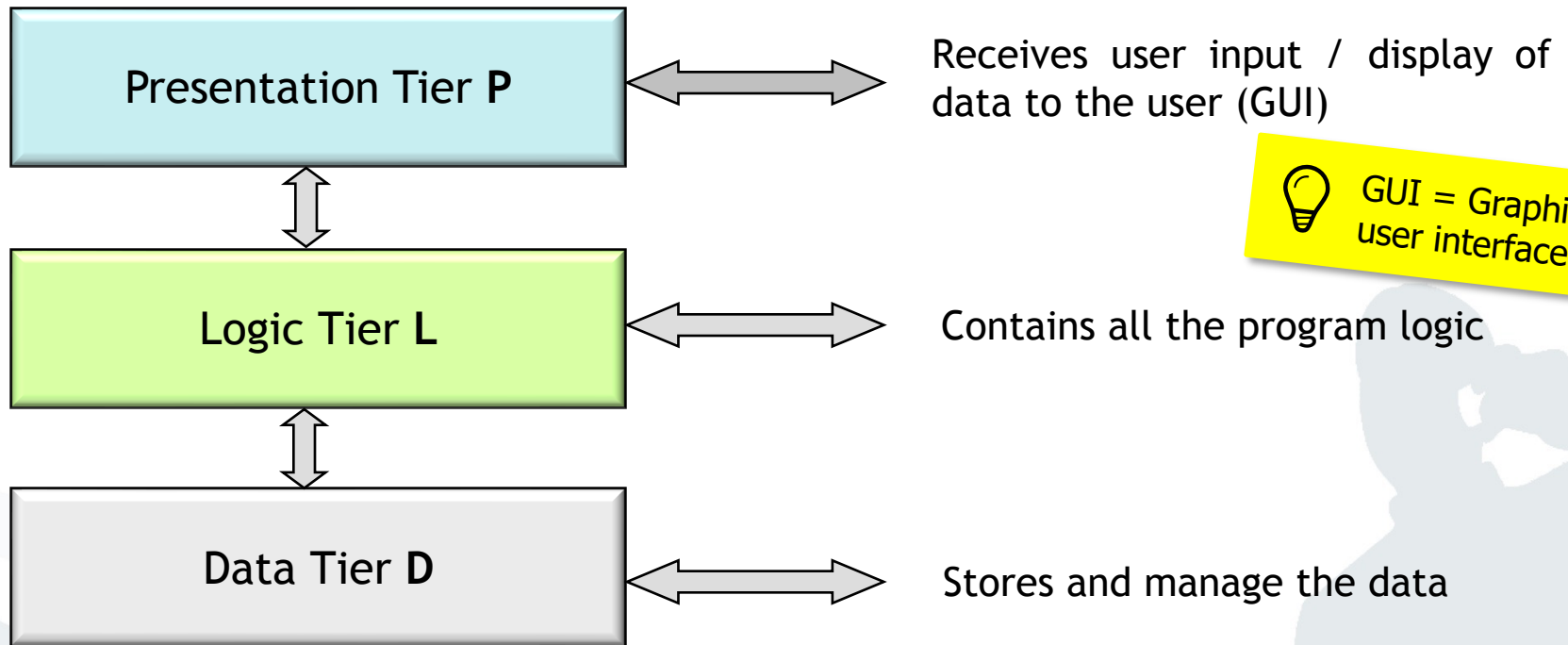


- Exercise 1: Models for the architecture of Information Systems
- Exercise 2: IS Architecture Concepts
- Exercise 3: Mobile Infrastructure and Ecosystem
- Exercise 4: Mobile Information Systems

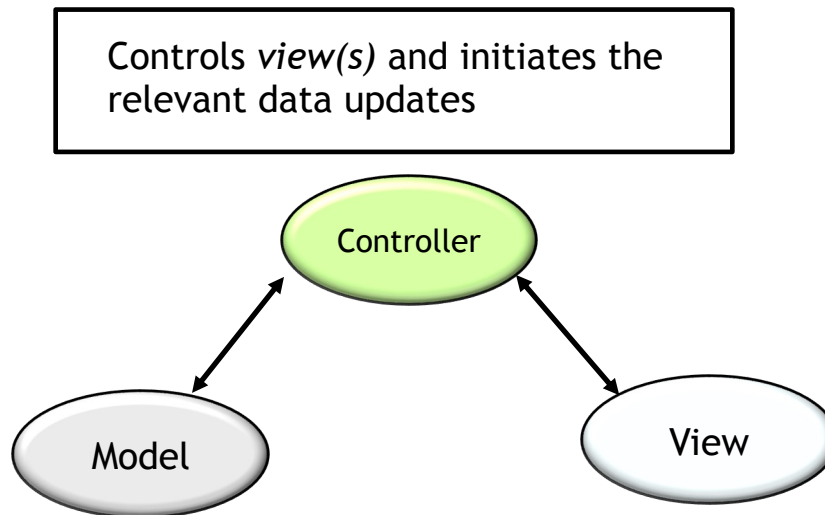


- a) Please sketch a three-tier and a model-view-controller concept and explain the function of each component.

Three-tier concept



Model-View-Controller concept



Controls *view(s)* and initiates the relevant data updates

Manages data and, if applicable, contains the program logic

Receives user input / displays data from *model* to the user (GUI)

