

Physical Mobile Interactions in Mobile Retail Shopping Scenarios

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Marvin Hegen

Chair of Mobile Business & Multilateral Security
Goethe University Frankfurt

www.m-chair.de

1. Mobile Retail Shopping
2. Media Disruptions
3. Physical Mobile Interactions
4. Physical Mobile Interaction Technologies
and Use Cases
5. Conclusion

1. Mobile Retail Shopping



Mobile Retail Shopping Initial Situation

Consumer Market



Increasing
product diversity



Food scandals



Missing
Transparency

Consumer Behaviour



always
on

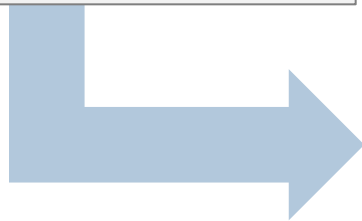


connected



Social
responsible

Increased uncertainty



Increased information need
of consumers

Increased interaction and
communication behaviour



Product Packaging



Customer Service Assistant

Cannot satisfy these new needs



Smartphone as magic bullet?

Mobile Technologies during the Shopping Process



Mobile Shopping

43%

have used their smartphone for shopping purposes while being in a retail store.

73%

prefer using the smartphone instead of asking a customer service assistant.

54%

of mobile shoppers compare prices on their smartphone.

33%

of mobile shoppers search for offers and discounts.

The (typical) Mobile Consumer

Better informed „Informed Consumer“

- By using:
 - Additional product information
 - Price comparison
 - Reviews/Feedback

Better Customer Experience

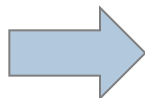
- Quick access to the customer service
- Increased product value (usage instructions, recipes)
- Additional benefits through personalized services

More comfort (through technology)

- **QR-Codes:** Easy access to information, coupons , discounts
- **NFC:** More comfortable Mobile Payment
- **Mobile Wallet:** better organized
- **LBS:** Getting there faster

Typically well integrated in social media

- Always on
- Higher communication and interaction readiness
- 73 % of consumers were influenced by social media when making purchasing decisions



Smart Mobile Shopper as opinion leader

2. Media Disruptions

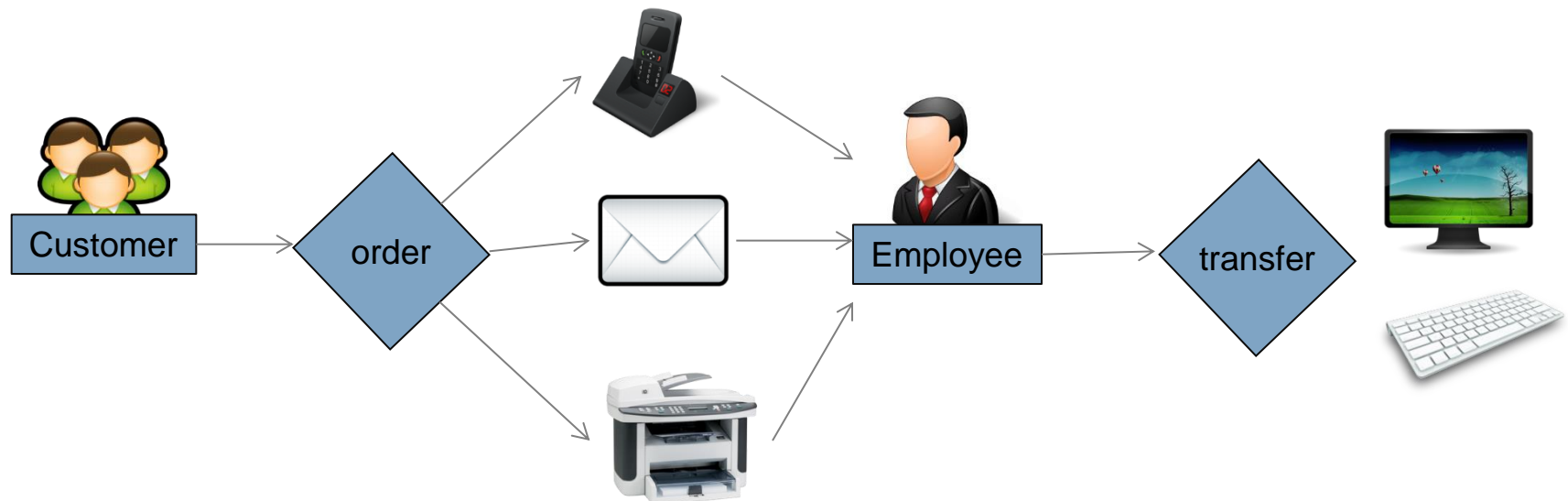
Media Disruption

- Information in business and private communication is attached to media like paper, e-mail, video, voice, fax, etc.
- If a transition to another media is required during the gathering or processing of information, this represents a media disruption.
- These media disruptions cause interruptions within processes and are responsible for more effort and redundancy in data transmissions.
- Leading to:
 - errors
 - delays
 - costs

One key aspect of Business Informatics is to reduce media disruptions and create media convergence.

Example for Media Disruptions

- **Typical examples for media disruptions are:**
 - Manual text input
 - Copy
 - Print
 - Scan



Media Disruptions in the Retail Environment



Recipe books



Shopping Lists



Coupons



Advertising Leaflets



Loyalty Cards



Product Packages



Internet Search Results

Smartphone as magic bullet?

Mobile Devices have the potential to overcome media disruptions in various business cases!



But how exactly does it work?

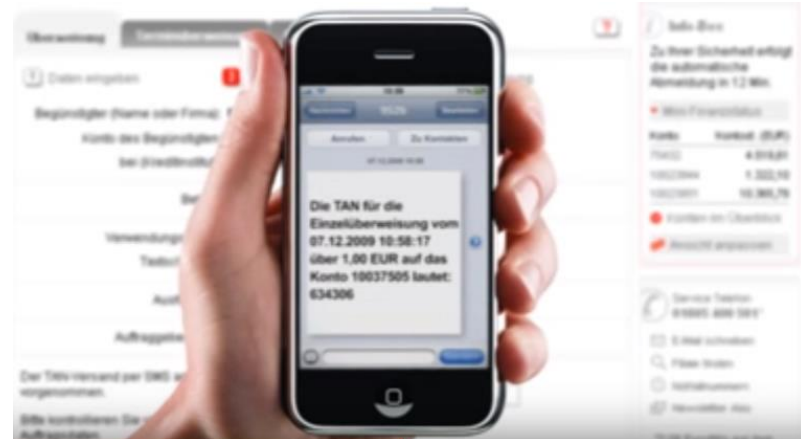
Can you think of a scenario where a media disruption has a positive effect?

Media Disruption in Mobile Security

- However, there are cases, where media breaks are quite desirable because they improve the level of security.
- An improvement in safety can be achieved when using two different media for authentication.
- E.g. Online Banking:



