Industry 4.0 / IoT Seminar
April 13, 2021

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Agenda:

- 9:00-9:15: Prof. Pekka Toivanen (DigiCenterNS DIH, UEF): Opening of Seminar & Overview of Cloud/Edge/Mist/Fog Computing and AI-Based IoT.
- 9:15-9:40: Mikko Kontio (Secora Systems Oy): Lessons Learned from IoT Projects.
- 9:40-10:05: Retu Ylinen (City of Kuopio) & Martti Vanala (City of Kuopio): Data Refinery: New Smart City Platform in Kuopio.
- 10:05-10:10: Seminar Break.
- 10:10-10:35: Aki Happonen (Savonia): DigiCenterNS DIH IoT and 5G.
- 10:35-11:00: Mikael Korkman (Fomatec Oy) & Markus Aho (Funlus Oy): Towards Ecological and Digital Order-Chain.
- 11:00-11:05: Seminar Break.
- 11:05-11:30: Marko Jäntti (CEMIS): CEMIS Industry 4.0.
- 11:30-11:55: Juri Sipilä (Convergens Oy): Rapid IoT Product Development.
- 11:55-12:00: Closing of Seminar: Keijo Haataja, DigiCenterNS DIH, UEF (University of Eastern Finland).

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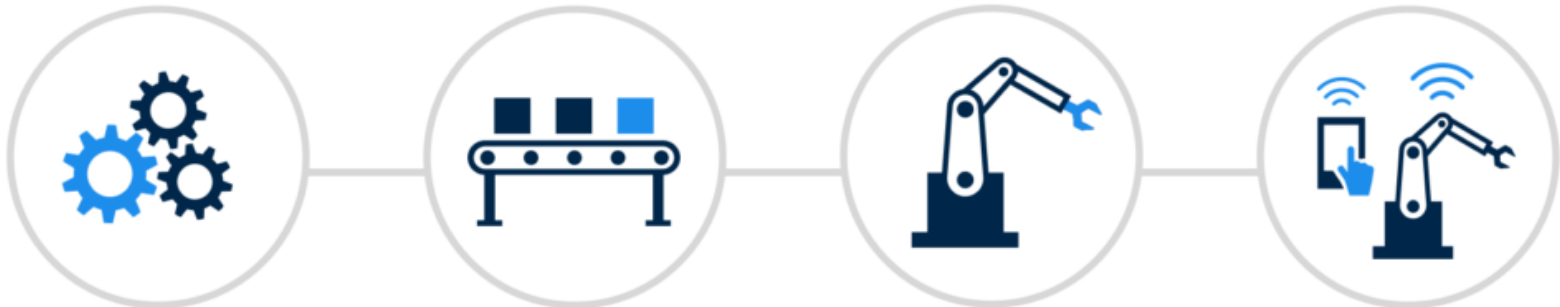
The Four Industrial Revolutions