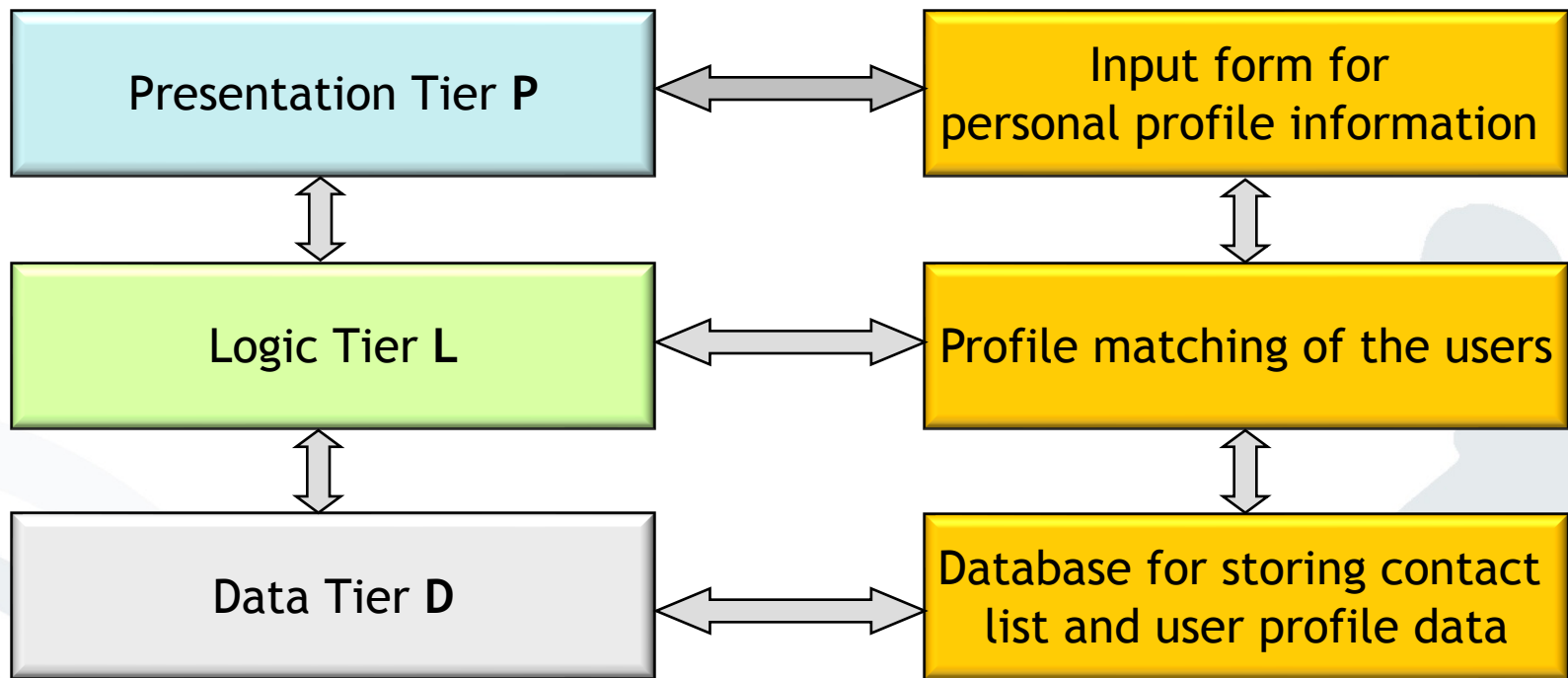
💡 Memory aid

Digital order system at a restaurant

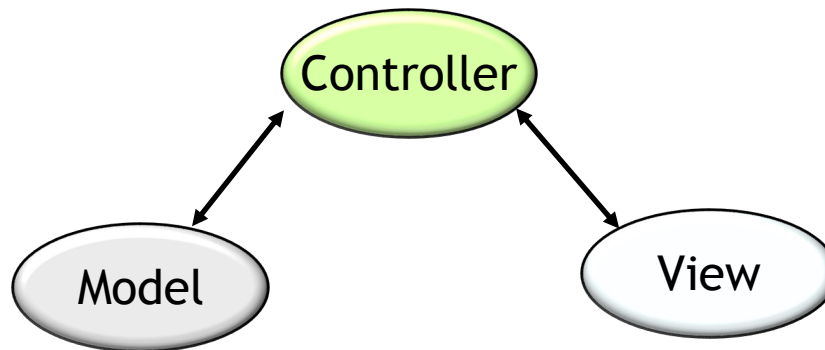
b) Please determine to which component the following InstaMatch® elements belong in each concept:

- The form for the input of personal information (e.g. gender, age, etc.) for users
- The database for storing the contact list and calendar of a user
- The software module containing the matching logic for the personal profiles of users.

Three-tier concept



Model-View-Controller concept

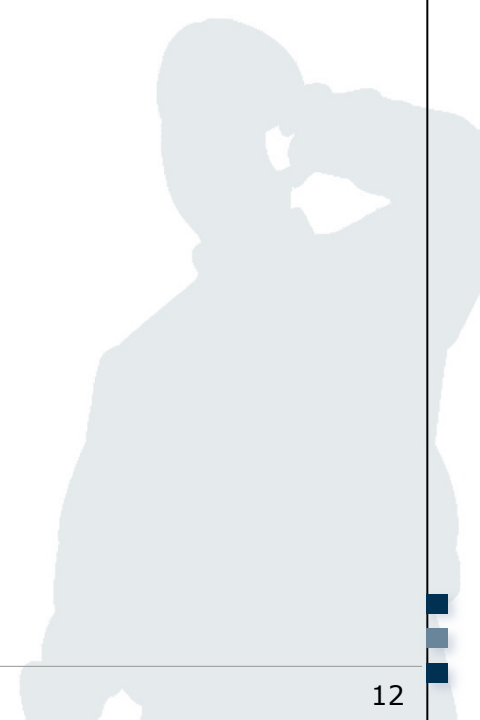


Profile matching of the users

Database for storing contact list and calendar

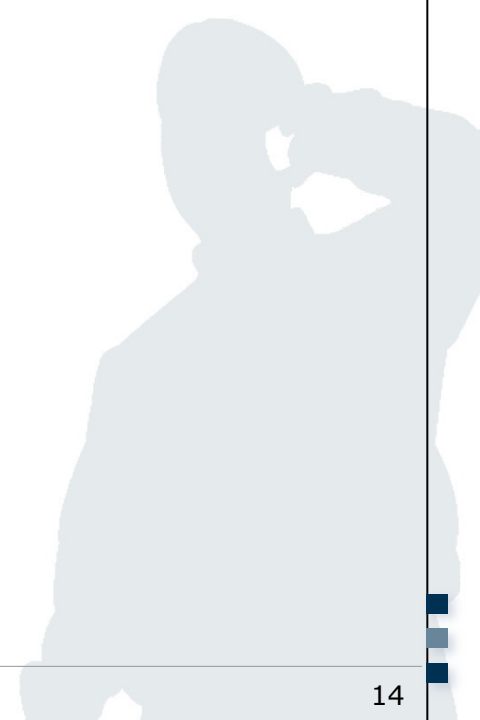
Input form for personal profile information

- Exercise 1: Models for the architecture of Information Systems
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- **Central Server Architecture**
Low-feature terminals (receiver of services) attached to a powerful central computing unit (provider of services)
- **Client / Server Architecture**
Network of computers, which can take the role of a server (provider of services), a client (receiver of services) or both.
- **Cloud Computing Architecture**
Network of computers in the role of a client (receiver of services) connected to a “cloud” of computers (provider of services), which act as a single central server
- **Peer-to-Peer Architecture**
Network of computers holding equal rights (provider / receiver of services)
- **Edge Computing Architecture**
Leverages network resources to optimise cloud computing systems by performing data processing at the edge of the network, near the data source

- a) What are the advantages and disadvantages of a Cloud Computing architecture in comparison to a central server concept?




Internet-centric computing architecture:

- Providers are offering complex services based on hard- and software in an abstract form.
- Storage, computing power, or complex services can be accessed by client via defined interfaces via the Internet.
- Underlying hard- or software of a cloud is not relevant for a client.
- Types of cloud computing services
 - Infrastructure as a service
 - Platform as a service
 - Software as a service
- Providers, e.g.
 - Amazon, Google, Microsoft, Deutsche Telekom, etc.