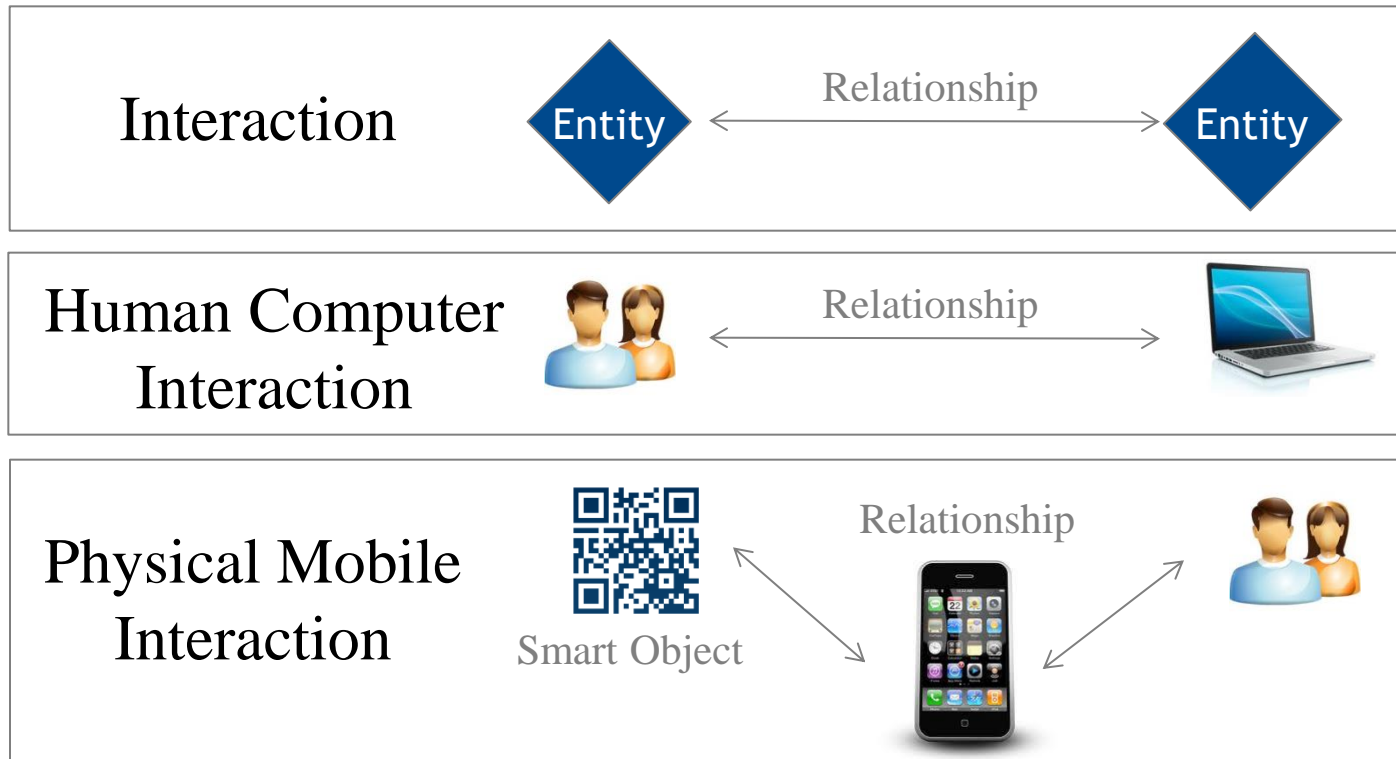
Chip Tan



SMS Tan

3. Physical Mobile Interactions

Physical Mobile Interactions



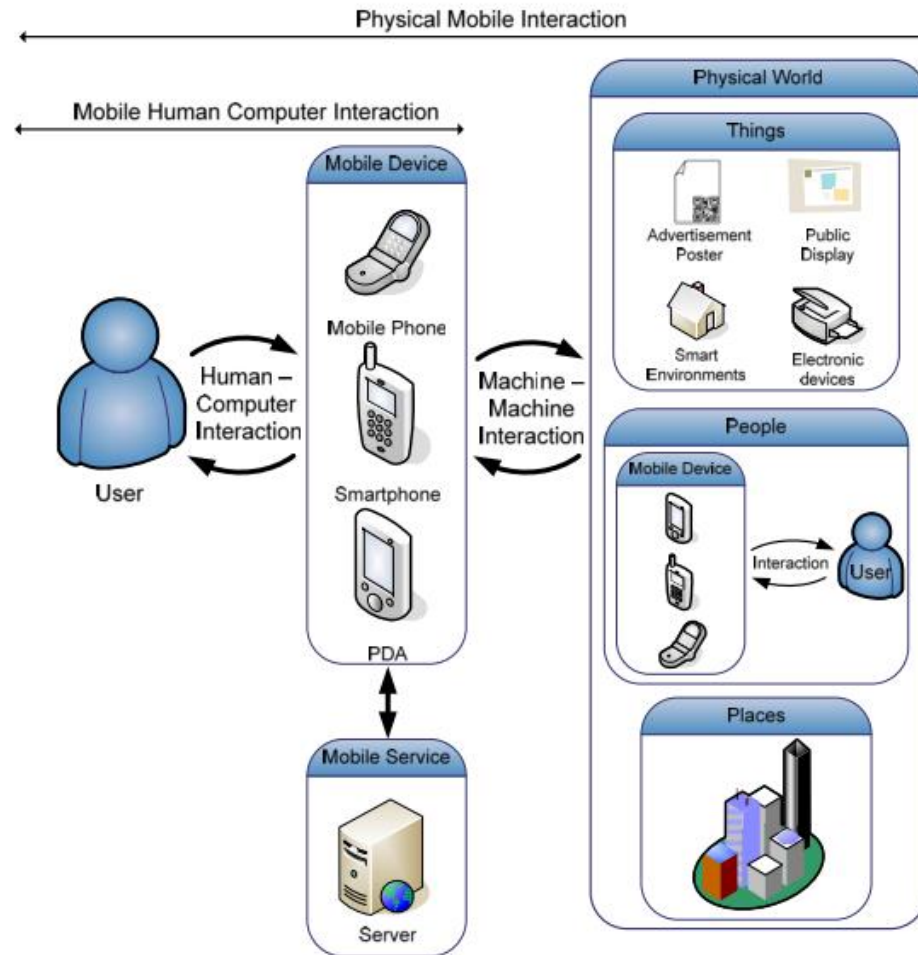
Physical mobile interactions use mobile devices for the interaction with everyday objects to facilitate the interaction with associated information and services.

Rukzio, E: Physical Mobile Interactions: Mobile Devices as Pervasive Mediators for Interactions with the Real World. Dissertation Munich 2006.

Rukzio, E., Broll, G., Leichtenstern, K. and Schmidt, A. 2007. Mobile Interaction with the Real World: An Evaluation and Comparison of Physical Mobile Interaction Techniques. Aml-07: European Conference on Ambient Intelligence, Darmstadt, Germany, 7-10 November 2007.

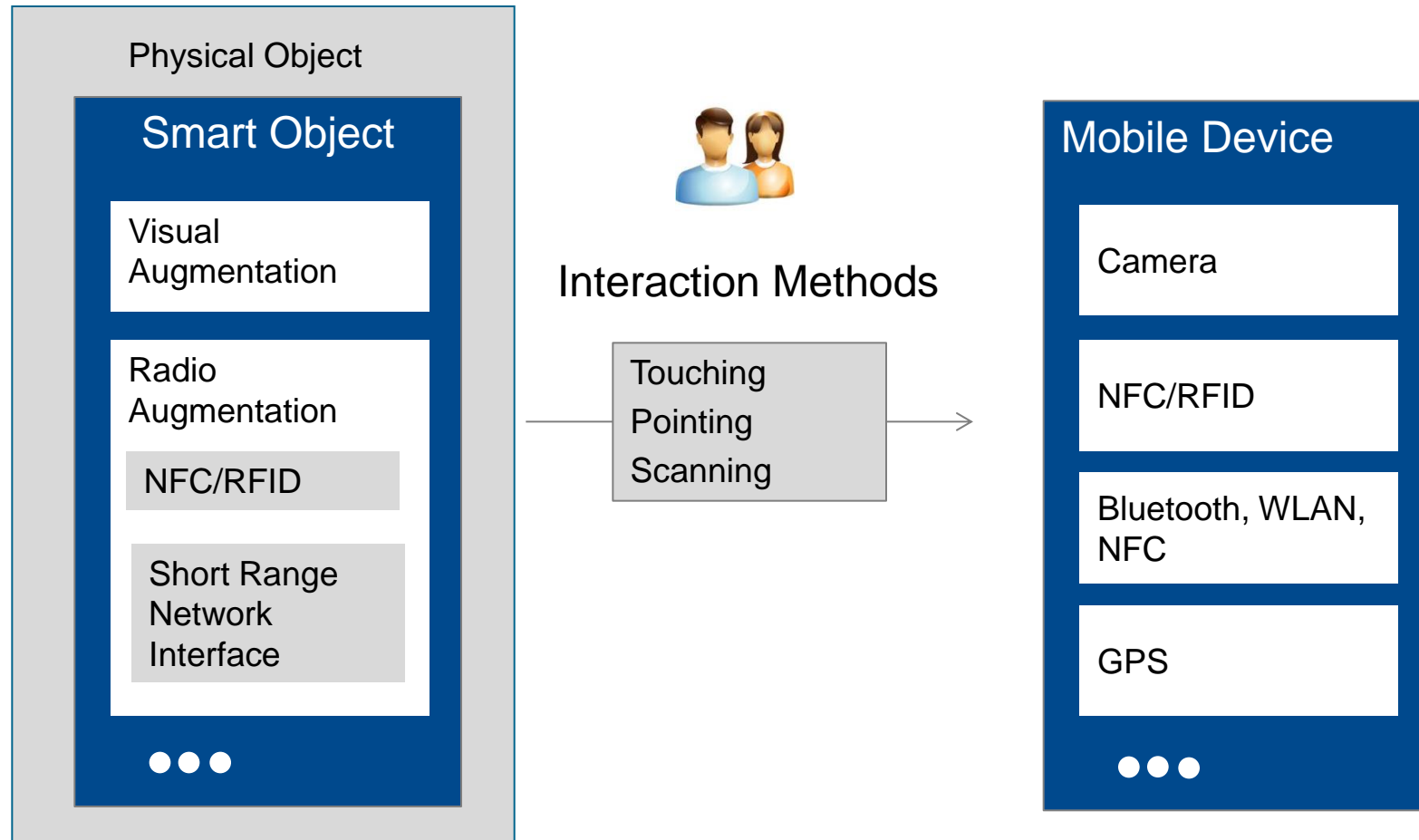
Herting, Broll: Acceptance and Usability of Physical Mobile Applications. 2008

Elements of a Physical Mobile Interaction







Rukzio, E: Physical Mobile Interactions: Mobile Devices as Pervasive Mediators for Interactions with the Real World. Dissertation Munich 2006.

