



Developing a learning, context-aware platform to support fast and accurate decisions

Companies that want to deliver sophisticated services still struggle to take into account and to learn from all relevant context information. They may have extensive information about their customers including history, behavior and present situation, but cannot always leverage those data to take intelligent decisions. Some of the challenges they face are:

- Which context data can influence and improve decisions?
- Is this information readily available or does it require additional processing?
- With fast-changing contexts, can a system be made self-adapting?
- Can we process information offline or in-stream, and how fast?
- What are acceptable processing latencies for service delivery, and how can we minimize them?
- Can our context-based system be scaled to account for future growth?

“CAPRADS was set up to develop tools for service providers to make their offer context-aware,” says Wouter Joosen, research lead and professor at imec - DistriNet - KU Leuven. “The middleware that resulted from our efforts together with imec - IDLab - UGent is self-learning and scalable. It allows fast and valuable decision making and can be customized to support a wide variety of use cases, three of which we have prototyped for our CAPRADS project partners.”

“When we looked at the expectations and use cases of the partners, two requirements stood out,” says Joury Gokel, project lead and managing director at JForce: “To have added value over existing solutions, ours should be self-improving. It should allow making better decisions based on the changing context and on feedback about the impact of previous decisions.

And second, it should be adaptable and scalable to a wide variety of use cases. At JForce, for example, we need to scour context to make lightning-fast decisions about financial transactions, decisions that we can really trust on in a forever-changing context. Luciad, in contrast, needs to take into account huge and growing amounts of geographical data to offer context-aware information to users, in some cases requiring fast and ultraprecise responses, for example for emergency response systems. And Televic Education wanted to customize and enrich its customers’ learning experience by taking into account their learning context.”

Based on these requirements, the CAPRADS partners looked for optimal strategies to include context in decisions, in a way that minimizes decision latencies and that allows learning from feedback. Next, they designed and implemented a common middleware platform and instantiated it for the partners’ use cases. This combination of features makes the CAPRADS platform unique in the world of context-based intelligence. “Commercial offerings may include rule-based decision making from context, but our system is able to learn from the impact of decisions and use the context to make better future decisions,” says Joosen.

THE OUTCOMES

1. A scalable, self-learning middleware as basis for context-aware decisions

The main outcome of CAPRADS is a versatile middleware platform that is scalable in several dimensions. First it can accommodate widely varying use cases. And within one such instantiation, it can scale for a massive number of users and huge amounts of context data. The platform processes context information from heterogeneous data streams, delivering the right context information on the fly to allow quick business decisions. It incorporates dynamic decision making, taking into account changing context and feedback on previous decisions.

2. Flexible architecture resulting in prototypes in three separate domains

With the middleware, the project built three separate use cases based on the project partners business. For JForce, the system is fed with information streams about the past financial transactions and history of people and institutions. The system then checks new transactions, assessing validity and flagging cases of fraud. Luciad's prototype was built to mine terabytes of geographical data to refine their offering's geographical awareness. And Televic Education is now able to refine its training offering depending on the learner's history and context. Apart from refining the offering towards the learners, context can also be used by the customer to detect potential fraud cases or find encountered difficulties in the assignments.

3. An extensive body of best practices to strengthen context-aware intelligence

CAPRADS had drawn up an extensive list of best practices, strategies to harvest business value from context information. These include guidelines to adapt the middleware to varied business cases, to process context-information and learn from it, to get maximum value from dynamically changing information, and to gauge the impact of decisions and feed it back to the system to continuously improve the output.

NEXT STEPS

CAPRADS commercial partners are now looking how to integrate the insights and tools from the project in their service offering. Luciad CTO Frank Suykens says "These insights and tools come right on time, as we are reinforcing our products and services with ever finer geographical awareness, harvested from huge and growing amounts of available geographical context." For the research groups involved, this was an interesting exercise to extend their expertise in context-aware processing and to get insights about market requirements and directions, expertise which they can now leverage in other projects, helping Flemish IT companies enrich their offering.

AGENTSCHAP
INNOVEREN &
ONDERNEMEN



Vlaanderen
is ondernemen

The CAPRADS project was co-funded by imec (iMinds), with project support from Agentschap Innoveren & Ondernemen.

FACTS

NAME	CAPRADS (A Context-Aware Platform for Rapid Decision Support)
OBJECTIVE	Enable service providers to deliver next-generation context-aware services, services that take into account all relevant yet complex context information to support rapid decision making that adds value at service delivery time.
TECHNOLOGIES USED	Spark, Hadoop, ZooKeeper, Kafka, MongoDB, MySQL, Drools, OWL, Spring
TYPE	imec.icon project
DURATION	01/01/2015 – 31/12/2016
PROJECT LEAD	Joury Gokel, JForce
RESEARCH LEAD	Wouter Joosen, Yolande Berbers, imec - DistriNet - KU Leuven
BUDGET	2,016,358 euro
PROJECT PARTNERS	Luciad, Televic Education, JForce
IMEC RESEARCH GROUPS	DistriNet - KU Leuven, IDLab - UGent



WHAT IS AN IMEC.ICON PROJECT?

The imec.icon research program equals demand-driven, cooperative research. The driving force behind imec.icon projects are multidisciplinary teams of imec researchers, industry partners and / or social-profit organizations. Together, they lay the foundation of digital solutions which find their way into the product portfolios of the participating partners.

CAPRADS project partners:



AMERICAS

raffaella.borzi@imec.be
T +1 408 386 8357

JAPAN

isao.kawata@imec.be
T +81 90 9367 8463

CHINA

timo.dong@imec-cn.cn
+86 13564515130

TAIWAN & SE-ASIA

mavis.ho@imec.be
T +886 989 837 678

EUROPE & ISRAEL

michel.windal@imec.be
+32 478 96 67 29

VIETNAM, BRAZIL, RUSSIA, MID EAST, INDIA

max.mirgoli@imec.be
T +1 415 480 4519

DISCLAIMER - This information is provided 'AS IS', without any representation or warranty. Imec is a registered trademark for the activities of IMEC International (a legal entity set up under Belgian law as a "stichting van openbaar nut"), imec Belgium (IMEC vzw supported by the Flemish Government), imec the Netherlands (Stichting IMEC Nederland, part of Holst Centre which is supported by the Dutch Government), imec Taiwan (IMEC Taiwan Co.) and imec China (IMEC Microelectronics (Shanghai) Co. Ltd.) and imec India (Imec India Private Limited), imec Florida (IMEC USA nanoelectronics design center).