

QUUPPQ

Quuppa - Accurate Indoor Positioning

Radioinsinööriseuran seniorit

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Some history

1996 -> HUT Radio Laboratory: Radio propagation measurements

1997 M.Sc. Thesis: "*Testbed for adaptive array antennas*"

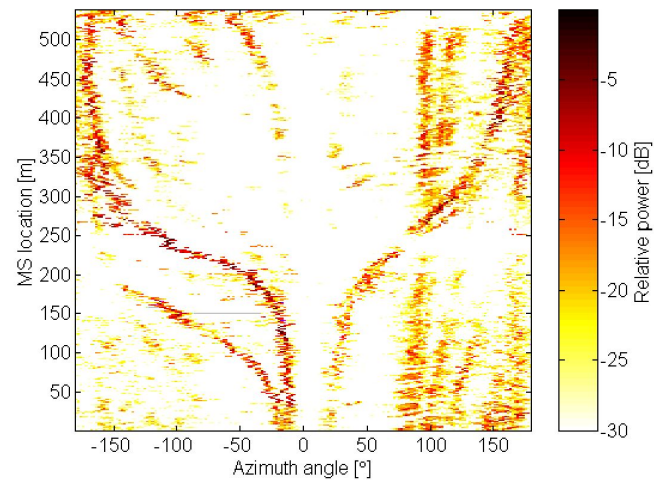
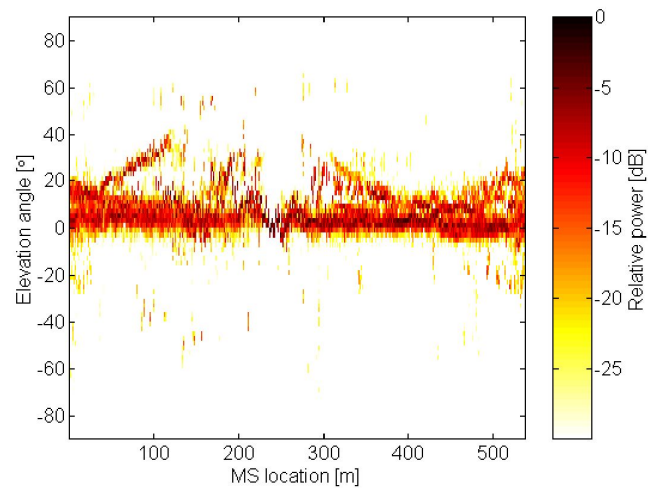
1999 -> Nokia Research Center: Radio channel modeling

2002 D.Sc. Thesis: "*Experimental characterization of multidimensional radio channels*"

2005 -> Nokia Research Center: Indoor positioning, Bluetooth LE prototypes

2012 -> Quuppa is founded

2000



Radio positioning principles

RSS - Received Signal Strength - fingerprinting (WiFi, Bluetooth)

TDOA - Time Difference of Arrival (GPS, UWB)

RTT - Round Trip Time (UWB)

AoA/AoD - Angle of Arrival, Angle of Departure (Quuppa)

Technology comparison

	Quuppa (BLE/AoA)	UWB (RTT)	UWB (TDOA)	WiFi / Active RFID (RSSI)	Beaconing (RSSI)
Developed for positioning	Yes	Yes	Yes	No	Some profiles
Tag power consumption	Very Low	Very High	Low	High	High
Accuracy	0.1 – 1m	0.1 – 1m	0.1 – 1m	5 – 20m	5 – 20m
Real-time	Yes	Yes	Yes	No	No
Smartphone compatible	Yes	No	No	Yes	Yes
IoT Gateway	Yes	No	No	Yes	No
Cost of setup	Medium	Medium	Very High	Medium	Low
Cost of ownership	Low	High	Medium	Medium	Medium