Physical Mobile Interaction Framework



- Rukzio, E: Physical Mobile Interactions: Mobile Devices as Pervasive Mediators for Interactions with the Real World. Dissertation Munich 2006.

Examples of Physical Mobile Interactions

Physical Mobile Interactions	User-mediated object selection	Touching	Pointing	Scanning
Example				
Description	The user types in information provided by the object.	The user "touches" a smart object with a mobile device.	The user points on a smart object with a mobile device.	A link between mobile device and smart object is established because of their closeness.
Interaction Technology	None	Radio: RFID, NFC, proximity sensors	Visual: barcodes, visual markers, Infrared	Location: Bluetooth, WLAN, GPS
Typical Application	Manual hyperlink input.	Contactless (NFC) Payment	Price Comparison (Barcode Scanning).	Location based advertising (Bluetooth Beacons)

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4. Physical Mobile Interaction Technologies and Use Cases

Example 1: Pointing

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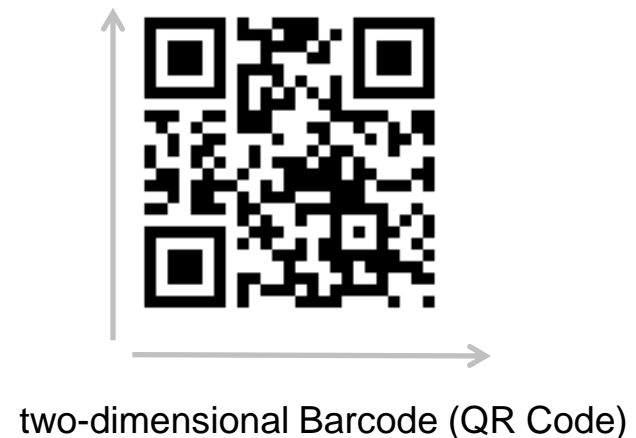
Mobile Product Information Systems (QR-Codes)

Barcode Scanning (QR-Codes)

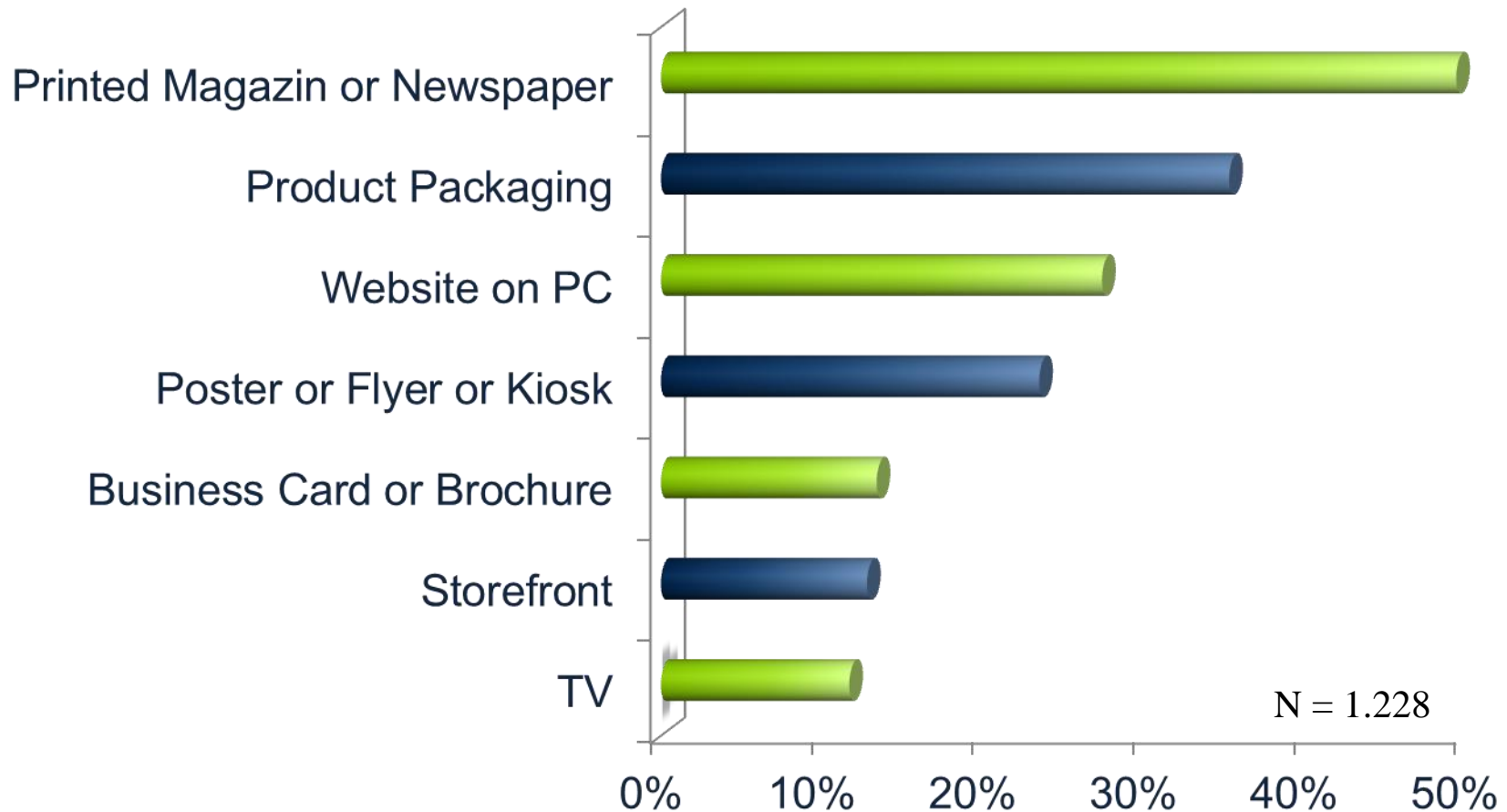


Barcode Scanning (QR-Codes)

- **Quick Response Codes (QR Codes) are two-dimensional barcodes that contain information that are machine-readable (e.g. with help of the optical camera of a mobile device).**
- **They are typically used to identify an object or to “point” to a website.**

