Context-aware computing and the user experience

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Context-aware computing will be the single most-significant change in enterprises’ customer management relationship strategies during the next five years. It forms the cornerstone of new experiences and shapes new ecosystems.

By 2015, Gartner expects context to be as influential to mobile consumer services and relationships as search engines are to the internet. Context’s largest overall impact is that it will be used to map the digital and physical worlds together.

Social media will provide key ingredients so that context providers and enterprises can create such experiences by inferring intent. They will need a deep understanding of the groups to which end users belong. They will also need to adjust to a user’s persona, as well as automatically adjust experiences in the physical and digital worlds by adapting to environments in real time.

Context-aware computing has been studied and applied for more than 20 years. Advances in software, mobility, analytics and the use of the internet to exchange information in real time will enable experience designers to link physical, electronic and mobile commerce for commercial gain and to enhance knowledge work productivity.

From 2007 to 2011, the rapid adoption of smartphones and tablets focused on the user interface of individual applications and individual platforms, but, for the most part, relied on manual, sometimes difficult, navigation; redundant inputs; inappropriate or inconvenient channels; and some personalisation, with limited integration.

Based on Gartner’s observation of the degree of personalisation (and underlying use of analytics) now possible in today’s mobile and social ecosystems and platforms, practices of optimising individual experiences and interaction channels will become mainstream during the next two to three years.

By 2015, advances in augmented-reality browsers and display technologies, as well as a focus by software, device and service providers on context-aware user experience — cross-application, cross-session, cross-channel and cross-platform — will lay the groundwork for enterprises to redefine user expectations.

The main battleground between retailers, payment card issuers, content providers, and context providers will be where physical and digital ecosystems overlap. Application, identity, and content awareness are part of an enterprise shift to context-aware security infrastructure.

Through 2014, the focus will be on expanded use of technologies, such as GPS, Near Field Communication (NFC) built into mobile devices, and image recognition of barcodes or photographs. The targeted use of this information, along with identity, time and other context, will enable websites and applications to expand contextual delivery to support mobile commerce and augmented reality.

Longer term, these contextually driven solutions will incorporate more information on user behavior. The internet of things — for example, information about places, such as where there are empty parking spaces — will dramatically expand the contextual information about real-world objects during the next five years.

By 2015, 40% of the world’s smartphone users will opt into context service providers that track their activities. At the same time, smartphone users that opt into context-enriched services will be using their devices for about 6% of their overall spending. By 2015, we expect Google, Microsoft, Nokia and Apple to be continuously tracking the daily journeys and digital habits of 10% of the world’s population.

According to Nielsen, almost 70% of Americans surf the internet and watch TV at the same time — at least occasionally — so the potential reach for applications that can synchronise dual screens is high and growing. Worldwide spending on television advertising dwarfs that of online. The ability to personalise and couple with an increasing number of devices (such as game consoles) means that advertising and marketing will be dramatically changed.
For example, advertisers will be able to target different devices in the same household with personalized advertising — even in cases in which two of the devices are playing the same game or watching the same content. When consumers are researching prices or making purchases, they will increasingly receive complimentary offers and advertising with increasing amounts of personalization.

Context-aware fraud detection enables the efficient pinpointing of suspect transactions and ensures that legitimate end users are not unnecessarily inconvenienced. The degree of transaction risk is ascertained through the analysis of contextual information about the user and his or her activities in a given environment.

For example, to help determine transaction risk, environmental factors such as the user’s geographic location and access device are compared with what’s expected of the user given his or her current and recent transaction information. (A simple example is that a flag would be raised when a user’s mobile device is in South America, while he or she is checking out of a hotel in Asia.)

Other contextual information increasingly includes social network information, such as Facebook profiles used to investigate users whose transactions are flagged as suspect. For example, customers whose billing addresses reconcile with their Facebook profile information would be less suspect than those whose addresses did not reconcile.

In addition to comparing information at the transaction, account, or customer level to a profile of what’s expected, fraud detection also includes other context-building techniques, such as peer-group analysis, which compares an individual entity or group of individual entities to their peers to spot suspect deviations, and entity link analysis that can discover organised crime rings and other collusive behavior. This type of network analysis can incorporate all sorts of context-enhancing structured and unstructured data.

Physical and digital world detection of emotions and mood is under-utilised, but this is beginning to change. Technologies such as Emotion ML (a markup language with which programmers can modify an app’s behaviour based on the detected emotional state of the end user) are evolving, and Gartner has observed that many more aggressive enterprises are already keeping social graphs on their customers. These organisations map group analysis with intent, environment and end-user behaviours to create information models that target specific requirements of a target audience.

Vendors and end-user organisations are also studying the mood of users (intensity and valence) to fine-tune how offers can be improved. For example, the timing of offers or pushed content can be modified, based on the current mood of the consumer, as indicated by direct and indirect cues. The success of personalised offers can be increased by improving the timing, relevance and consideration of the influences on end users in their moments of choice.

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