Industry 1.0

Mechanization and the introduction of steam and water power

Industry 2.0

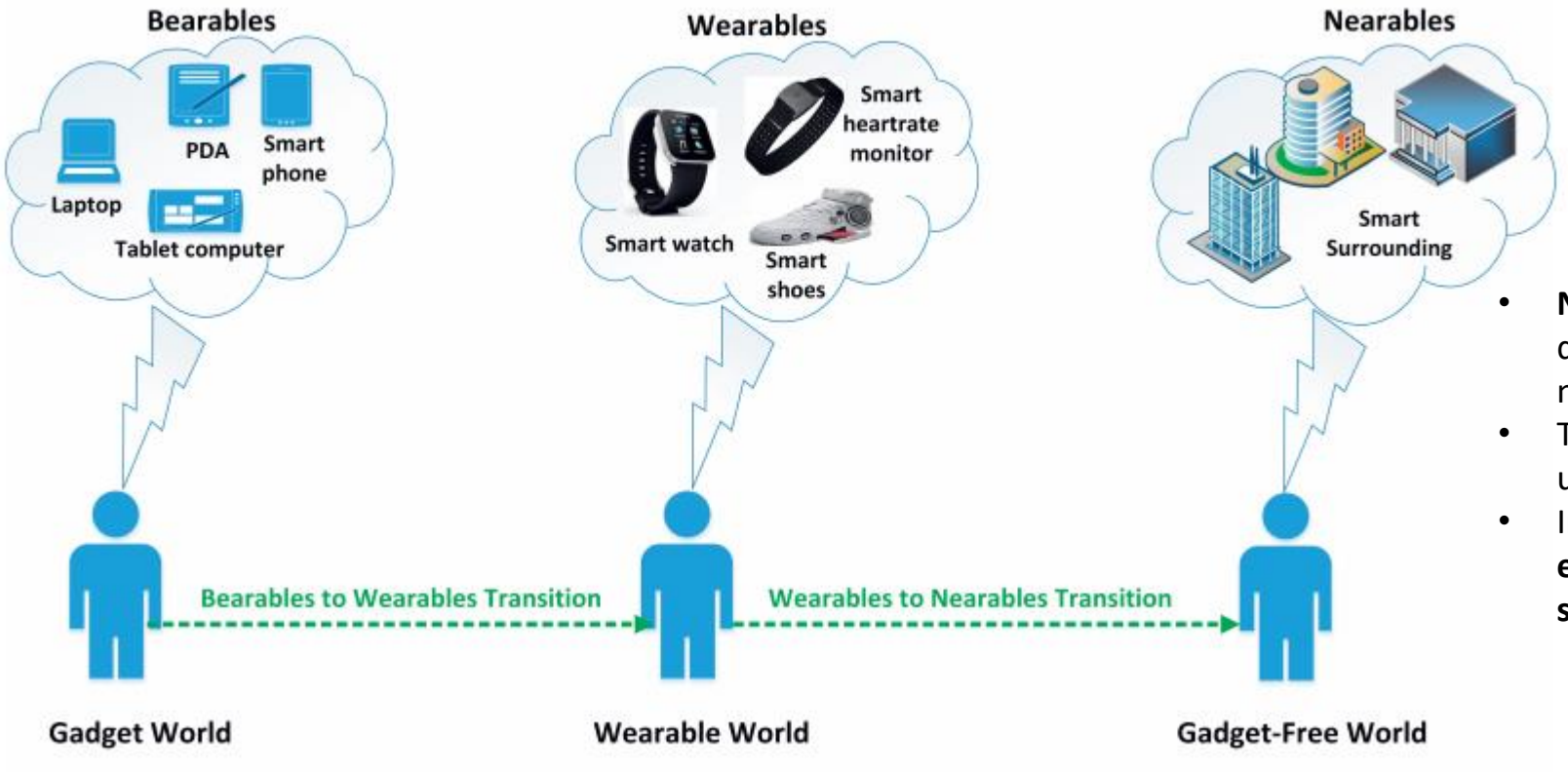
Mass production assembly lines using electrical power

Industry 3.0

Automated production, computers, IT-systems and robotics

Industry 4.0

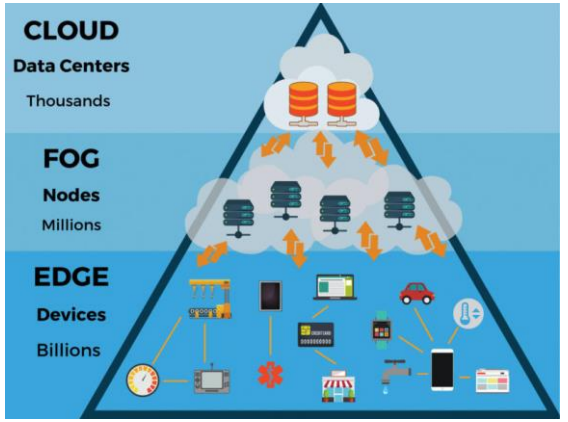
The Smart Factory. Autonomous systems, IoT, machine learning



- **Nearables** ensure the availability and delivery of digital services through the nearby smart surrounding.
- They provide the required services to the users without using gadgets or wearables.
- Instead, the **intelligent and ambient environment offers the necessary/desired services to the users.**

