



## Project Results

# SOLOMON

## Amplifying online experiences in the world of physical retail

### EXECUTIVE SUMMARY

Via a shop operations and experience platform, the ITEA project SOLOMON blends online and offline services for seamless interactions between retailers and consumers. This enables smaller stores in particular to capitalise on (and compete with) e-commerce while providing a more efficient, enjoyable shopping experience for their customers.

### PROJECT ORIGINS

E-commerce has radically changed the nature of retail, leading to the closure of many store-based companies. Only 56% of adults are more satisfied with the mall shopping experience compared to five to ten years ago; most would like to see a greater convergence of online and offline experiences. For smaller retailers with less resources, this raises questions of how to compete and how to engage with users digitally. Retail must therefore be polymorphous, meaning that the best possible services can be delivered to customers regardless of the channel.

The overarching goal of the SOLOMON (Shop operations and experience platform) project is to provide businesses with a digital shop operations and experience platform that blends online and offline services. Several sub-goals make this possible. Firstly, customer assistance services (such as for parking) have been realised on mobile devices while interactive digital touchpoints offer conversational interfaces with virtual assistants. Secondly, physical and digital data have been integrated to provide customised information to customers. Finally, customer behaviour in the online store has been merged with product search information to improve audience profiling. This should result in a more efficient and engaging environment for both customers and retailers.

### TECHNOLOGY APPLIED

The starting point for SOLOMON was to investigate the state-of-the-art for the current retail market,



Image: Pexels - Tuur Tisseghem

through which three use-cases were described and requirements were identified in terms of both functional orchestration and the user and technical perspectives. These use-cases are book recommendations, mobile-assisted smart shopping and an intelligent parking web platform with indoor localisation. The requirements informed the SOLOMON framework, which consists of an operating engine, in-store algorithms and analysis and application programming interfaces for experience amplifiers.

Smaller businesses are typically reluctant to implement entirely new systems, so SOLOMON's framework is a vertical, layered model in which users engage with touchpoints according to their own needs. The generic recommendation service, for instance, can be customised beyond the

scope of the original use-cases. A domain-specific language (Little Activity Language) describes interactions with digital touchpoints in order to enable virtual assistance. The experience amplifier modules, meanwhile, bundle various services such as ephemeral apps, a Mobile Popup Store (MPUS) and smart parking via location services.

By nature, the experience amplifiers require data capturing and analysis, creating a potential conflict between personalisation and privacy. SOLOMON circumnavigated this through SOLID, an open-source specification which allows users to create anonymous shopping avatars. This Personal Mobile Assistant (PMA) acts as an intermediary between customers and companies and allows them to control the flow of their personal data, ensuring the project's GDPR compliance.

## MAKING THE DIFFERENCE

In terms of technical output, SOLOMON's biggest achievement is the creation of new services from a baseline of zero: 17 experience amplifier modules and seven QoS parameters for service management. One particular success is customer behaviour prediction, which was increased from 60% accuracy to 85%. For consumers, these services make shopping more efficient (if they need specific items) or more enjoyable (if they are interested in multi-channel experiences). For retailers, costs can be minimised through more efficient operations while revenue can be maximised – frequent mobile shoppers, for instance, spend an average of 25% more in-store. Increased uptake of such services will also push up customer acceptance, helping physical stores to compete more effectively with e-commerce.

SOLOMON is unique in that its consortium is composed largely of SMEs, for which these services represent new business cases and a springboard to international markets such as digital signage (worth almost USD 4.5 billion in 2016 versus USD 1.3 billion in 2010). By early 2020, SOLOMON had generated 200 business leads. IKANGAI,

which created MPUS and a Mobile App Maker App (MAMA), therefore predicts a return on investment of over EUR 276,000 after three years; within the same timeframe, Beia anticipates a profit of EUR 155,000 from its smart parking, smart shopping platform and indoor localisation platform. The credibility boost which ITEA gives to SMEs may be an additional factor in this.

The eruption of COVID-19 in SOLOMON's final year saw a shift in focus for retailers: digitisation is no longer just about engaging customers but also about giving them the feeling that businesses aim to keep them safe. The smart parking use-case, for example, can thus be retooled to guide customers to collection points without having to enter the building. The project's ephemeral apps, in particular, are a likely basis for future projects beyond the current scope. As physical-only stores have been most affected by lockdowns, there is now a greater awareness amongst retailers of the need for a flexible, multi-channel approach. This will likely accelerate the push for polymorphous shopping experiences, in turn increasing SOLOMON's uptake within an ever-growing range of retail domains.

## MAJOR PROJECT OUTCOMES

### Dissemination

- More than 10 publications (e.g., Fabulous 2017, eLSE 2017, SGEM Social 2018, CSE 2018, URBAN INCERC 2019).
- 12 presentations at conferences (e.g., EUREKA Innovation Days 2018, IMWORLD 2018, Smart City Expo World Congress Barcelona 2019, Knowledge4Innovation Forum 2019).
- 22 Meetings with potential customers from the retail sector.

### Exploitation (so far)

- MAMA – Mobile App Maker App: Interactive no-code tool that generates Progressive Web Apps.
- MPUS – Micro Popup Store: Interactive popup shelf for self-service shopping.
- Mobile Shopping Avatar: Privacy preserving digital identity management for customers.
- Beacon SDK: Dynamic, scalable, modular platform for indoor positioning and outdoor parking spots occupancy detection.
- PRS – Product Recommender System: User profile based product recommender system.
- Interactive Billboard: Interactive screen for in store customer and marketing services.
- LAL – Little Activity Language: Domain specific language for defining user interactions with digital touchpoints.

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

## SOLOMON 14025

### Partners

*Austria*

IKANGAI

*Romania*

Beia Consult International

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Kardtek

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Turkcell Teknoloji

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### Project start

December 2016

### Project end

June 2020

### Project leader

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