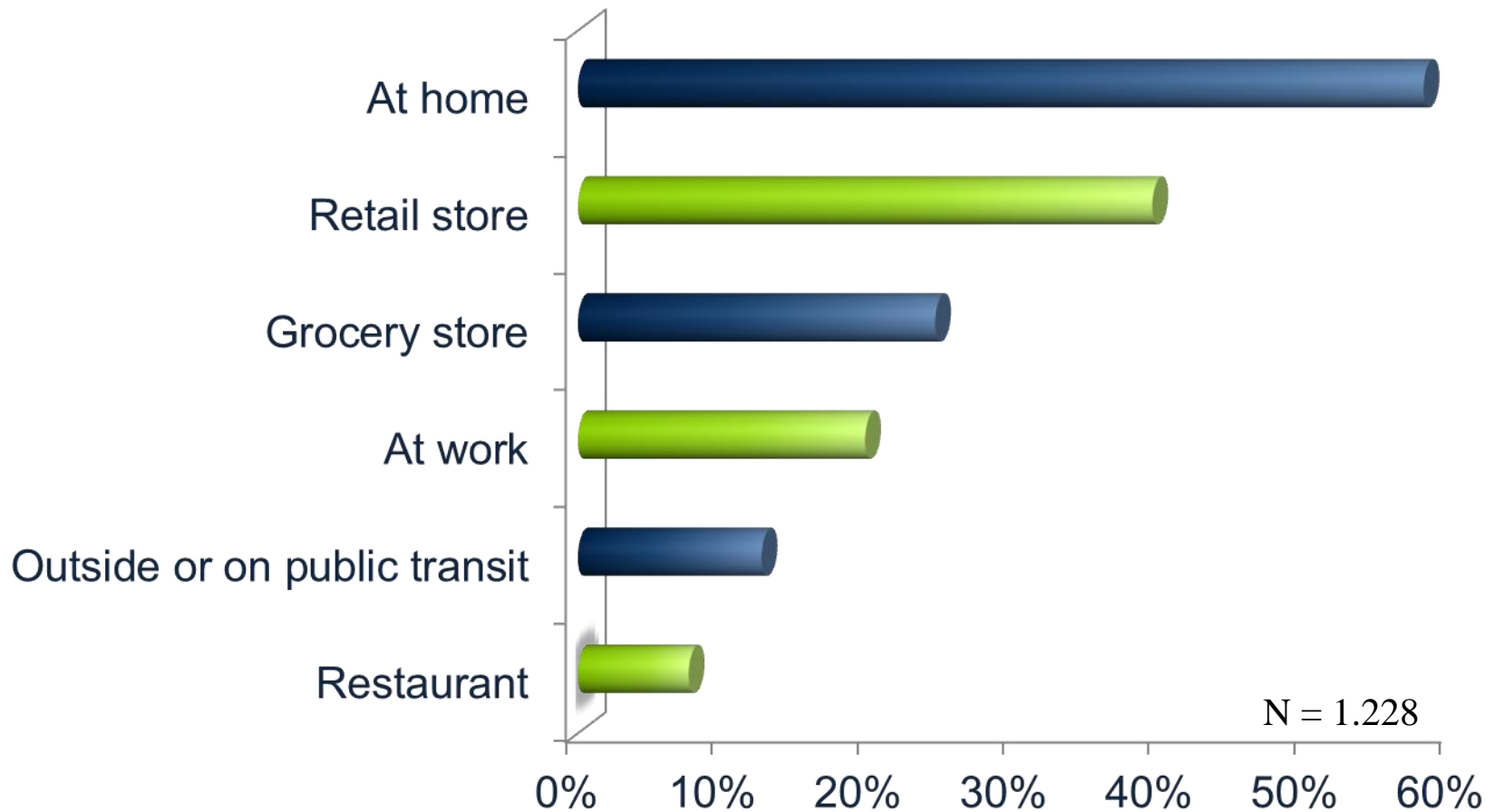


Sources of QR-Codes



CMB Consumerpulse: 9 Things to Know About Consumer Behaviour and QR-Codes. <http://www.cmbinfo.com/cmb-cms/wp-content/uploads/2012/01/Consumer-Pulse-Template-QR-Codes-Final.pdf>. 2011

Location where QR-Codes get scanned



CMB Consumerpulse: 9 Things to Know About Consumer Behaviour and QR-Codes. <http://www.cmbinfo.com/cmb-cms/wp-content/uploads/2012/01/Consumer-Pulse-Template-QR-Codes-Final.pdf>. 2011



“A Mobile Product Information System (MPIS) is an approach to allow consumers to access additional information and services about products through their mobile devices.”

Real World Motivation

People want to make more informed choices



Mobile technologies changed our information seeking behaviour in many areas



Do mobile technologies also change the way we make our food related buying decisions?

Customer Touchpoints of Mobile Product Information Systems



Pre-Sales



POS



After Sales

Providers of Mobile Product Information Systems

Producer



Example Data:
Manuel & Recipes
Vouchers & Coupons
Ingredients & Allergens
Origin and Manufacturing



3rd Party



Example Data:
Price comparison
Product comparison
Nutrition
Consumer Rating and Comments



Differences

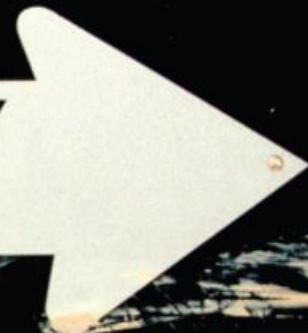
Technological
Requirements

Data

Institutional Trust /
Brand Loyalty

Mobile Product Information

ONE WAY



Motivation

Negative Impact of 3rd Party Applications

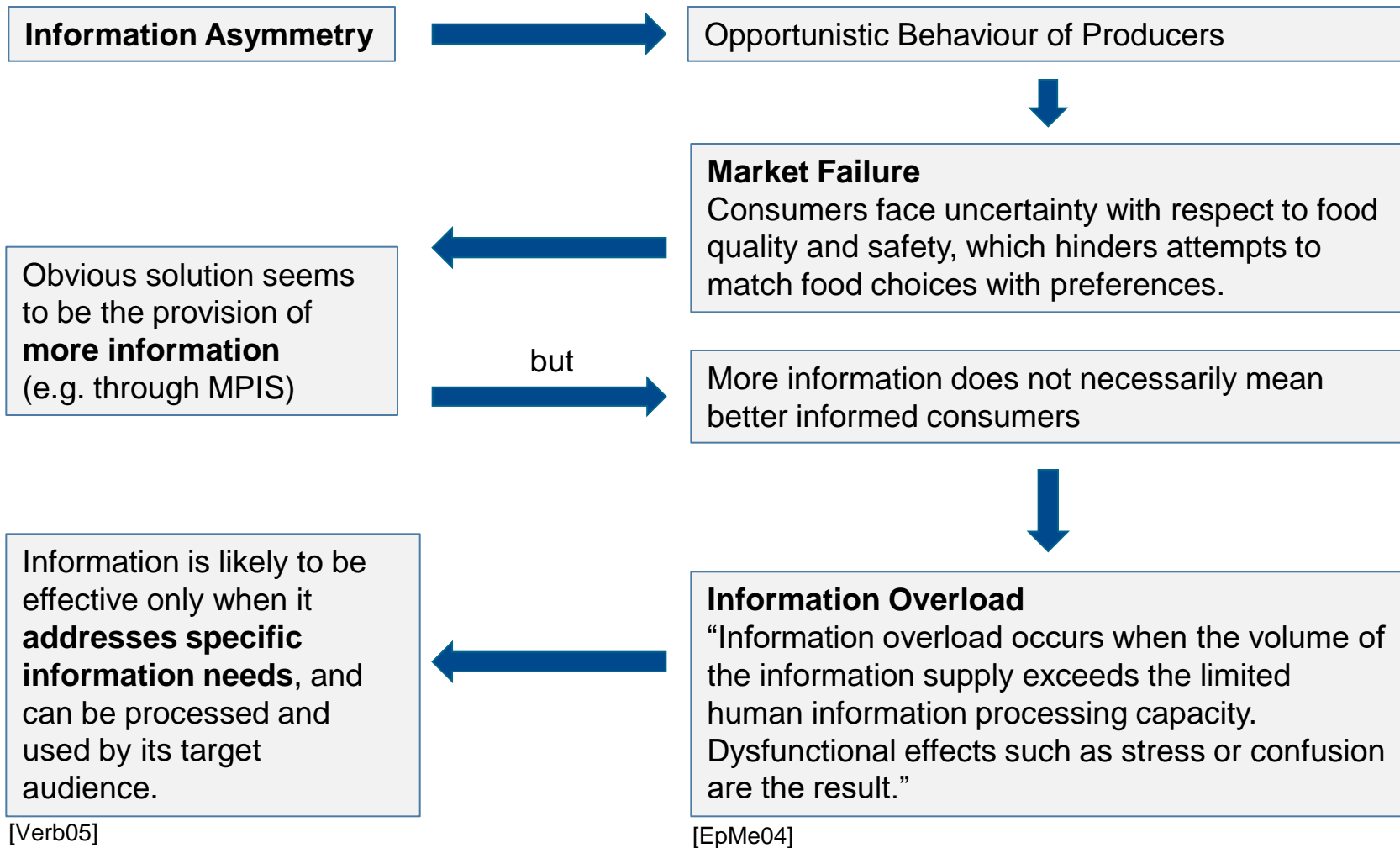


Producers lose control about the Mobile Consumer during the most important stage of the purchase decision.