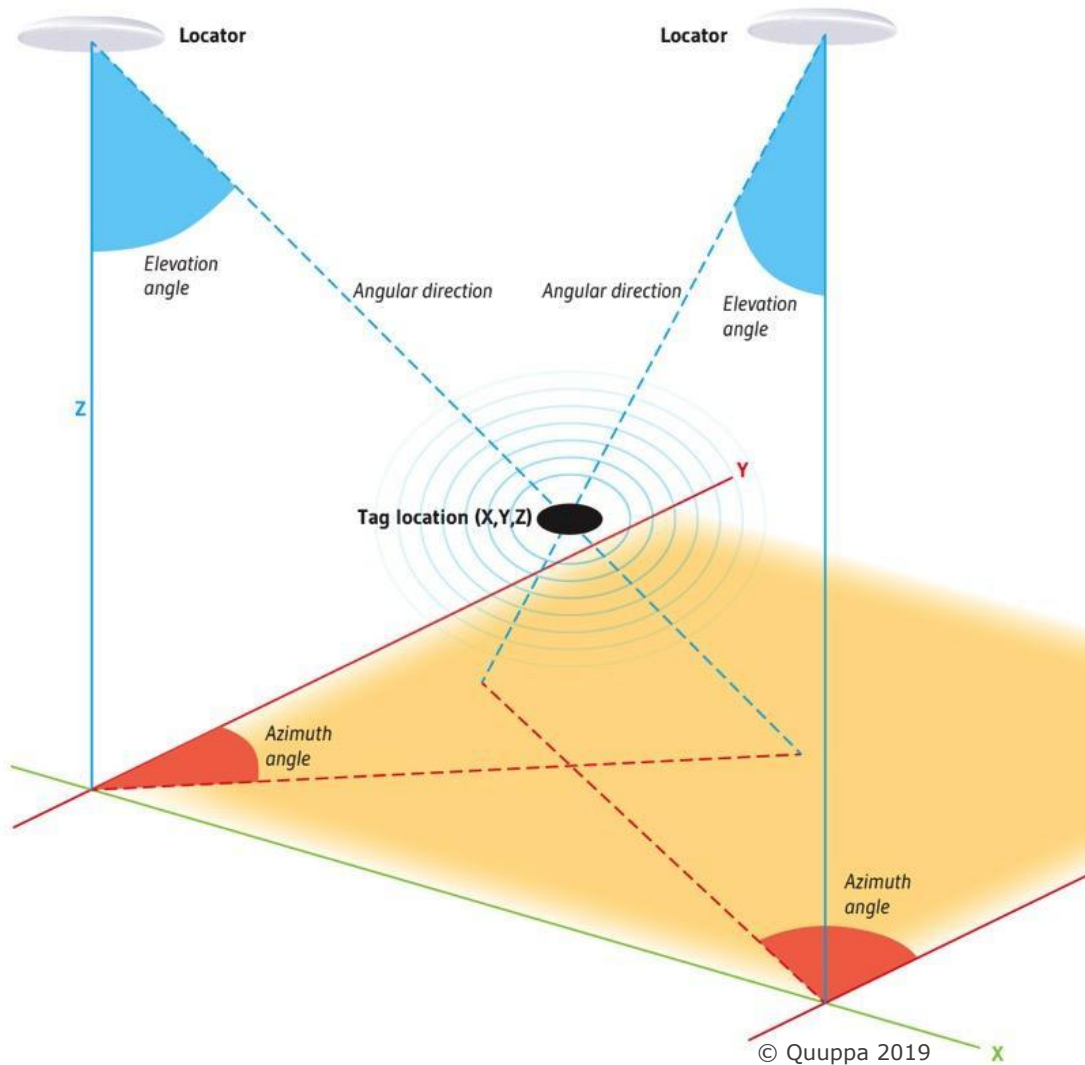
Bluetooth standard for direction finding feature



Enhancing Bluetooth Location Services with Direction Finding

KIRKLAND, Wash. – January 28, 2019 – The Bluetooth Special Interest Group (SIG) today announced a new direction finding feature that holds the potential to significantly enhance the performance of Bluetooth location services solutions. The new feature allows devices to determine the direction of a Bluetooth signal, thereby enabling the development of Bluetooth proximity solutions that can understand device direction as well as Bluetooth positioning systems that can achieve down to centimeter-level location accuracy.