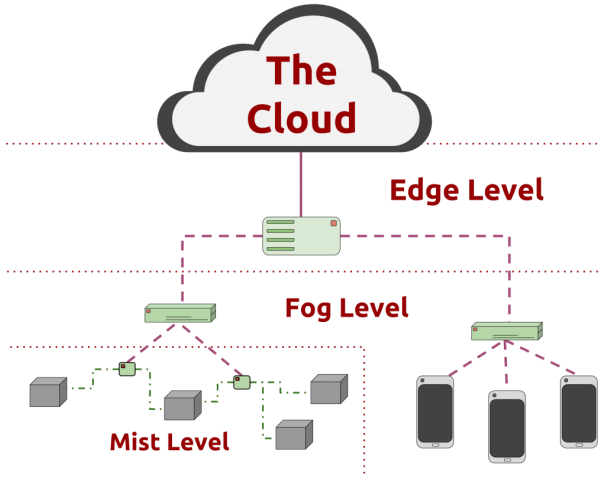
Cloud computing

- **Data centers and servers are usually centrally-deployed.**
- They provide a platform for global accessible services .
- Cloud computing is able to provide huge data processing and storage capabilities.
- **Suitable for the applications with delay-tolerant requirements.**
- Various critical applications such as healthcare, smart transportation, and Industrial IoT require real-time data processing, decision making with rapid responses in terms of needed services/resources.
- For example, when a healthcare IoT application is monitoring various health related parameters of a patient in critical condition, longer delays can occur due to the gathering of healthcare data from various sensors/devices/machines and sent to the cloud every time for the processing.
- ➔ **Therefore, along with the cloud capabilities, solutions which may provide faster responses in the crucial processes/applications are needed.**



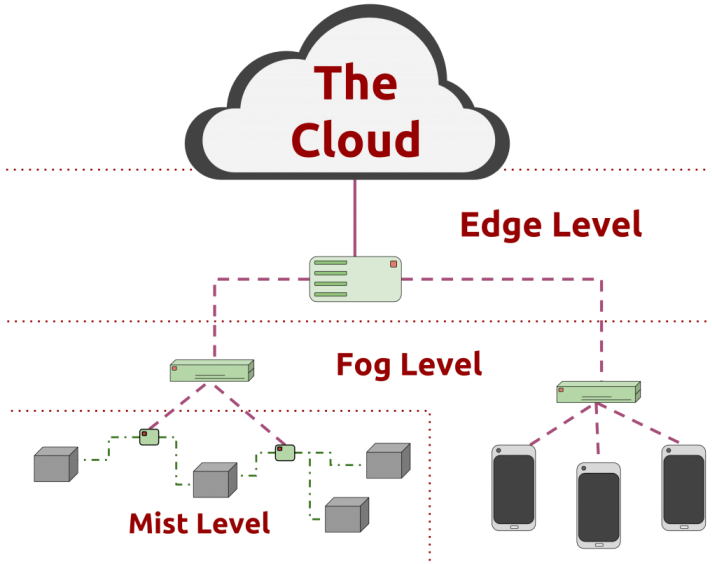
Edge computing

- Multi-access edge computing (MEC) or edge computing brings some of the **computational resources from a centralized cloud near to the edge of the network.**
- An edge can consist of dedicated routers, base stations, switches or servers placed near to the end IoT sensors/devices and can also act as gateway to fog or cloud networks.
- MEC was introduced by European Telecommunications Standards Institute (ETSI) to ensure the availability of services/resources to the nearest/assigned base stations at Radio Access Network (RAN).
- Edge computing provides some highly important features in the IoT-based smart environment, e.g. low-latency services, scalability, and improved privacy, among others.
- **Edge networks are considered as the key technology enabler for massive-scale in industrial applications.**