- **Showrooming is the practice of examining merchandise or products in a store and then purchasing them online at a lower price**
- The widespread adoption of smartphones by consumers means that even while they are in the store, they can easily search for a better price online. Because of this, many have little loyalty to any one particular store.
- Customers have quick access to UPC and QR code readers and applications that are immediately pulling up prices and information from other retailers.
- They are one “tap” away from closing the deal with someone else.
- A full 20 percent of online adults are practicing showrooming, and 33 percent of them say they ultimately use the information to buy from a competitor.
- This action costs retailers more than 217 billion in sales, annually.

Problem Formulation

Information Asymmetry vs Information Overload



Another Example of QR-Codes and Media Disruption (Pre-Sales)



- Scanning the QR-Code of the advertising leaflet „automatically“ adds all the required ingredients on to the shopping list.
- The retailer thereby created a customer relationship which increases the possibility that the goods are bought at his store.

Does this example “solve” the media disruption?

Example 2: Touching - NFC Payment

Near Field Communication (NFC)

NFC is a short-range (< 4 cm per design) wireless technology:

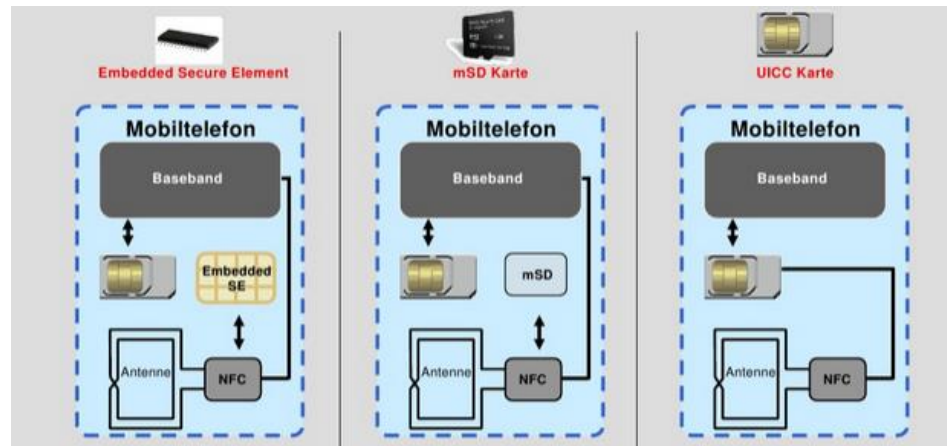
- Communication mode of a device can be active or passive.
- Magnetic induction between two loop antennas
- Potential applications
 - Mobile Payment / Mobile Wallet
 - Mobile Marketing (e.g. redemption of digital coupons)
 - Mobile Ticketing
 - Access Control (e.g. e-Key)
 - Mobile Data User Exchange
 - ...



Source: techtickerblog.com (2011)

Secure Elements / Wallets

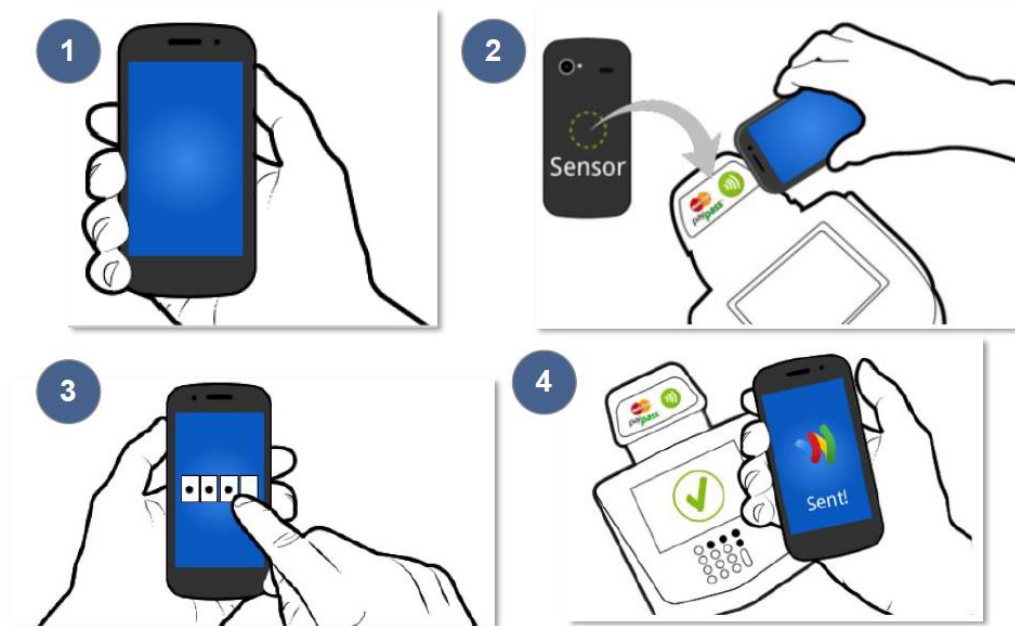
- The combination of NFC and secure elements on smartphones is the key technological enabler for mobile wallets.
- Secure elements are hardware tokens, that store encrypted personal information and thereby enable secure mobile applications, services and payments.
- They can be provided as:
 - integrated non-replaceable hardware components or
 - Interchangeable hardware such as UICCs or mSD



[Source: Giesecke & Devrient]

Mobile Wallets

- Paying with the mobile wallet is similar to paying with a credit card, but customers can choose the payment method / loyalty card from one single device.



Mobile Wallets

- Mobile Wallets store payment cards, coupons and loyalty cards. Until recently, filling the wallet with prepaid funds was one of the most popular options.



Credit Cards



Loyalty Cards



Coupons



Mobile Technologies during the Shopping Process



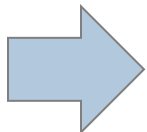
Mobile Technologies during the Shopping Process



2. Step:
Mobile Wallets will integrate all Mobile Shopping-Processes

How can the privacy of consumers be protected?

- Mobile operators, hardware manufacturers, Internet companies and financial service providers are entering the market .
 - Mobile Wallets in combination with mobile payments have the potential to integrate many mobile technologies and applications.
 - Data of loyalty cards, product scans, LBS, social media, and more will be merged.
- ➔ This creates completely new business models and risks.
- ➔ Involved parties get more insides about the purchasing behaviour of consumers.
- ➔ In the future mobile wallet providers and mobile payment operators could transform their business models from purely managing business transactions towards customer insights and marketing platforms.



To whom belongs the customer data?
How can the privacy of consumers be protected?

Example 3: Scanning

-

Location based services with Bluetooth Beacons



Position Transmitter (Bluetooth, Infrared)

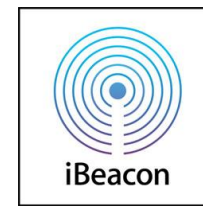
- **A terminal (smartphone) can receive location information from transmitters (Infrared, Bluetooth).**
- Terminal detects the transmitter information and runs LBS or transfers location information to the application.
- The BLE transmitter sends an identification code - the so-called UUID - while the app assigns the context (via the connection to a server).
- Application scenarios are
 - indoor navigation,
 - contactless payment or
 - advertising at the point of sale.

Position Transmitter

Bluetooth Low Energy (BLE)