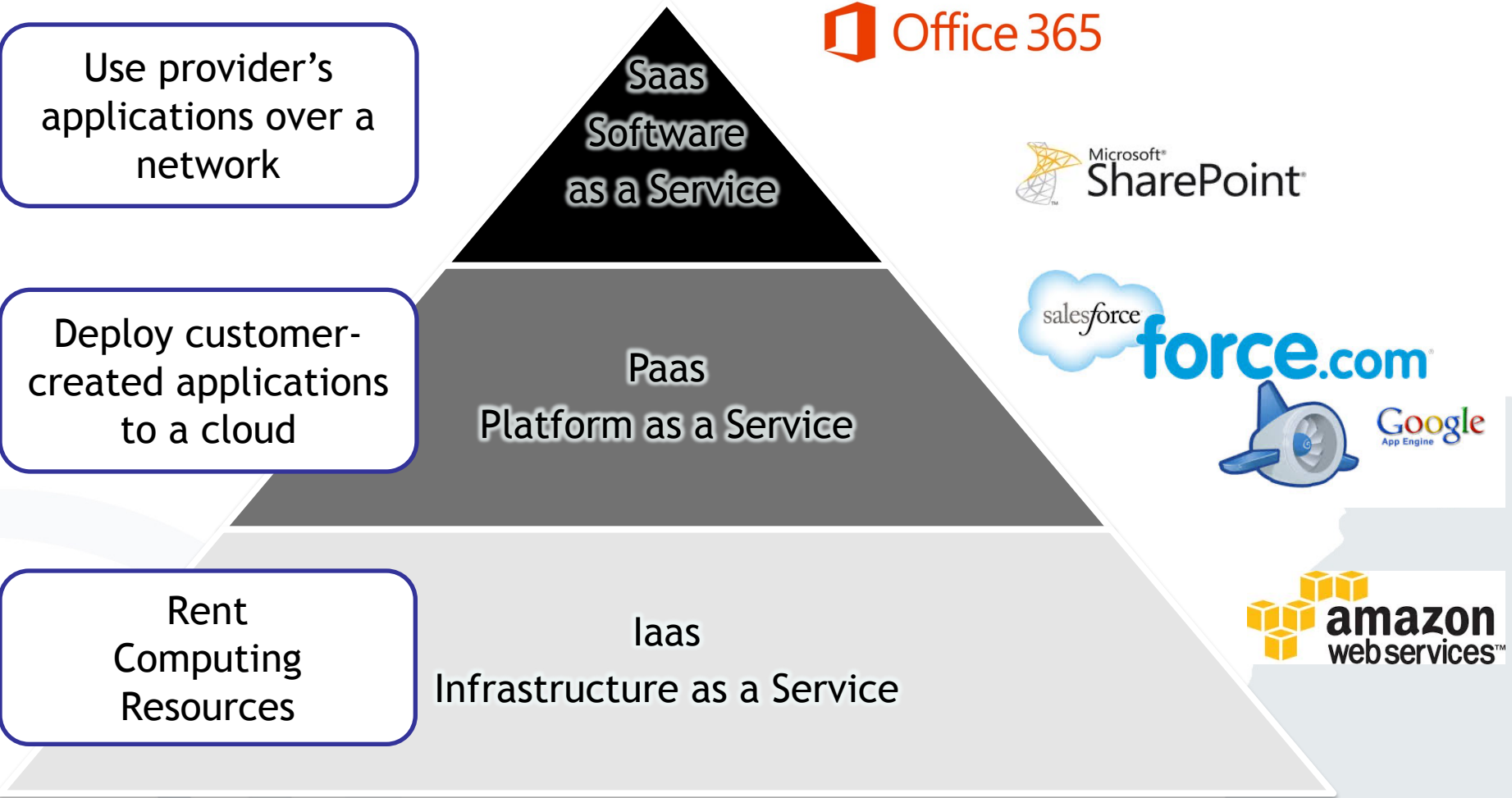
 Note
AWS = amazon
web services

- Advantages
 - Information system become highly scalable
 - Central data storage and backup
 - Cost efficient (one has only to pay for the actually used computing power and time)
 - Anytime & anywhere access to applications and data
 - Allows to run sophisticated applications on low-powered systems (e.g. Google's mobile voice recognition on Android devices)
- Disadvantages
 - Enterprises or end users have to rely on the cloud service provider
 - Potential threats
 - Data security, data privacy
 - Provider bankruptcy, lock-in effects
 - Internet connection failures

- Cloud Computing:
 - Abstracts from underlying IT-infrastructures (Computing power, storage, services, etc.) for its customers
 - Allows customers the dynamic allocation of required IT-resources on demand
 - Pricing based on consumed IT-resources (e.g. CPU-cycles, used disk space, etc.)
- Central Server:
 - Allocation of IT-resources based on the actual hardware/software. For instance, single server units (3 GHz Processor, 16 GB RAM, 1 TB hard disk)
 - Pricing based on actual or “virtualised” hardware/software

b) What kind of Cloud Computing services do there exist? Assuming the Cloud Computing concept is suitable for the InstaMatch® service, what type of Cloud service (e.g. infrastructure as a service) should be booked and why?

Exercise 2b: Solution



All three types of Cloud Services are possible. Decision depends on planned InstaMatch® architecture.

■ Infrastructure as a Service

- Only the IT-infrastructure is provided by the cloud
- The InstaMatch® provider needs to install its own *platform* and subsequently build its service upon it

■ Platform as a Service

- The cloud provides the infrastructure and operating system.
- The InstaMatch® Provider can install the application on this platform (e.g. web-based application)

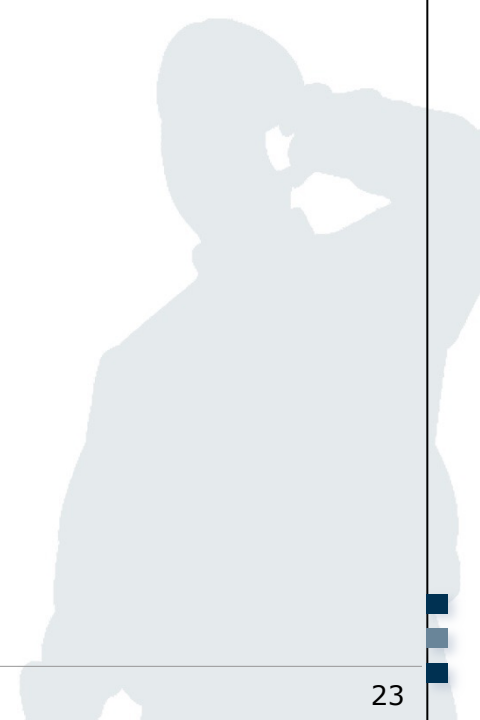
■ Software as a Service

- The cloud provides software functionality as a service which can be accessed through Application Programming Interfaces (APIs) via the Internet
- The InstaMatch® provider can run its application via the Web and allow users to use it without any prior downloads or installations

Exercise 2b: Solution (Background)

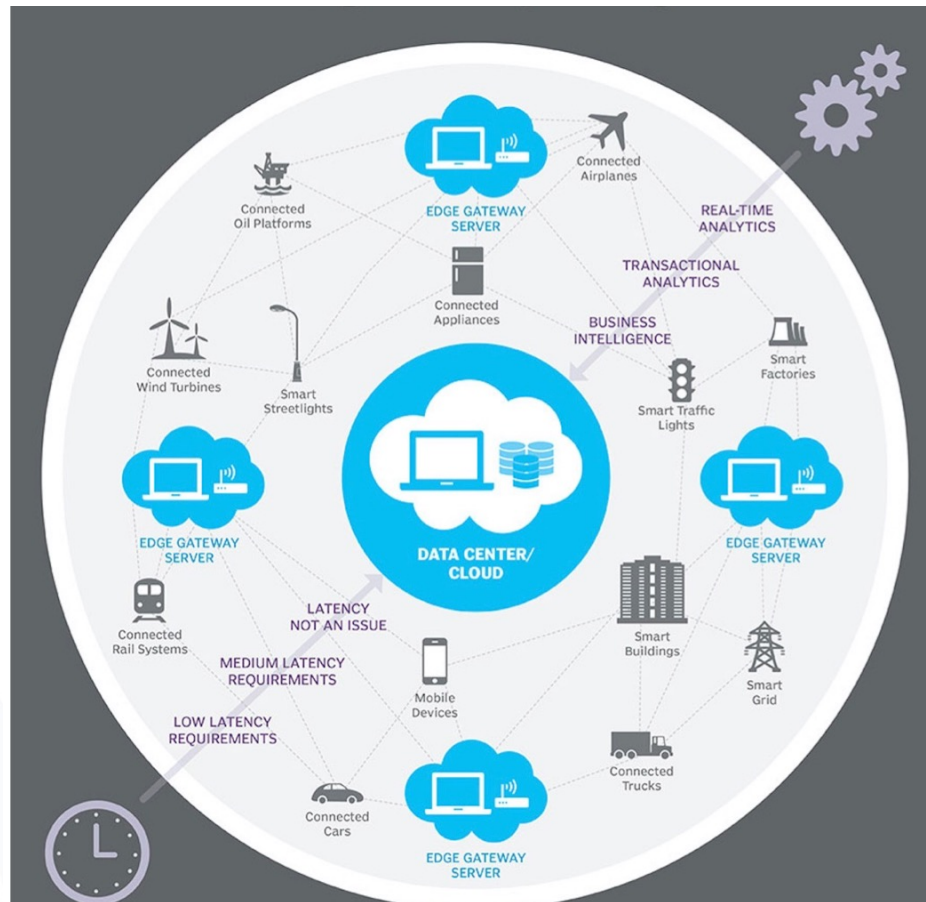
Features	IaaS	PaaS	SaaS
What you get	You get the infrastructure & pay accordingly. Freedom to use or install any OS, software or composition	Here you get what you demand. Software, hardware, OS, web environment. You get the platform to use & pay accordingly	Here you don't have to worry about anything. A pre-installed, pre-configured package as per your requirement is given and you only need to pay accordingly.
Importance	The basic layer of Computing	Top of IaaS	It is like a Complete package of services
Technical Difficulties	Technical knowledge required	You get the Basic setup but still the knowledge of subject is required.	No need to worry about technicalities. The SaaS provider company handles everything.
Deals with	Virtual Machines, Storage (Hard Disks), Servers, Network, Load Balancers etc	Runtimes (like java runtimes), Databases (like mySql, Oracle), Web Servers (tomcat etc)	Applications like email (Gmail, Yahoo mail etc), Social Networking sites (Facebook etc)
Popularity Graph	Popular among highly skilled developers, researchers who require custom configuration as per their requirement or field of research.	Most popular among developers as they can focus on the development of their apps or scripts. They don't have to worry about traffic load or server management etc.	Most popular among normal consumers or companies which rely on softwares such as email, file sharing, social networking as they don't have to worry about the technicalities.