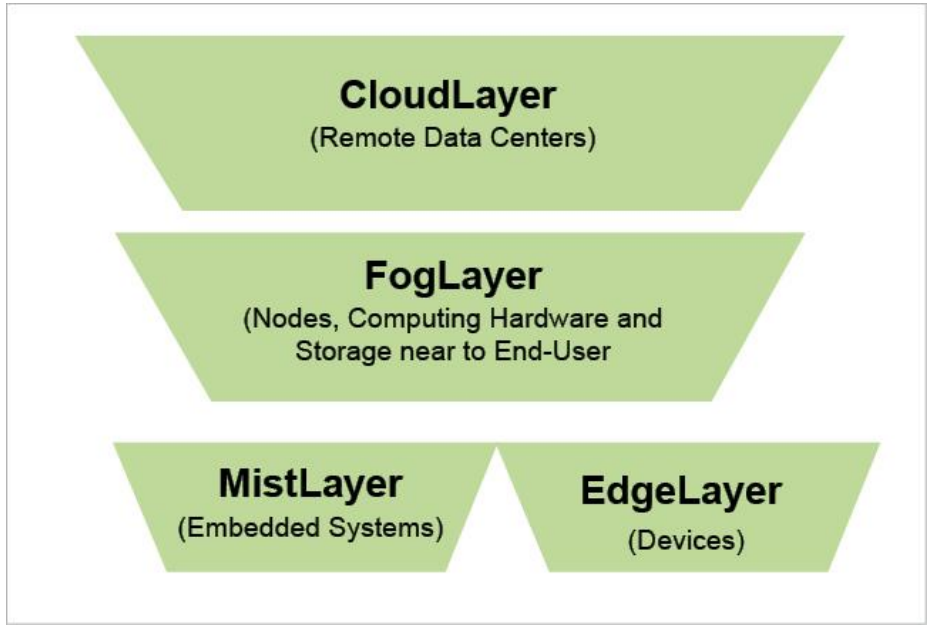
Fog computing

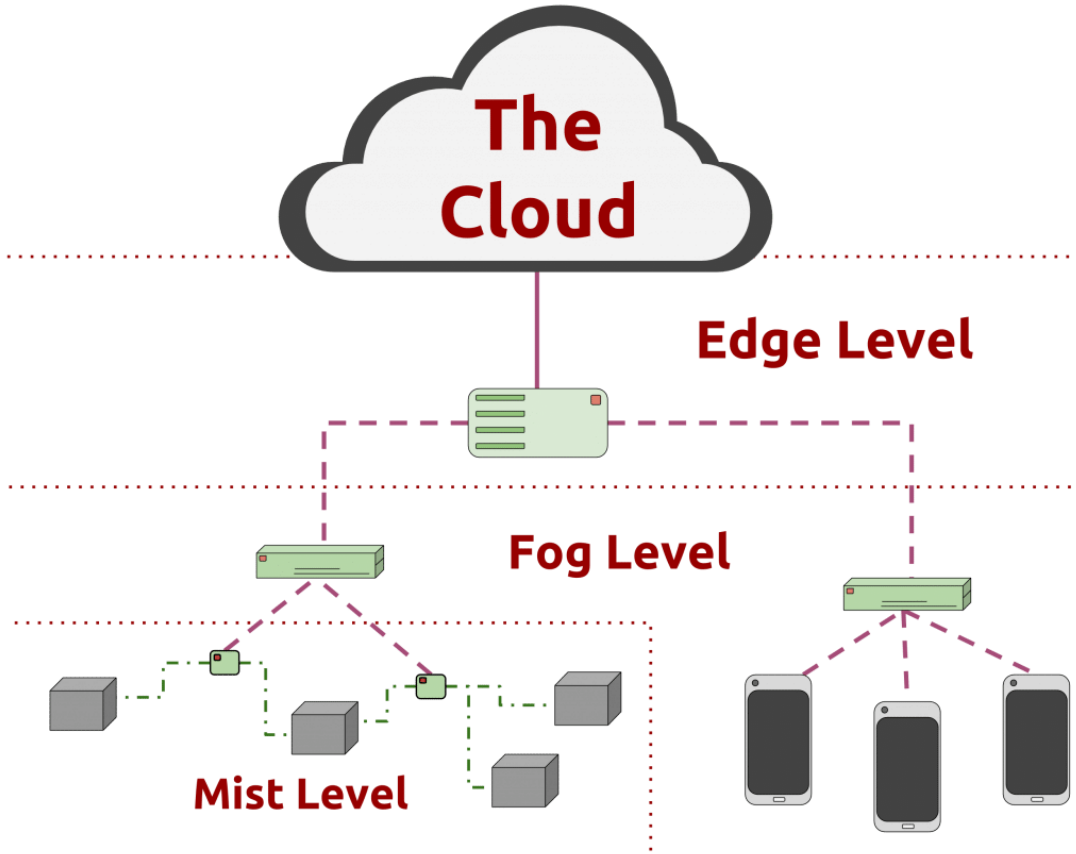
- Fog computing is considered as a similar concept as the edge computing that **pushes the computation and resources closer to the end devices/users.**
- Fog computing can also be considered as a bigger and richer umbrella of resources/services and an edge can be smaller subset/unit of the fog with limited resources.
- Fog computing have become vital in a number of smart environment based applications and **presents various key features, such as low-latency, orchestration functionalities, faster data processing, and decision making.**