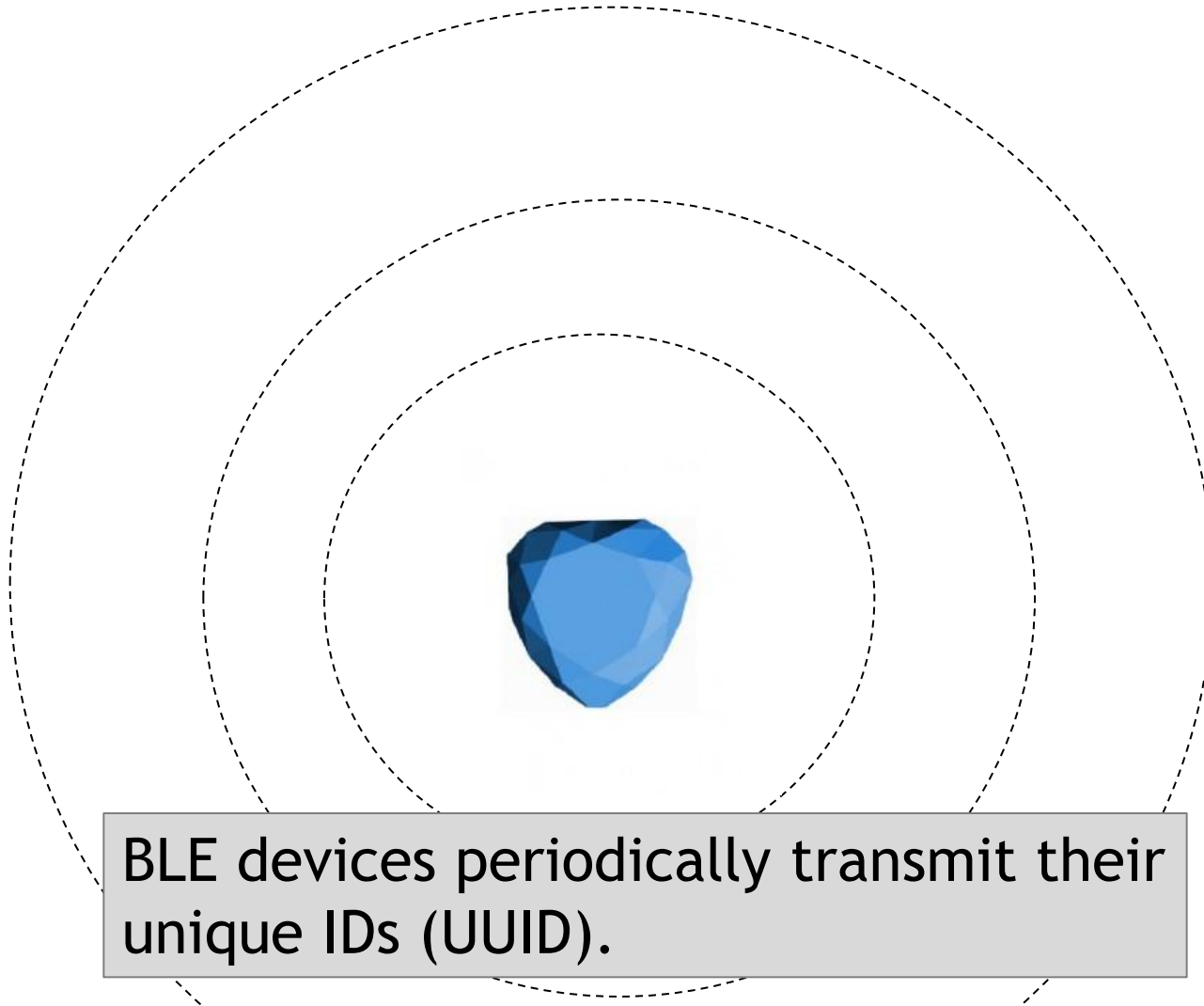
- BLE (also called Bluetooth Smart) is a specification for the Bluetooth radio technology (introduced in 2009)
- It is used to produce modern BLE chipsets for Bluetooth transmitters such as Beacons.
- It requires significantly lower power of the receiver and the sender than traditional Bluetooth.
- The beacons come in different formats, including small coin cell powered devices, USB sticks and software versions.



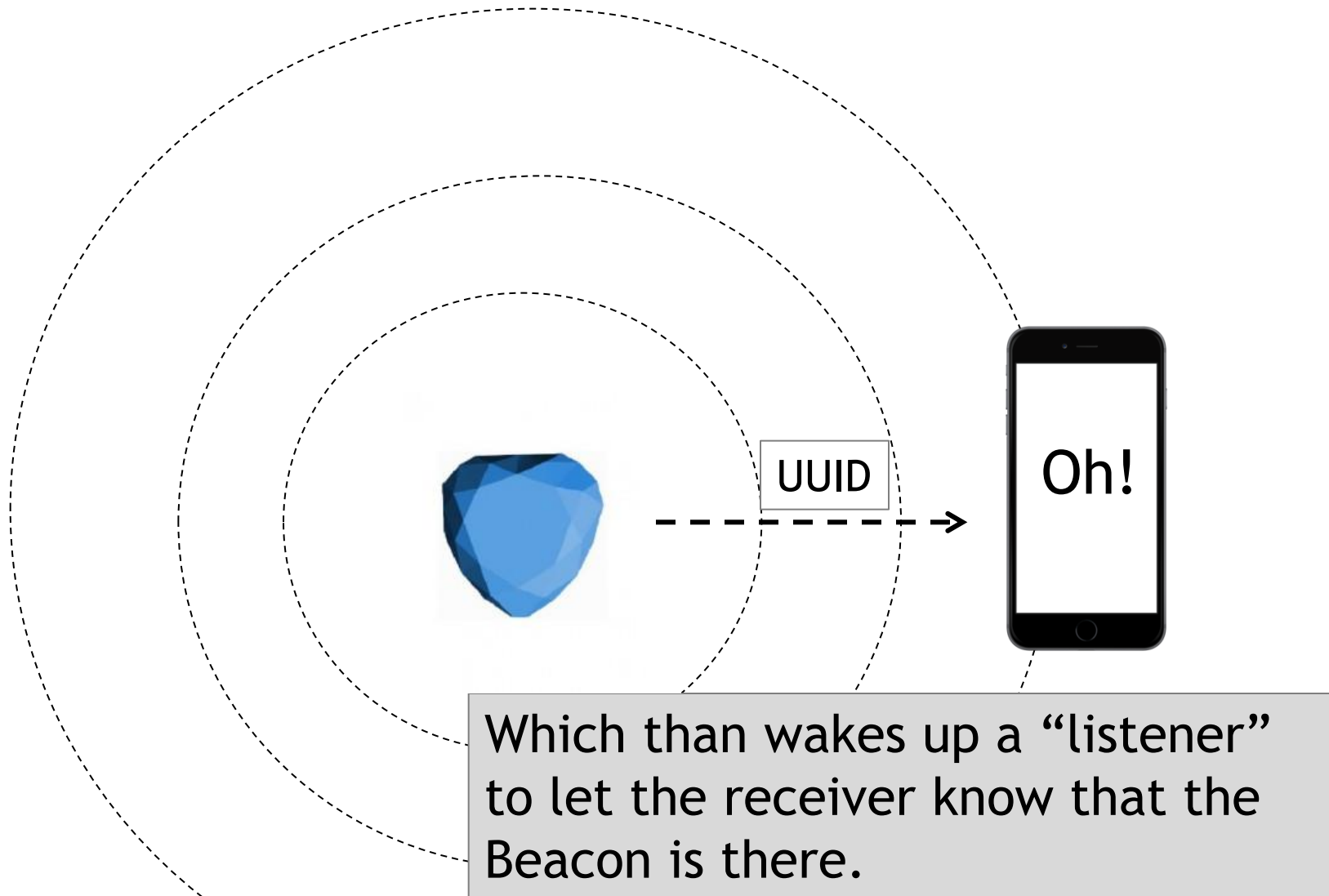


- iBeacon is Apple's term for an ordinary Beacon. The physical Beacon itself has not changed. But how the iOS software deals with Beacons is different from other systems (e.g. Android).
- Now the 'listening' happens within the OS instead of within the app itself. The IDs of iBeacons are registered against an application with Apple.
- iOS tracks the beacons it encounters and queries Apple's UUID database to see what app the beacon is associated to, then alerts the app (if installed on the iPhone or iPad) that a relevant beacon has been found.
- The app then uses that UUID to figure out a course of action.
- For example, a museum may designate a specific Beacon's UUID to indicate a beacon in the tyrannosaurus exhibit, so the museum app can pull up pictures, videos, audio descriptions, and so forth about that dinosaur.