- c) Briefly explain the concept of Edge Computing Architecture and why it is gaining importance.



Edge Computing Architecture

Pushing "intelligence" to the edge of the network



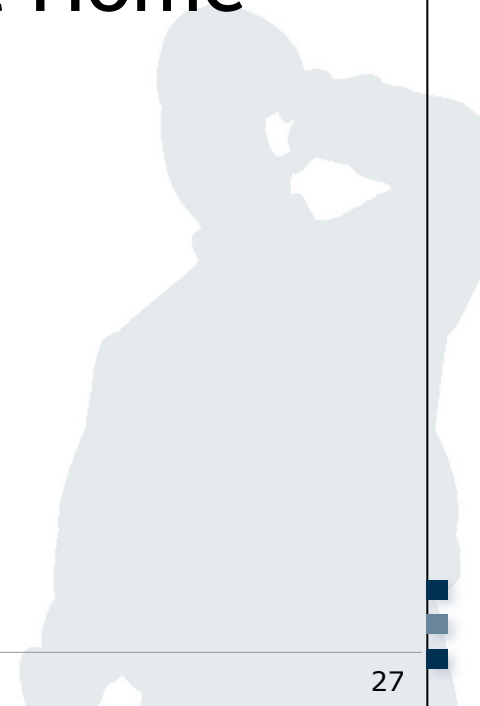


Edge Computing Architecture

Pushing "intelligence" to the edge of the network

- Why edge computing?
 - Proliferation of IoT devices producing data to be processed
 - Limitations due to centralized nature of cloud architectures
 - Clouds' quality of service impacted by distance to data center
 - Steady decline in the cost of processing power & appearance of intelligent endpoint devices that sense and can make inferences
- What is edge computing?
 - Distributed approach to computing at/near network-endpoints
 - Heterogeneous nomenclature [edge (2004-), fog (2012-) and mist (2015-) computing] due to multiple interests and approaches
 - None of them synonymous with cloud computing

d) Imagine you own a smart speaker, smart vacuum cleaner and smart light bulbs. Discuss the pros and cons of Edge Computing in the context of Smart Home Devices.



d) Edge computing in Smart Homes

Computing happens local, within the devices or smart hub

Pros:

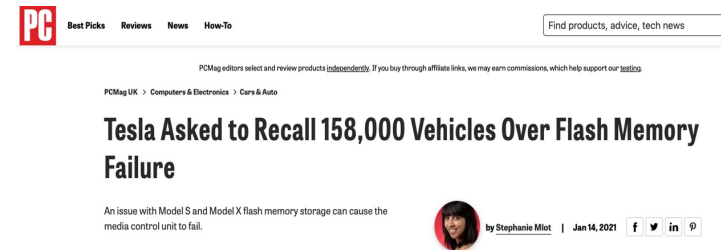
- Increased user control
- Reduced latency (processing time + actions)
- Reduced bandwidth
- Increased privacy as data is processed within the home network?

Cons:

- High number of cheap, unsecure devices, leading to privacy and security threats.
- Limited computing resources could lead to failure

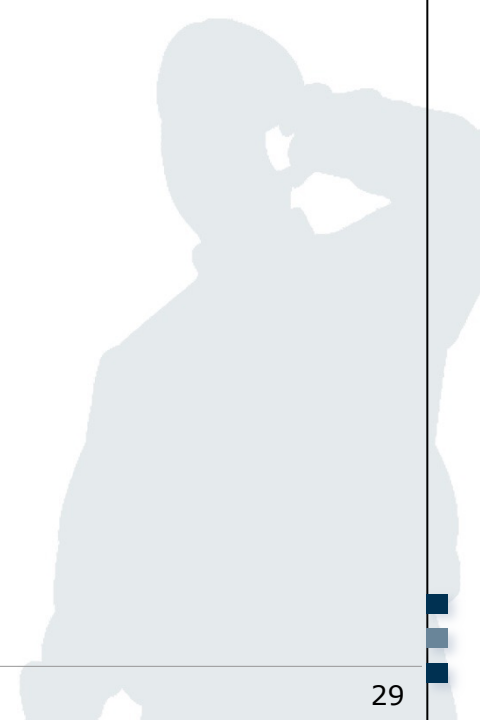


Kindel Media via pexels.com

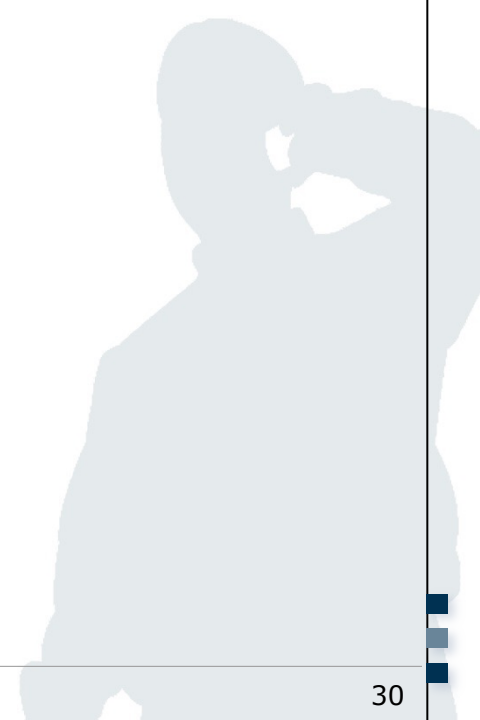


Stephanie Mlot, 2021. <https://uk.pcmag.com/cars-auto/130984/tesla-asked-to-recall-158000-vehicles-over-flash-memory-failure>

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a) What is a SIM and why is it needed?

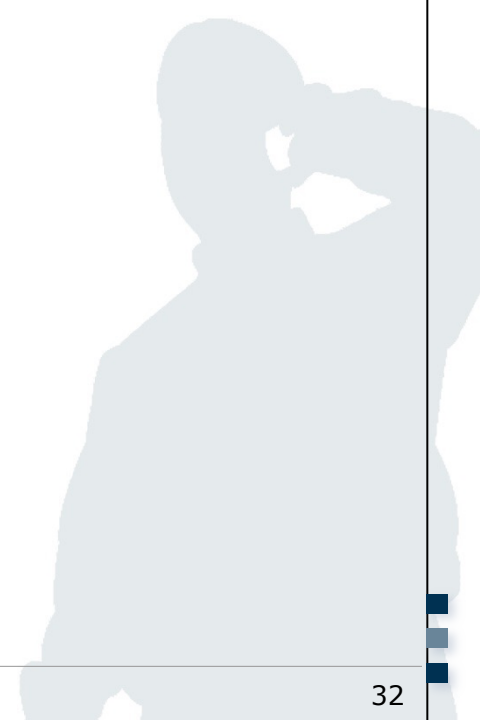


The Subscriber Identity Module (SIM)

