Future is Composable:

How APIs, Microservices and Events are reshaping the next-gen Enterprises
2020 was a year of massive disruption for businesses and individuals everywhere. The world has changed forever - business processes and customer touch points that have been embedded in organizations for decades are being swept away by online and app-based companies – powered by Cloud, APIs, data analytics, mobile, and social.

Some of the key imperatives for this new era are Resilience, Flexibility and Agility.

To keep up with the pace of technological innovation, organizations are rethinking their architecture strategy with a more modular approach, to maximize their ability to build, assemble and reassemble business elements to rapidly seize market opportunities and respond to disruption and threats while being resilient. To do this, organizations must understand and implement the “composable enterprise”.

In this paper we will address how this approach embraces the API economy, delivering business outcomes through the assembly and combination of packaged business capabilities.

Come with us, it’s time to compose the future!
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What is Composable Enterprise?

According to Gartner, a Composable Enterprise is:

“An organization that delivers business outcomes and adapts to the pace of business change. It does this through the assembly and combination of packaged business capabilities (PBCs). PBCs are application building blocks that have been purchased or developed.” - Gartner: Future of Applications: Delivering the Composable Enterprise

As many organizations struggle to fully implement digital transformation, the composable enterprise framework offers a new path to success. So, what do you need to know about it?

Composable enterprise means creating, innovating and adapting business through interchangeable building blocks, which enables a business to rearrange and reorient as needed depending on external (or internal) factors.

Delivering the composable enterprise will require much deeper collaboration between stakeholders. This will blur the boundaries between business and IT, as organizations will need to deliver more unique and customized application experiences to application users.

Gartner established the 4 principles of composable business, which are:

• More speed through discover: organizations need to deliver innovation and adapt more quickly to respond to the accelerating pace of business change.

• Greater agility through modularity: organizations will need to adapt their offerings — making them more modular and consumable through different delivery channels, touchpoints and modalities. This will require an improved architectural approach.

• Better leadership through orchestration: business leadership is taking a more strategic role in purchasing, implementing and maintaining applications. This requires a new approach to vision and strategy.

• Resilience through autonomy: business continuity plans are designed to address the challenges of the past. Organizations plan for disruptions to resources and processes, but don’t recognize that business models can be just as big a threat to the continuity of operations. The key is to ensure that your business model is as resilient to outside disruptions as the rest of the business.
In the end, composable business requires a foundational change in business thinking, architecture and technology.

So how does composable enterprise architecture work?

The three building blocks of a composable business are:

- **Composable thinking**, which keeps you from losing your creativity. Anything is composable. When you combine the principles of modularity, autonomy, orchestration and discovery with composable thinking, it should guide your approach to conceptualizing what to compose, and when.

- **Composable business architecture** ensures that your organization is built to be flexible and resilient. It’s about structure and purpose. These are structural capabilities — giving you mechanisms to use in architecting your business.

- **Composable technologies** are the tools for today and tomorrow. They are the pieces and parts, and what connects them all. The four principles are product design goals driving the features of technology that support the notions of composability.

A critical component of the success in the composability journey is the **packaged business capability** (PBC).

According to Gartner, “Packaged business capabilities (PBCs) are software components representing a well-defined business capability, functionally recognizable as such by a business user”. Technically, a PBC is a bounded collection of a data schema and a set of services, APIs, and event channels.
Packaged business capabilities expose APIs and event channels, allowing enterprise architects to coordinate and scale packaged business capabilities across a complex digital enterprise.
Breaking the monoliths with microservices

The key drawback of monolithic applications is the inability to evolve quickly according to business needs. It usually is a single deployment element that needs to be coordinated when changes happen and also cannot take advantage of the cloud elasticity. When breaking the monolith, every microservice can be an independent deployable component that allows updates without disrupting the whole system, that also can be scaled to address some particular needs. In addition, it brings flexibility in terms of programming languages and underlying technologies. On the other hand it creates challenges in terms of communication between services. In this scenario they are not necessarily in the same network and often developers underestimate the complexity of network issues between the microservices.

Faced with these modern advantages and needs, rethinking a monolith and rewriting it with microservices does not only mean performance and economy gains. Here we are dealing with the viability of a cloud operation, application modernisation and agility. To rethink a monolith, we can adopt some simple steps, such as:

- Don’t throw away your monolith, however don’t add anything else to it;
- Start with the least dependent or most decoupled services and;
- Have a clear roadmap for this task. Rewriting a monolith is not an easy task.
- Pay attention to the network element
APIs as the standard communication format

APIs, although they are not a new concept, represent a revolution in the construction of modern and scalable applications. In this new economy, ensuring the connectivity of systems, and especially of businesses, is fundamental. The APIs are a simplified way of guaranteeing that your services are exposed and consumed with greater ease by third party applications.