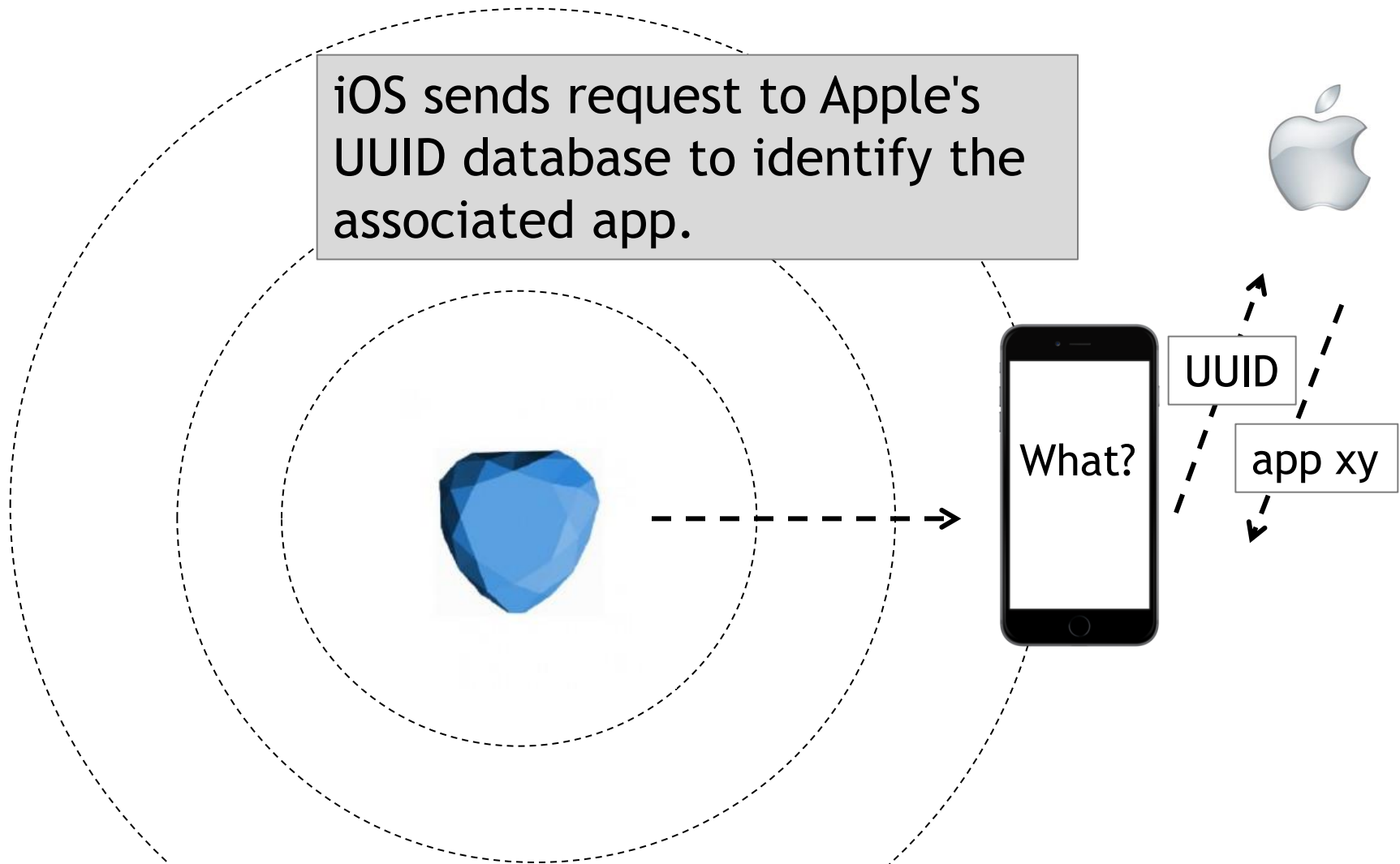
Position Transmitter iBeacon



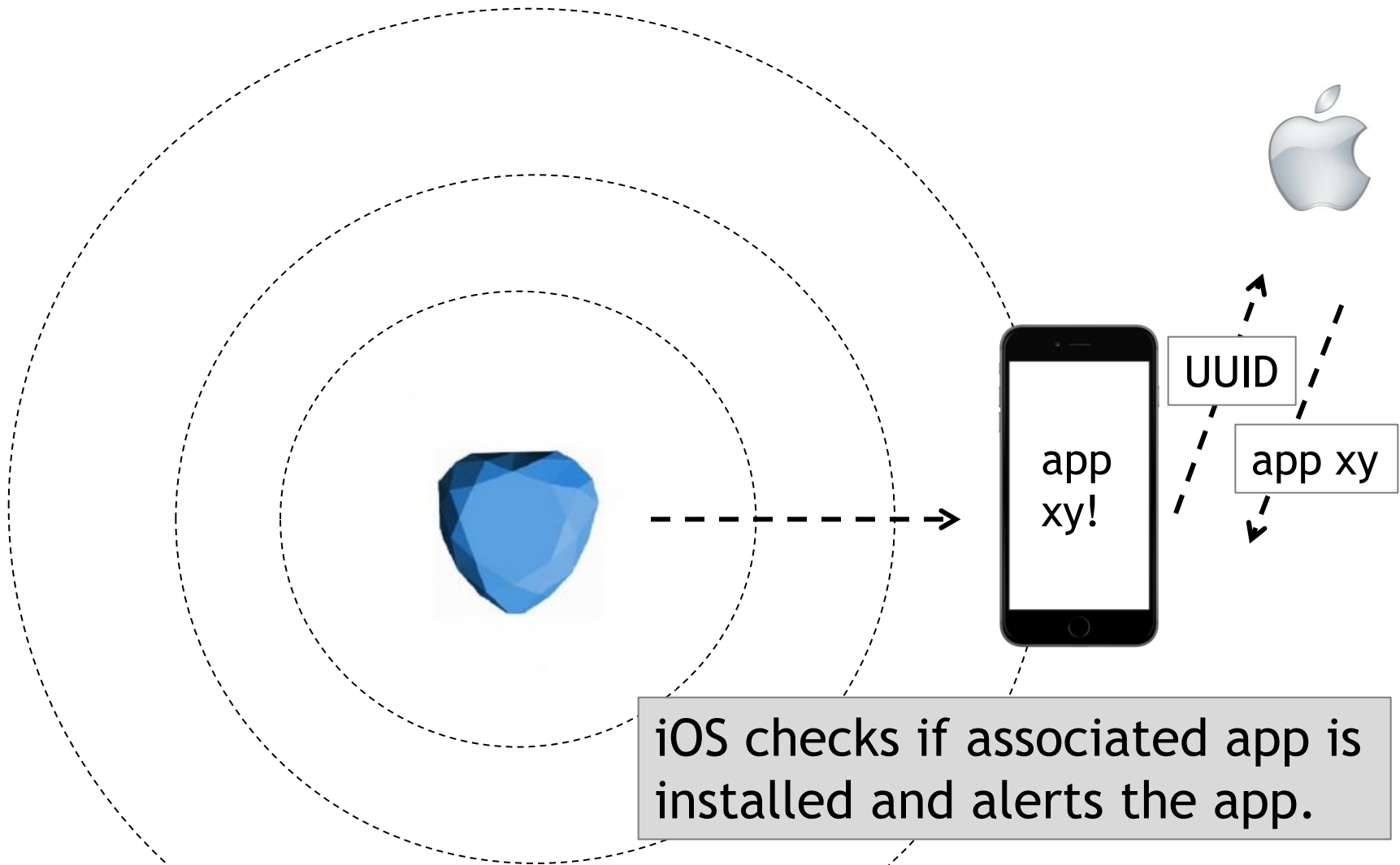
Position Transmitter iBeacon



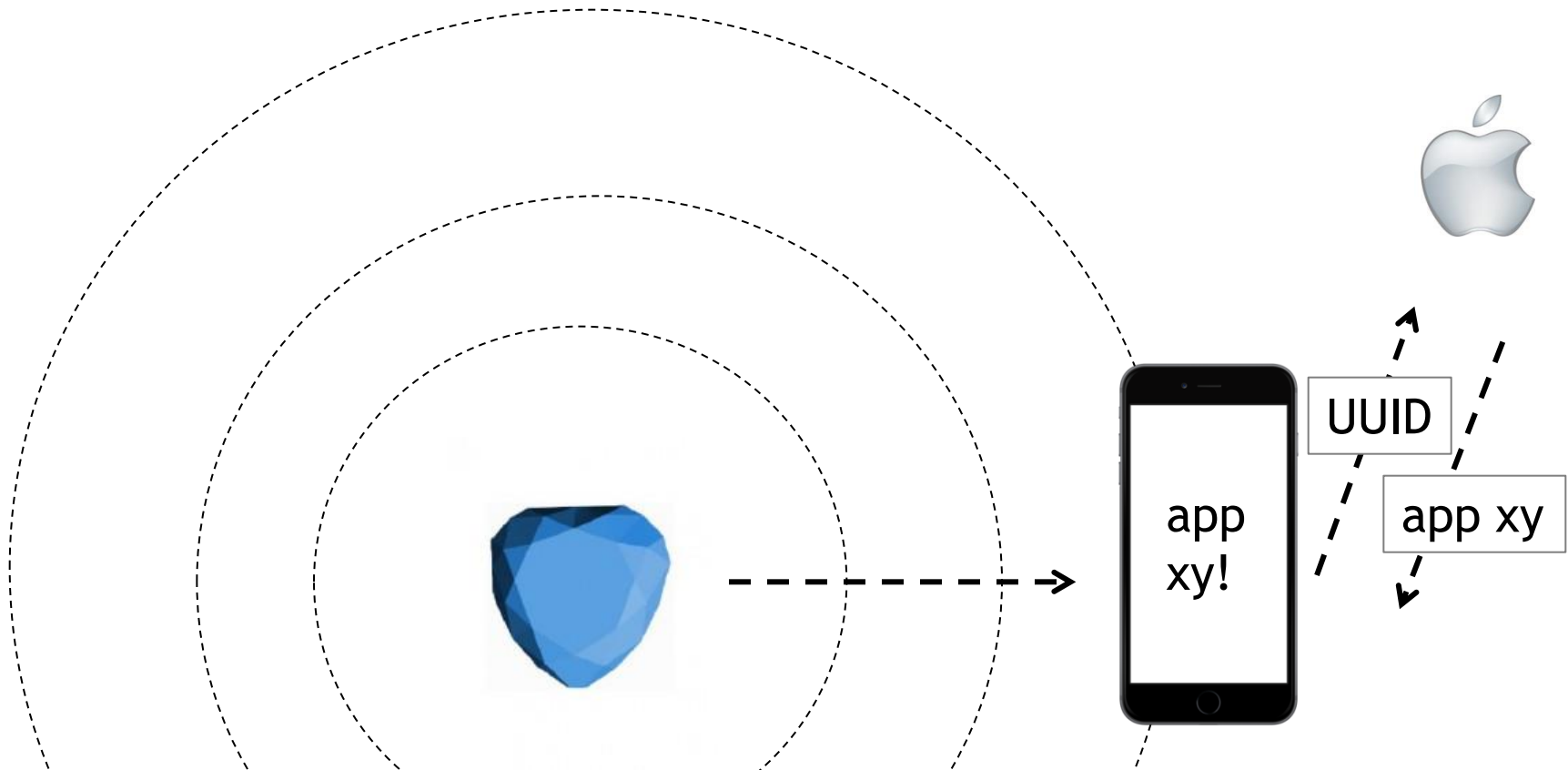
Position Transmitter iBeacon



Position Transmitter iBeacon

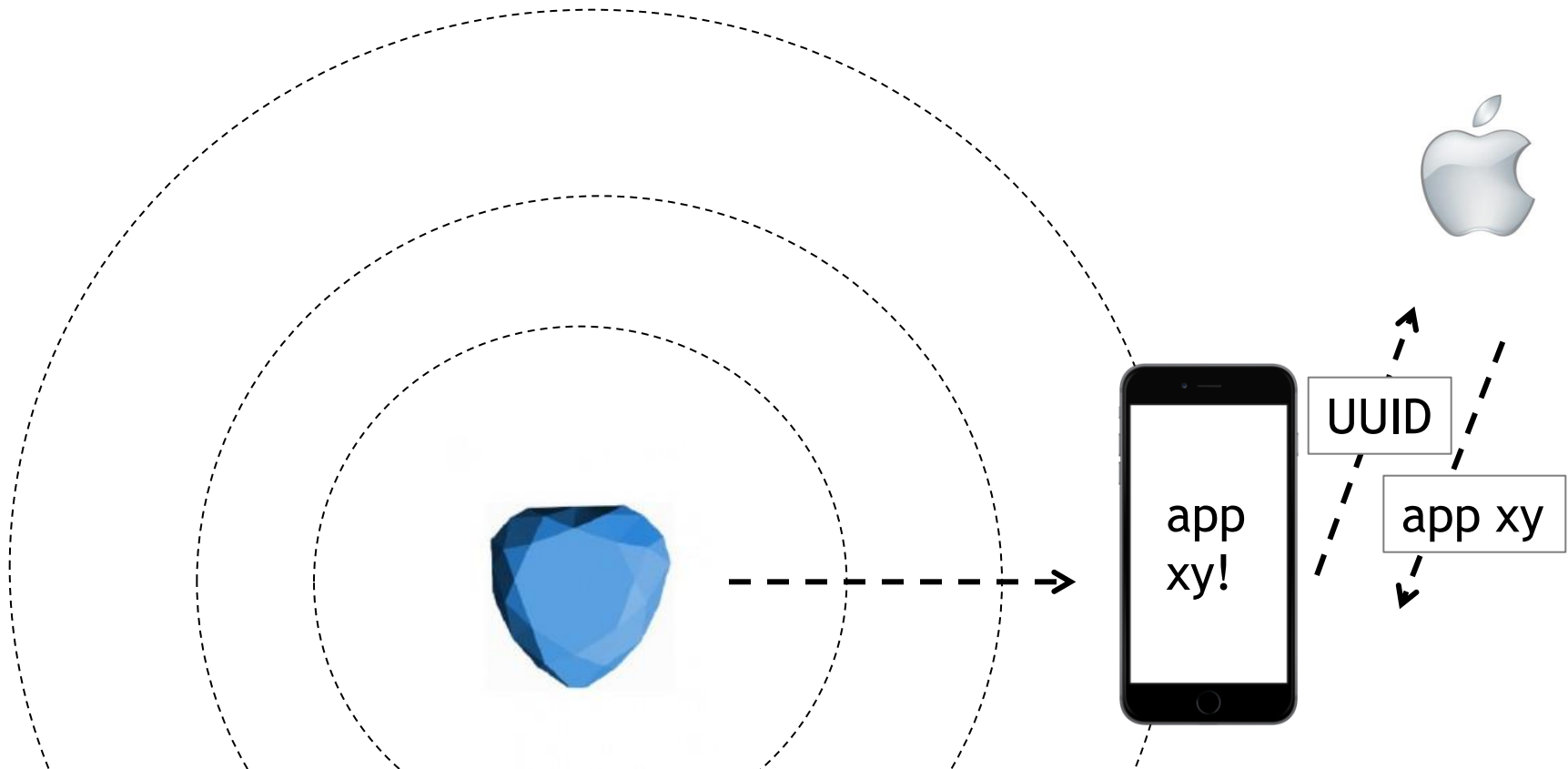


Position Transmitter iBeacon



With help of an algorithm the proximity to the beacon can be calculated and segmented into (unknown, immediate, near, far).

Position Transmitter iBeacon



The app then uses that UUID and the proximity information to figure out a course of action.

Bluetooth Beacon Retail Scenario



“Customer Journey” Scenario:

1. At home the consumer creates his shopping list using the retailer’s app
2. At the entrance the customer is personally greeted with an individual offer
3. Based on his shopping list the consumer is navigated through the store
4. At the checkout the consumer can pay with a contactless payment method

Bluetooth Beacon Retail Scenario

- The real change through Bluetooth Beacons is the ability to offer new **context-based services** which is possible due to new and previously unavailable customer data such as: identification of the user, purchase history, residence in certain retail segments, etc.
- If the new customer data is stored in a central POS analytics system the same what is possible for e-commerce websites with Google Analytics will, in future, also be possible for stationary retailers.