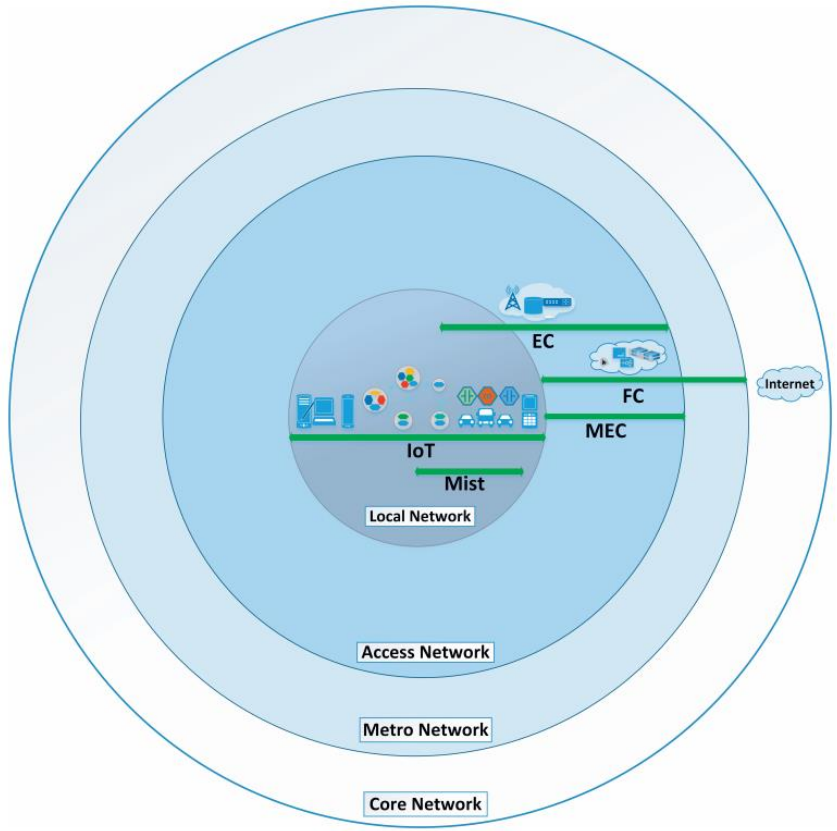


Mist computing

- **Mist computing refers to the data processing/computations at the extreme edge of the network**, i.e. the sensor, actuators and devices, which are able to do the required limited data pre-processing.
- **Mist computing can reduce the network load of access network (i.e. edge/fog) by doing data processing locally,** and improves the fault tolerance in the systems.
- Future smart environment will require interrupted delivery of the services with rapid data analytics and decision making.







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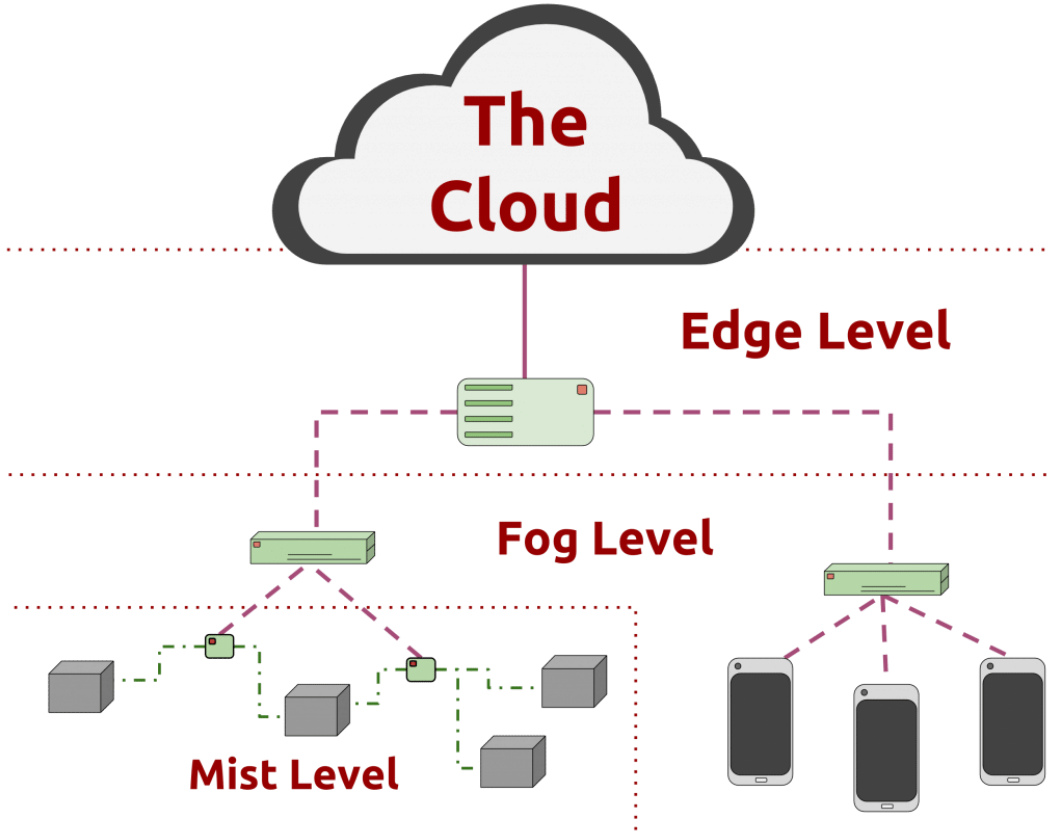
Thank You!



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