Among the universe of advantages of using APIs, we can highlight the standardisation in communications. More important than sharing your services, is the way they are shared. The use of unfriendly interfaces or difficult coupling may represent barriers for those who are trying to connect to you.

A RESTful interface is characterized by easy onboarding, which directly reflects on the development cycles, which become much shorter. This point becomes very relevant when we are talking about the speed of value delivery to your client or partner, whether they are consuming your resources for the development of an application, or for those who are trying to connect to your business ecosystem.

Another important factor for the adoption of APIs is the security of information and systems. It is easier to deal with layers of security when dealing with APIs, since data manipulation and access control policies are facilitated. APIs are no longer a technology element anymore, now they are among the strategic foundations of business.
Events when asynchronous is the better

An Event Driven Architecture (EDA) uses state changes (events) to trigger asynchronous communications and is common in modern microservices based applications. As events, we can describe specific actions within a context that are important for the business, such as for example the moment when the customer adds a product to the cart in e-commerce. We observe here that this action is treated as a moment, the detection is done instantaneously and we do not need a request/response cycle for validation, unburdening computational resources for the operation.

Some emerging technologies depend on EDA for maximum performance, as is the case of IoT. In this case, Beacons are a great example of the need to be based on events, because imagine managing hundreds of devices in the same shop and depending on a request/response cycle for each of them. The use of resources in this case would be huge, and may even make it unfeasible. Events meet this demand in this context, enabling the capture of information and triggering other actions.

A key point when thinking about Events and asynchronous communications is in relation to business moments. Their definition is quite simple: they are specific events within a journey that can represent some kind of (re)action to take advantage of that moment. It is essential to have a model that can react quickly to these moments and trigger an action in response. In this context, EDA necessarily meets their needs and can empower the business with faster responses to the customer. This context is very coherent in the payment or retail industries, where decisions are made in fractions of a second and totally change customers’ journeys.

At this point you may be thinking that this can be solved with other technologies. However, let’s think about the degree of complexity when we have several other systems that need to capture this information (banks, acquirers, marketplaces, ERP etc.). Here we can see the feasibility of Events Notifications, and how we can equalize all occurrences through a single call.

Basically, in the act of a purchase the event(s) is (are) triggered and only the systems interested in each type of event will be notified, firing a GET to receive such information.

Now think that each of these systems can take advantage of these moments to target more specific actions to your customer, whether it’s a quick purchase confirmation, or offering products and promotions that are directly related to this event, being more accurate and
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offering a better experience. In addition, it generates less dependence on remarketing actions, which can be costly and invasive for your consumer.

An Event Driven Architecture will certainly bring great benefits to businesses that go beyond taking advantage of business moments. There are hundreds of contexts where monitoring events becomes an excellent option for real gains and at scale.

Supporting Modern Integration Trends

Integration has traditionally been delivered by a centralized team. This model only allows for linear scaling of integration implementation and can be a bottleneck. Enabling citizen or ad hoc integrators will allow faster scaling of implementation, but it can introduce significant governance, consistency, security and compliance risks, while also increasing technical debt.

To continue supporting digital business demand, software engineering leaders responsible for integration should:

• Enable low-code integration platforms by engaging different personas (such as ad hoc or citizen integrators) and ensuring proper operational and governance models. This will help to shorten time to value and enable rapid innovation.

• Eliminate wasted efforts associated with building excessive APIs for integration by reusing the existing APIs that are offered as an entry point to an interface.

• Implement and combine APIs and Microservices management (Mesh architectures) to fully support North-South and East-West communication. This will help to simplify and speed up the way the organization addresses hybrid and multi-cloud integration challenges.

• Prevent the technical and governance challenges associated with the proliferation of multiple SaaS-embedded integration tools by using these tools only when there is a significant, demonstrable reduction in time to value.
You enable the change

Composable business doesn’t replace digital business. Architecting your business for real-life adaptability & resilience in the face of uncertainty make things modular; mix & match business functions to orchestrate proper outcomes; discover, sense when change happens and; use independent / autonomous business units.