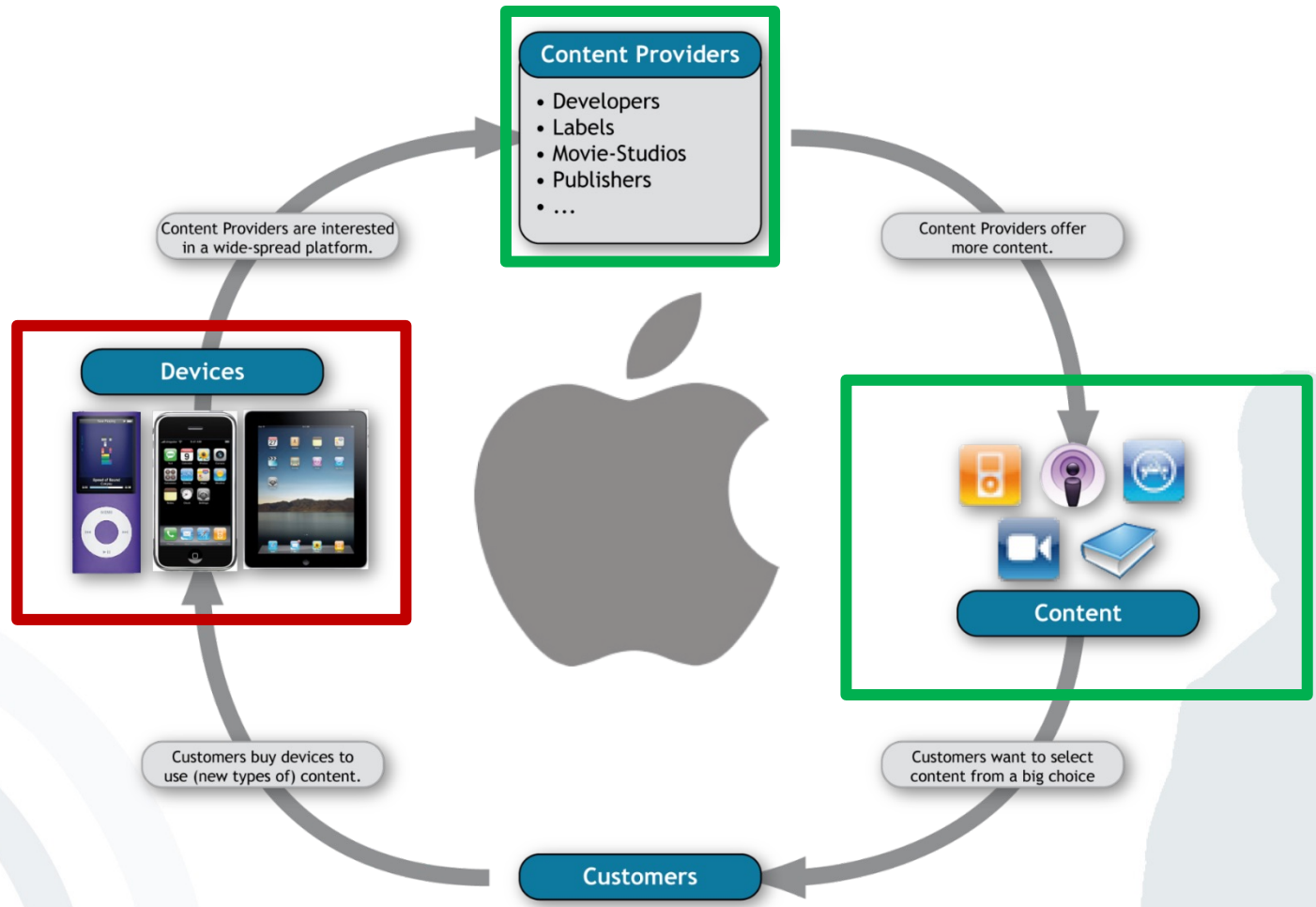
- In GSM since 1991, and used in all further mobile networks
- **Represents contract between subscriber & network operator**
- Authorises a “phone” to use the network by linking it to a **subscription**
- By 2017 around **5.0 billion** mobile broadband subscribers (forecast to grow to **5.9 billion** by 2025) with **\$1.5 billion** mobile operator revenue [GSM12018]
- More countries with SIM infrastructure (ca. 239, 2016-Q3) than McDonalds (118, 2016-Q3) and UN-members (193, 2016-Q3) [GSM2016, Wiki2016, UN2016]
- More and more called “Subscriber **Identification Module**” to reflect progress in the general field of **Identity Management**



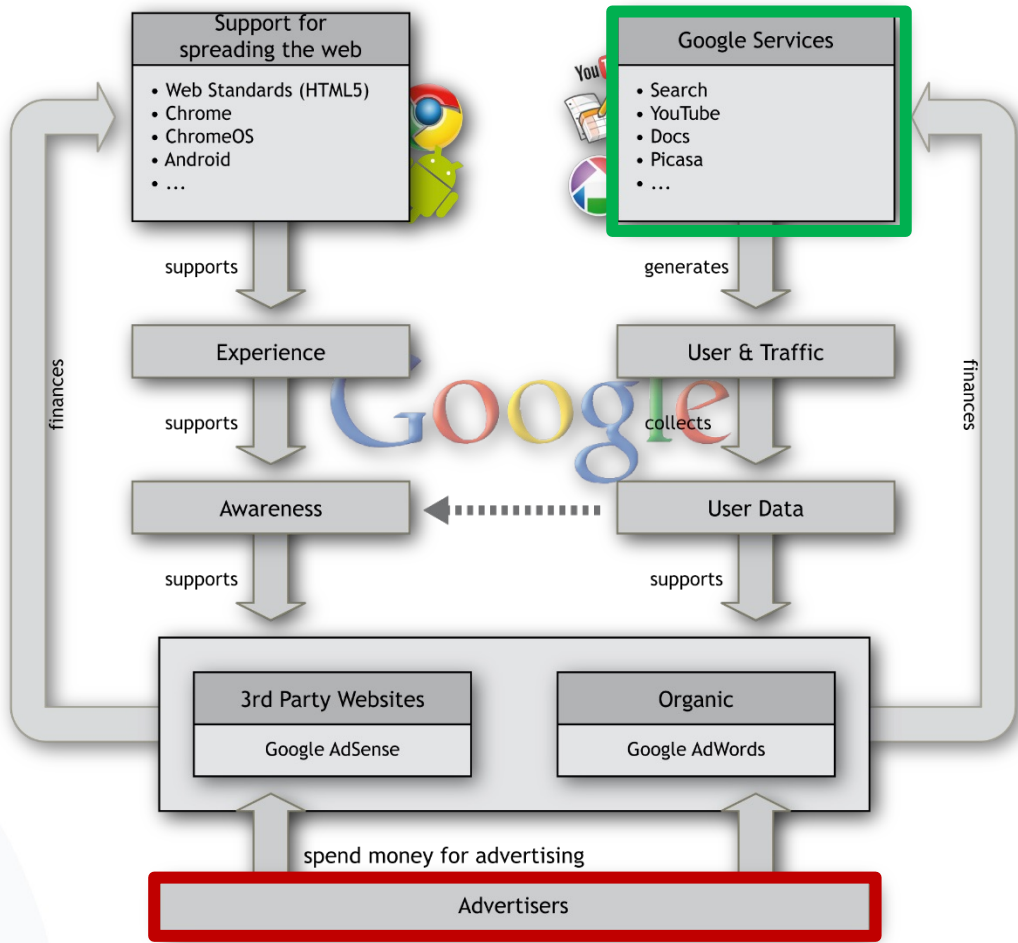
b) What is the difference in Google's and Apple's business model?