Quuppa Intelligent Locating System™

Standard Bluetooth Low Energy (BLE) technology

Angle of Arrival (AoA) methodology

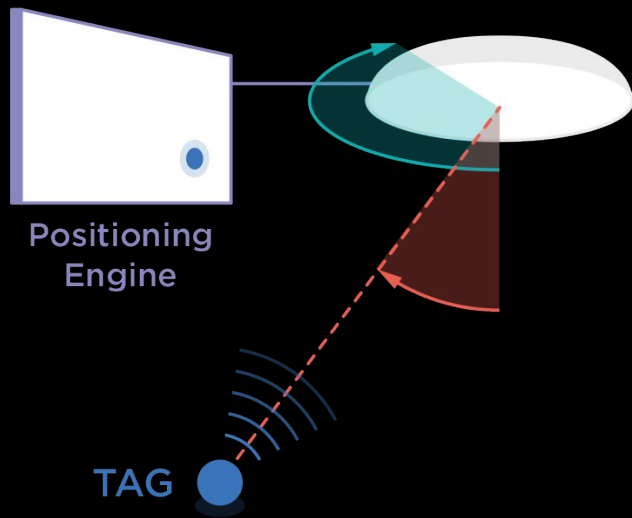
Advanced algorithms

Quuppa company overview

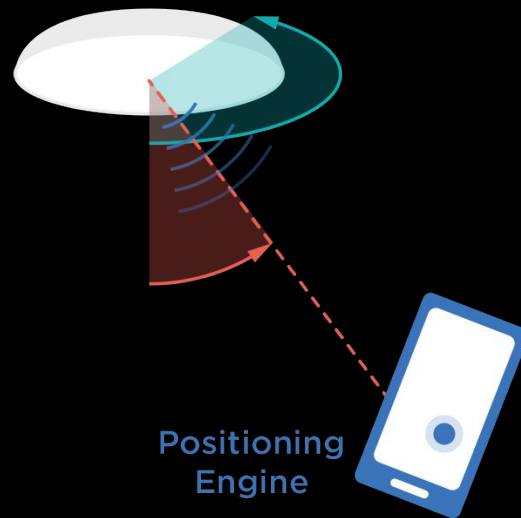
- Founded in 2012, spin-off from Nokia Research Center
- Technology has been developed by the founding team since 2005
- HQ in Finland; offices in Washington, Shanghai, Shenzhen, Abu Dhabi, Mumbai, Sydney
- More than 130 partners (system integrators, application providers, tag vendors,...)
- 2000 systems delivered to 49 countries



Bluetooth standard for direction finding feature



Angle of Arrival (AoA)