5. Conclusion

- Mobile Retail Shopping offers a lot of opportunities to enhance business processes by overcoming media disruptions.
- Increased transparency and involvement leads to better „informed consumers“ and raises the power of the customer
- The influence of 3rd parties on consumers purchase decisions increases.
- Manufacturers and retailers are in danger of losing control of the Mobile Customer Experience, because...
- ...providers of mobile wallets and mobile payment solutions enter the market.
- This results in a variety of new business models and data protection issues.

- Rukzio, E: Physical Mobile Interactions: Mobile Devices as Pervasive Mediators for Interactions with the Real World. Dissertation Munich 2006.
- Rukzio, E., Broll, G., Leichtenstern, K. and Schmidt, A. 2007. Mobile Interaction with the Real World: An Evaluation and Comparison of Physical Mobile Interaction Techniques. Aml-07: European Conference on Ambient Intelligence, Darmstadt, Germany, 7-10 November 2007.
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<http://blog.getchee.com/?p=4070>. Informationsabruf 05.12.2012
- GS1 UK (2011). Mobile-savvy shopper report: The impact of poor third-party app data on shopper behaviour. Abgerufen am 28.09.2012
http://www.gs1uk.org/resources/help_support/WhitePapers/GS1_UK_Mobile-Savvy_Shopper_Report_2011.pdf
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