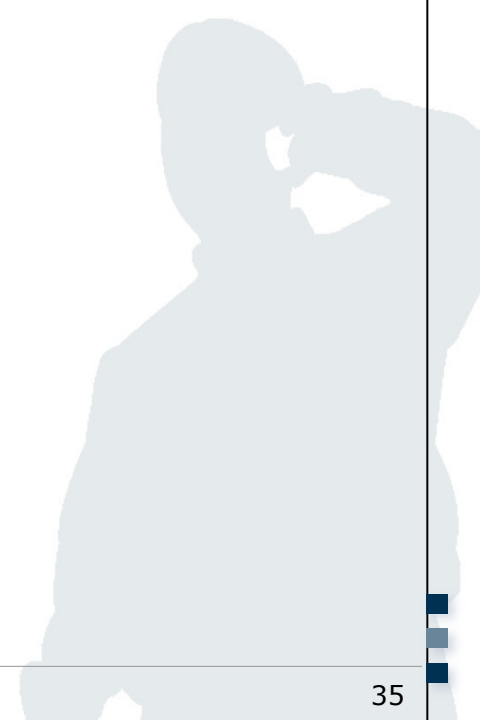
Exercise 3b: Solution



Exercise 3b: Solution

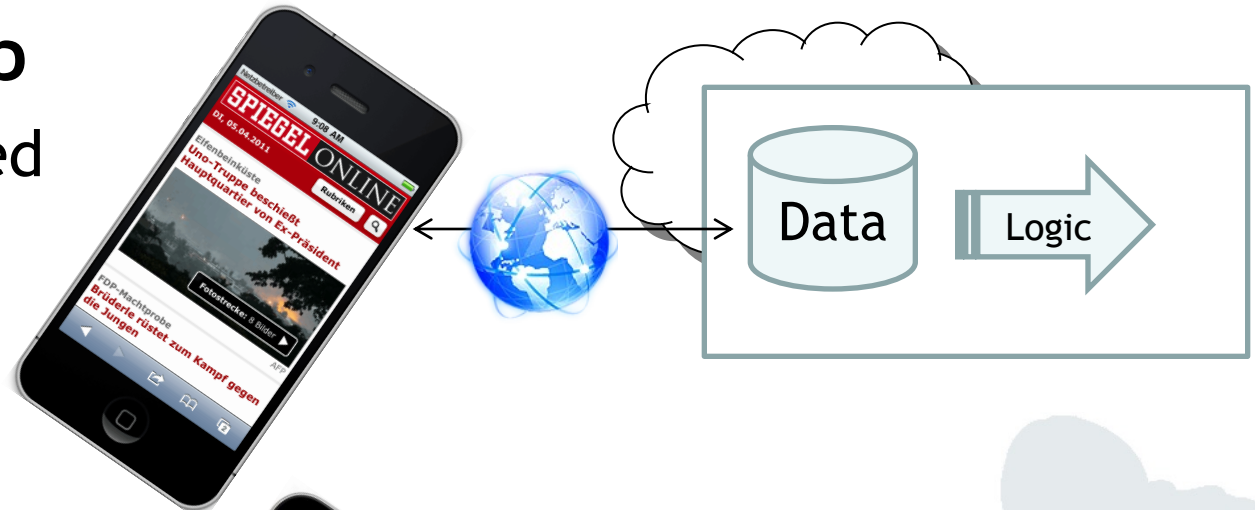


- c) What types of apps do there exist and what is the difference between them? Which type is best suited for the InstaMatch® service and why?



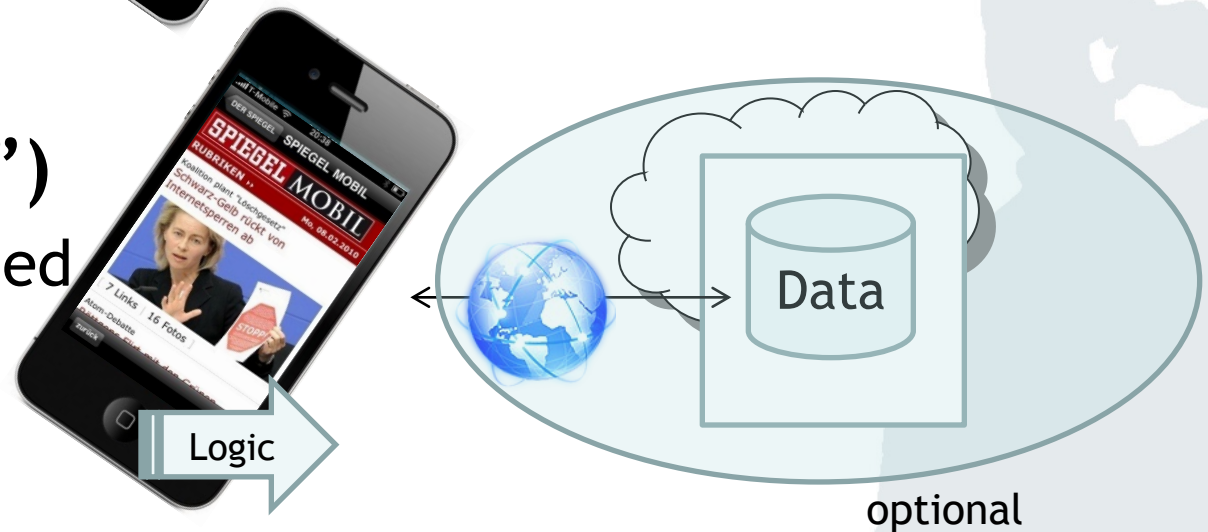
Mobile web app

- App not installed on the device



Mobile app ("native App")

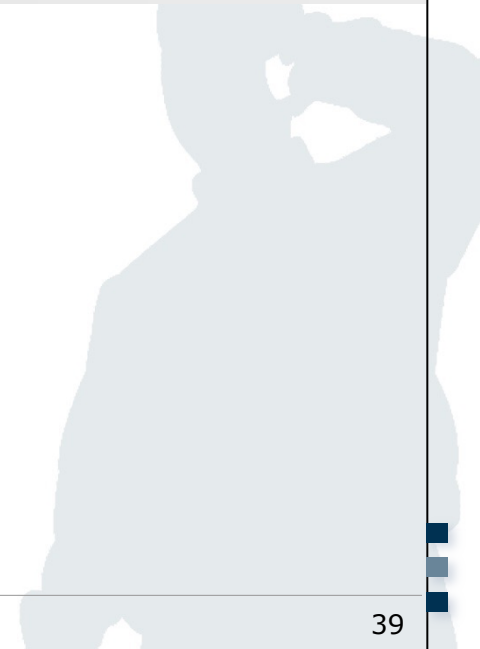
- App is downloaded and installed



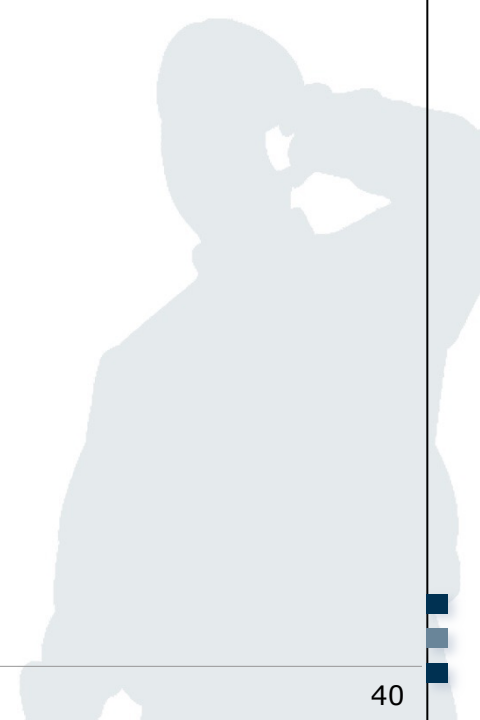
Mobile app (“native App”)	Mobile web app
Supports offline use	Needs constant internet connectivity (network coverage)
Can be found easily in app store(s)	Distribution via URL, e.g. QR-codes
Business model: Sold in app store(s)	Difficult to implement payment and authentication system
Can make use of all OS and device functions	Cannot access OS core functions (e.g. 3D graphic processing or access to locally protected storage)
Needs to be platform-specific (native code)	Using web browser of the device, hence manufacturer-independent multi-platform support possible; also porting to other devices/platforms is less expensive
Based on Objective-C, C#.Net, Java	Based on HTML5, CSS, Javascript
Updates/versioning through app stores	Easy updates as they are done on the server, not on every client device