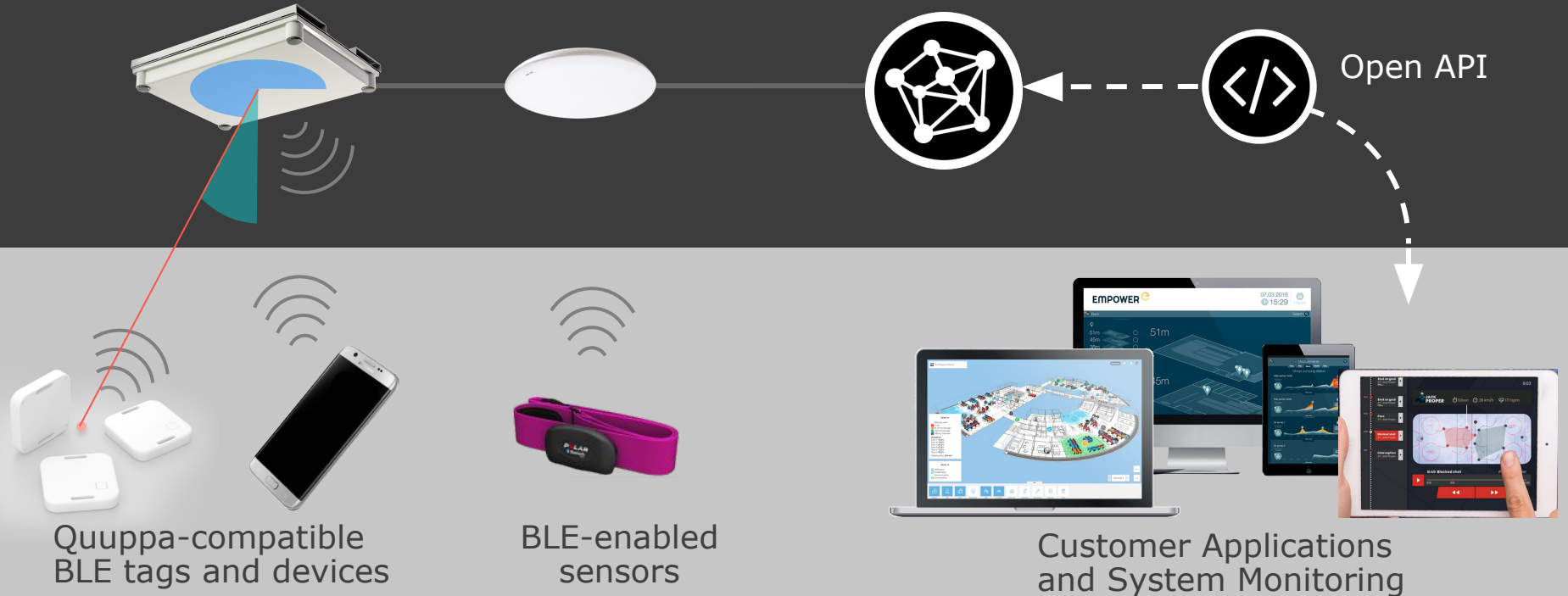


Angle of Departure (AoD)