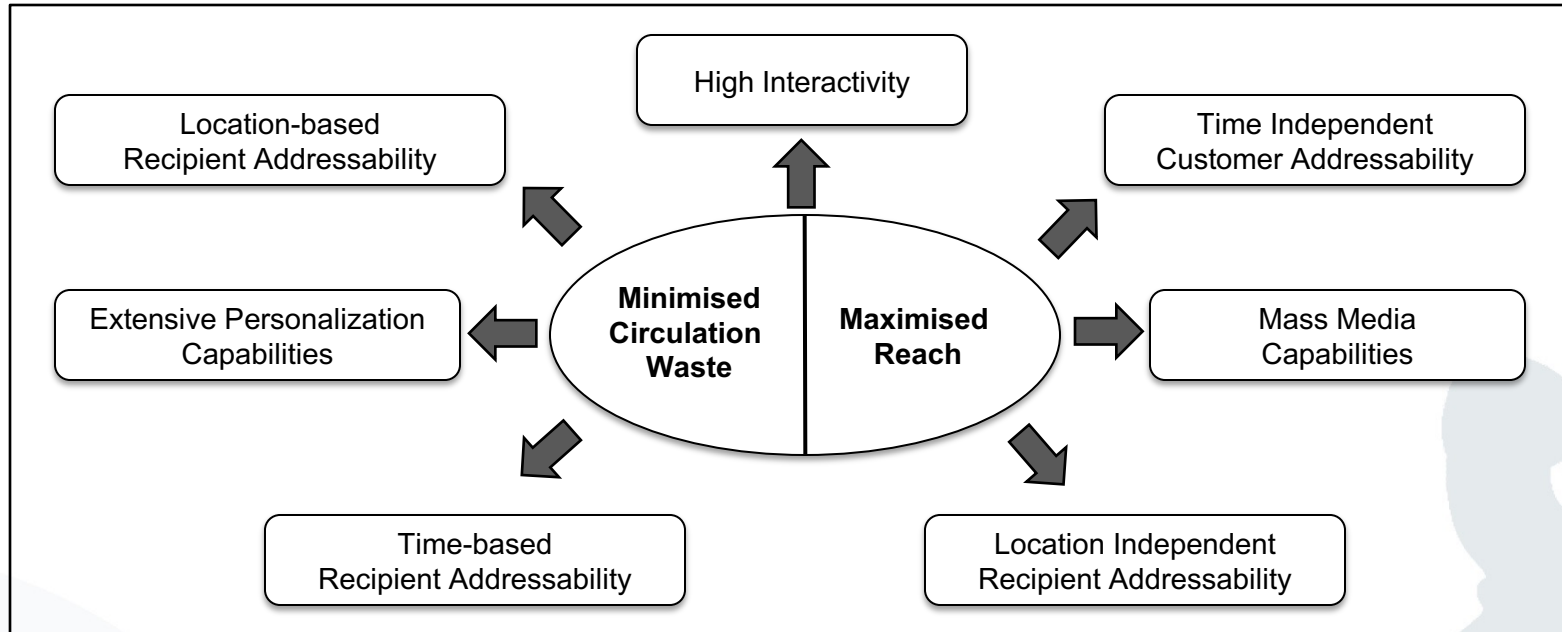
Because of its convenience for users and mobile specific features (e.g. access to location, but also handling of payments) a native mobile app is most suitable for InstaMatch®.

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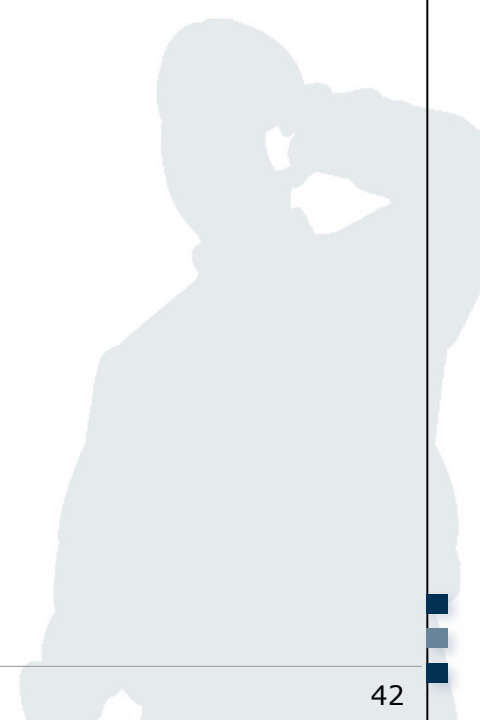
a) Name three particularities of mobile devices that make them attractive for Marketers.

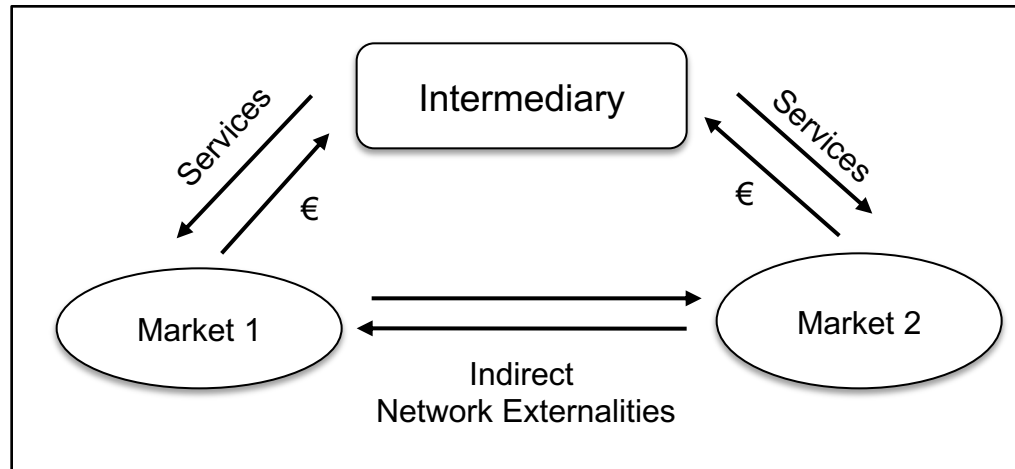




Theoretical Potential of Mobile Marketing

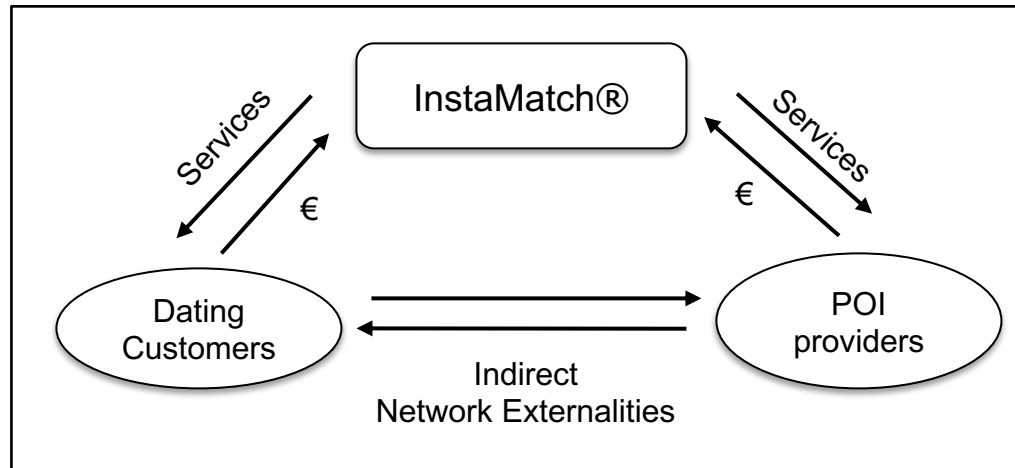
- b) Explain how a two-sided market works.
Is InstaMatch® using this kind of business model? Please reason why or why not.





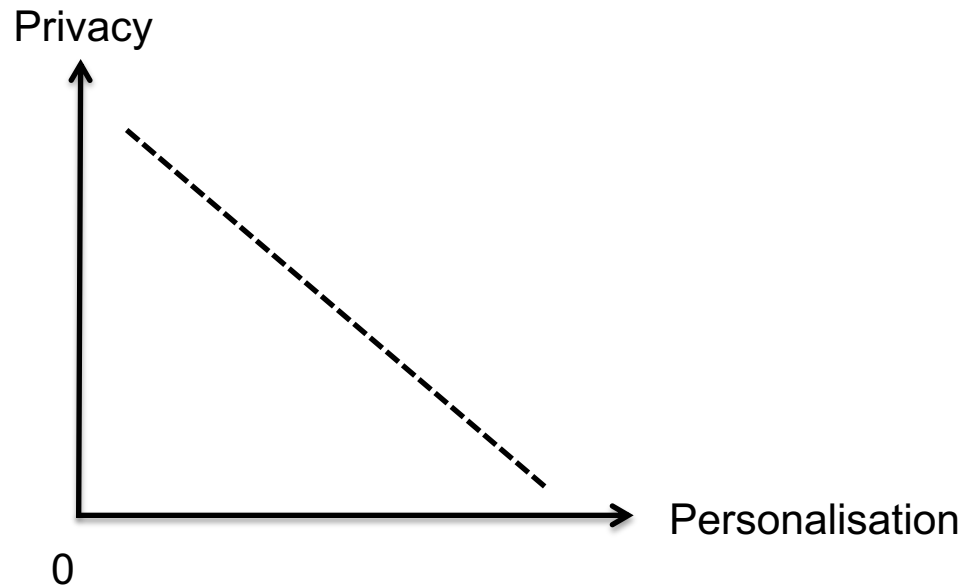
- Benefits
 - Indirect network externalities
- Weaknesses
 - Critical mass of users required

InstaMatch®



- c) Discuss the area of conflict between the benefit of the InstaMatch® service collecting context information about users and the demand of users to maintain their privacy.

- Trade-Off between Service Personalisation and User Privacy



- User should be in control of his data: Identity Management.

Components of the Course

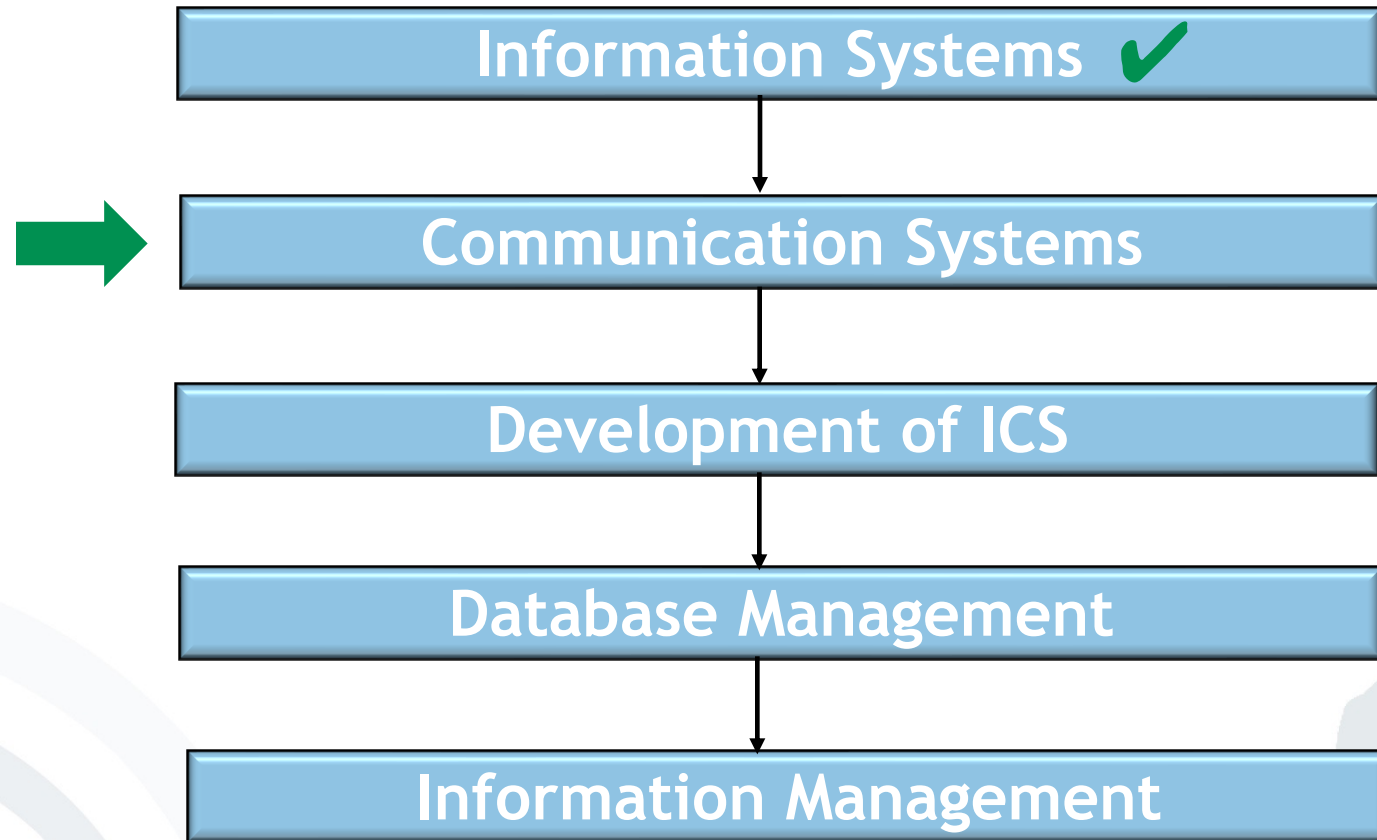
Information Systems

Purpose of and Research on Information Systems ✓

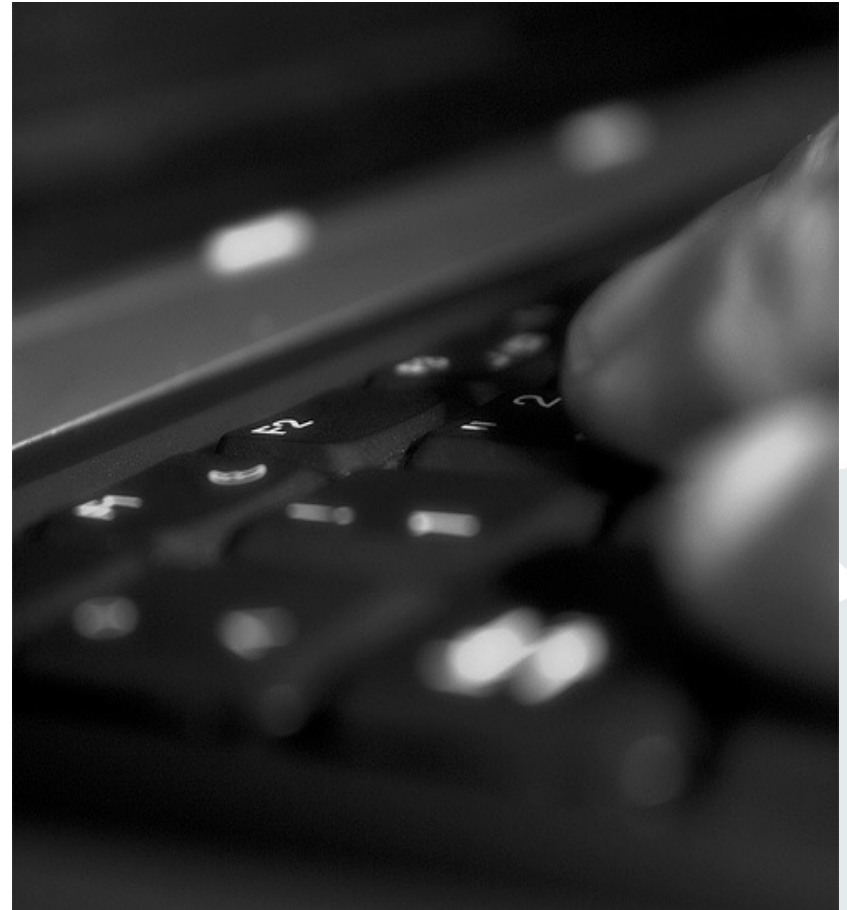
Enterprise Modelling ✓

Architectures of Information Systems ✓

Mobile Information Systems ✓



Thank you!



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