Quuppa Intelligent Locating System™

Quuppa Locators

Quuppa Positioning Engine



Key Benefits



Real-time **high accuracy positioning** down to 10cm

Competitive TCO - low price tags with long battery-lifetime



Interoperability - tracking of tags and smartphones

Radio interference-free solution

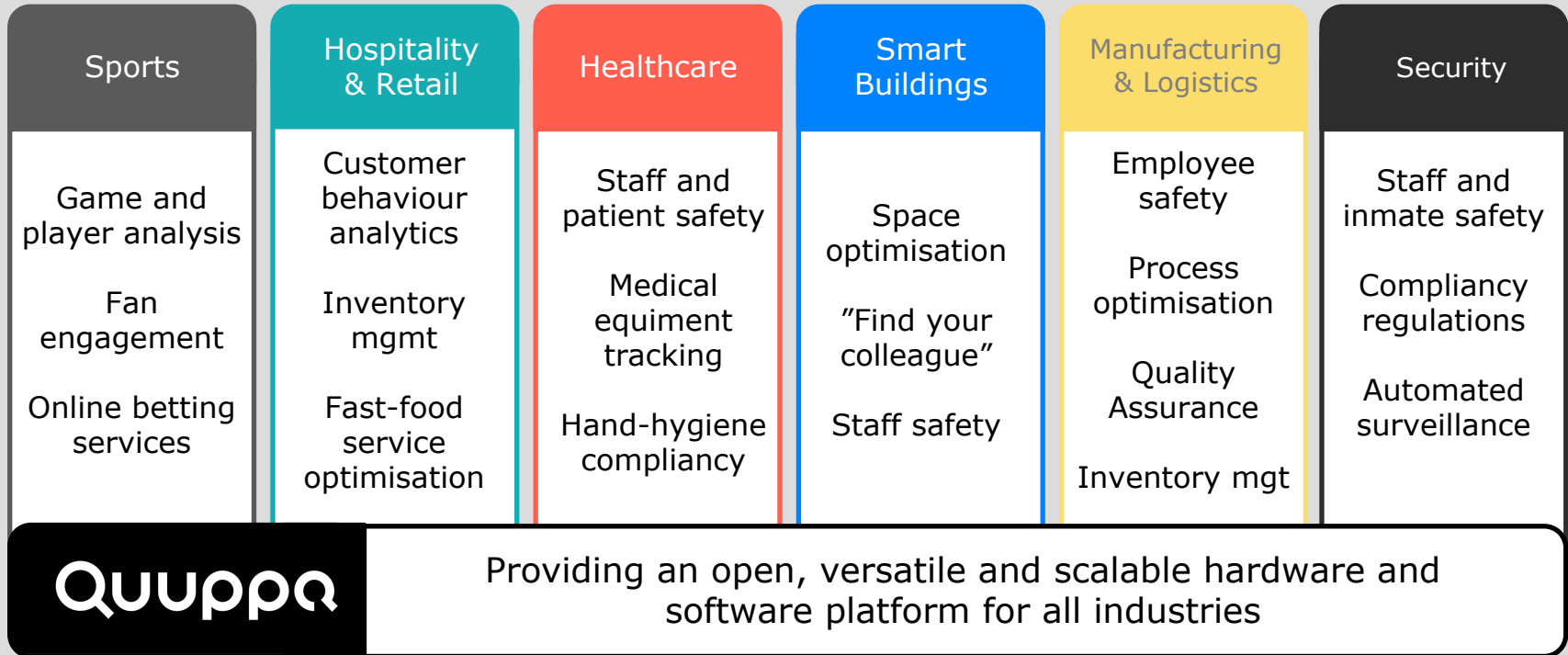


Versatile platform - from presence detection to precise positioning

No vendor lock-in - large tag ecosystem and open APIs



Enabling solutions across a wide range of industries

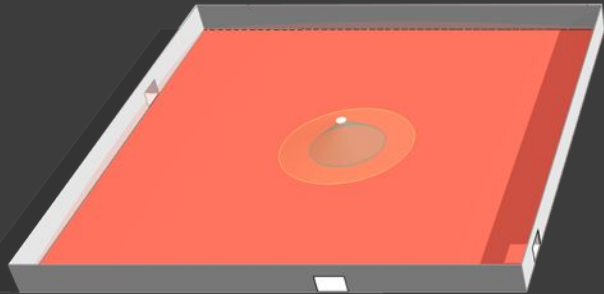


Wide range of Quuppa compatible tags, sensors and devices



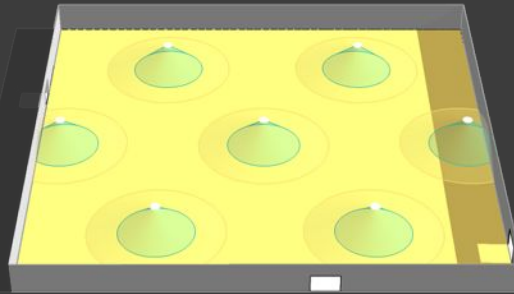
Scalable and versatile solution

PRESENCE
"Building-level"



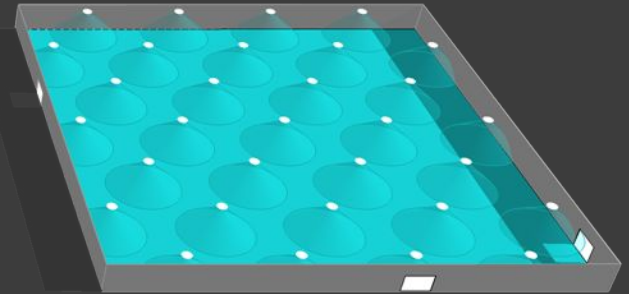
Inventory
management

PROXIMITY
"Zone-level"



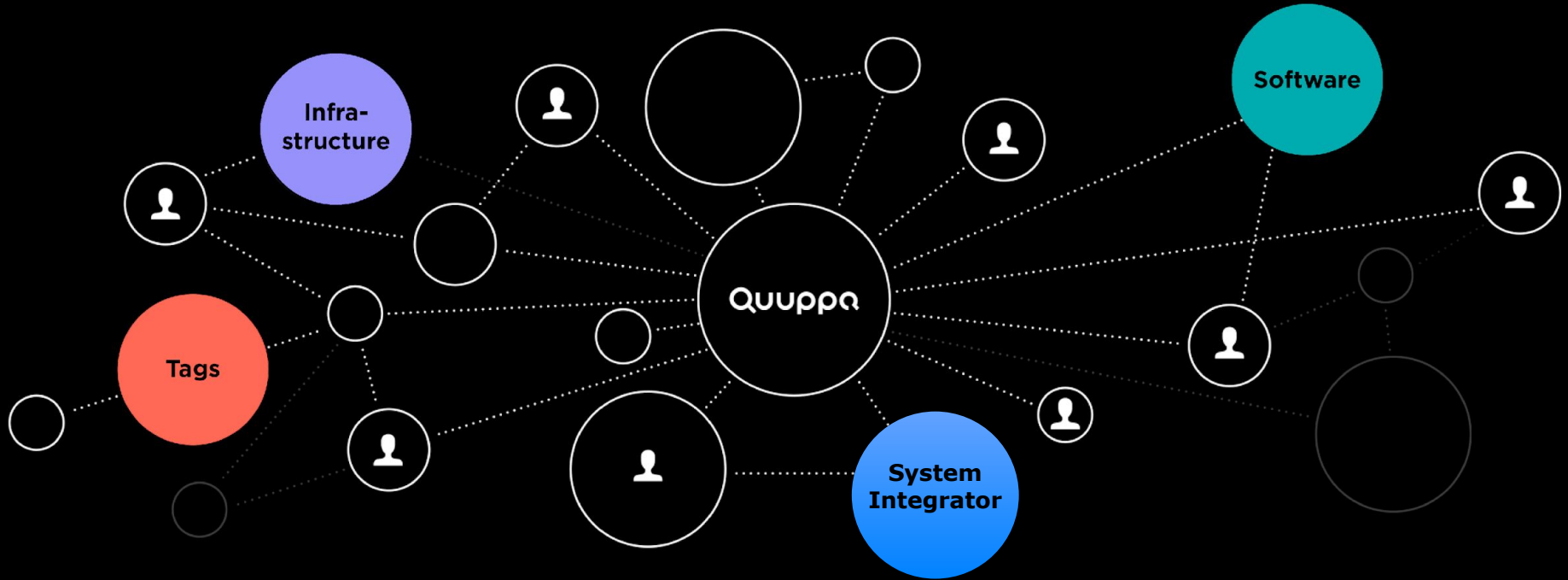
Area/zone-level
services

POSITIONING
High-accuracy



Process optimisation,
worker safety

Quuppa Partner Ecosystem



Use case examples

Industrial use cases

Collision avoidance

Preventing forklifts and other machinery to collide with pedestrians in e.g. warehouses



Intelligent access control

Enabling quality assurance by associating work orders with asset and worker tracking



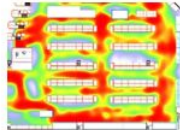
Dangerous area detection

Identify unauthorised entry to dangerous areas e.g. during production



Process optimisation

Optimising production process by locating workers, tools and assets.



Free-route AGVs

Real-time navigation of AGVs and other vehicles in warehouses and logistic centres



Remote sensing

Remote monitoring of worker vital signs or e.g. temperature or humidity of assets



Intelligent asset tracking

"Responding" tag (blinking LED) to quickly identify the wanted asset



Route optimisation

Providing the optimised route based on workflow orders in warehouses, logistic hubs, airline hangars,...



Maintenance of assets and vehicles

Locate assets in need of maintenance (e.g. forklifts). Prevents valuable tools from being "misplaced".



Healthcare use cases

Staff Safety

Anti-assault and assistance needed-button with back-channel acknowledgement



Inventory Management

Crash cart inventory and patient bed check and locationing



Hand-held hygiene compliance

Ensure hand sanitation is done as required



Asset tracking

Locationing of mobile valuable medical equipment for compliance and cost efficiency reasons



Patient safety

Alzheimer and dementia patient tracking with minimum privacy intrusion



Productivity optimisation

Optimise staff productivity based on asset locationing



Visitor guidance

Online navigation in hospitals using smart phone navigation and/or displays



Contractor management

Ensure subcontractors are fulfilling agreed service level agreements



Assistance Needed

Non-intrusive Assistance Needed-button on patient mobile assistance equipment



Retail use cases

Shopper behaviour analytics

Tracking of shopper baskets and trolleys



In-store navigation

Context-aware marketing campaigning to shoppers with smartphone app



Assistance Needed Service

Provide shoppers with a location based service (e.g. find a product)



Self scanner tracking

Locating of consumer self-scanners to provide accurate product placement information



Picker service optimisation

Using back-channel on ESL to guide pickers to the right products



Remote sensing

Remote monitoring of e.g. white goods in a retail store



Anti-theft alert

Prevent theft of valuable products, e.g. With integration to CCTV system



Queue management optimisation

Forecast the queue development based on historical patterns and current locationing data



Customer service monitoring

Monitor staff activity based on time engaged with shopper



Hospitality use cases

Visitor behaviour analytics

Tracking of exhibition visitors, providing heatmaps, journeys, time spent at ...



Visitor navigation

Navigation to the place of interest with smartphone application or e.g. with interactive screens



“Find my child”-service

Tracking of e.g. children in large exhibition venues



Personalised service for VIPs

Personalised treatment to VIPs, based on provided personal profiles on their event tags



Location-aware services

Providing e.g. the exhibitors location-based marketing services to visitor smartphones in the vicinity



Asset tracking

Inventory and maintenance process optimisation by tagging valuable and business critical assets (e.g. tools, forklifts)



Workforce management

Managing the security guards by knowing their location and by sending commands (dynamic tags with e.g. LCD screens)



Evacuation management

Ensure fast evacuation of venue in case of emergency by knowing where people are located.



Contractor management

Ensure subcontractors are fulfilling agreed service level agreements



Thank you!

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