To summarise, a composable enterprise seems to be a path to future growth. At Sensedia we would say that the long-term success of a composable enterprise includes looking for the “moments of composability” and seize the opportunity they present, target outcomes, and related technology with a workforce and vendors prepared to innovate.
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- Packaged Business Capability (PBC)
- APIs, Events Stream Interface
- User Experience

Relevant additional skills:
- Product mindset for APIs
- Adaptive Governance
- Mesh Architecture for microservices
- Open / Restrict APIs

Monolithic Application

Optional User Interface

Microservices approach
Independently deployed

Composability

API Products

Composition Technology

Low code Integration Development Automation

Composed Application Experience
Case studies

Companies were forced to shift their operation to a homework basis and quickly adapt their processes, keeping agility, transparency and value for the clients.

Our clients’ stories were not different.

Open Finance is changing the way people use and move money. Its goals - to prompt innovation, increase competitiveness and help businesses/consumers better understand and utilise their finances – are also key objectives of Cielo, Brazil’s leading electronic payment provider.

Alongside these objectives, Cielo wanted to transform itself from a simple point of sale (POS) payment provider to a widely-recognised tech facilitator and innovator. To do so, in 2014 the company moved onto an API Management platform, supported by API specialist firm, Sensedia. Since then, Cielo has gone from strength to strength; at its core an Open Innovation strategy with projects delivering change at an unprecedented rate.

The projects
Cielo first changed its business model and architecture supporting online solutions. This included programming languages, adopting microservices and APIs, cloud-data processing, using big data providers, rolling out developer apps and ensuring teams could work within a more agile environment.

Its teams developed a business platform to enhance the digital end-to-end customer experience, using analytics and big data to support informed decision-making, helping customers predict sales figures and trends.

Portable machines with QR code reading and NFC technology, intelligent terminals and new payment and transfer solutions were introduced and Cielo provided white-label technology for brands with digital wallets, such as Bitz and Bradesco.
Solutions included:
- **Superlink** – for customer’s selling goods without a website. Partnered with a logistics company, Cielo delivers ordered goods within 24 hours
- **Checkout Cielo** – adds a payment page to customers’ websites
- **Cielo e-commerce API** – for websites/apps with transaction analysis, support features and data intelligence
- **Promo** – systems to create events, gifts, discounts and loyalty programmes
- **Cielo Management** – an online sales app with predictive sales and receipt-tracking functions
- **Cielo Pay** – a digital wallet app focused on a ‘long tail’ audience, performing all transactions, including debit card issue, via a single application
- **Lighthouse** – analyses activity within a users’ peer group, giving insights into customers’ income profiles, purchasing behaviour and sales patterns
- **Cielo store** – personalised apps offering: digital web tools, sector specific support, PD Vend (management tracking), POS control tools, Finder (tracking Cielo POS equipment) and media/sales support.

Cielo stats
- **6.9** billion transactions – around 15% of Brazilian householders – captured every year
- Accounts for **9%** of Brazil’s GDP
- Covers **99%** of Brazil’s territories
- **100%** availability
- Technical capacity to support **14,000** sales per second
- **100%** of sales monitored 24/7
- Around **50%** of Brazil’s online businesses use a Cielo e-commerce solution
- Has capacity to support **8 x** the volume of Brazilian e-commerce transactions
- Uses AI system with machine learning and best anti-fraud tool in the market

Cielo also used in-house teams to run:
- **Innovation labs** - developing proof of concept, testing new tech hypotheses, implementing scalable solutions
- **Open innovation programmes** - developing added-value services with senior management teams mentoring start-ups (140+ registrations from Brazil, Portugal and Costa Rica) and hosting hackathons/developer meetings
- Internal tech content validation.
**Developer portal**

Having introduced external REST APIs in 2015, Cielo now has a portal with over 15,000 external developers integrating their apps and products. Out of the 60+ APIs in production, 10 are openly documented and include ones for:

- E-commerce
- QR Code payments
- Omni-channel payments
- A promotions platform
- A LIO smart terminal (integrated to a LIO platform)

**Pandemic pressure**

When Covid-19 took hold, Cielo’s innovation supported customers. During 2020, the company reported a 45% increase in e-commerce revenue, a 1000% increase in QR code payments via Cielo Pay (52 million transactions between March and August 2020) and a 300% increase in demand for Superlink.

Cielo also developed QR codes so its machines could take payments from people receiving emergency Government aid (instead of them having to go to banks to transfer money). Between May and November, **4.5 million transactions per month were recorded**.

**Future innovation**

Cielo is partnering Facebook in its new WhatsApp payment platform, set to trial in Brazil this year, and there are plans to introduce a digital currency, white-label platforms for accounts and wallets, new credit products, more value-added services and innovation events.

**Cielo API use**

- 15,000 registered external developers
- 60 APIs in production
- 10 freely-documented in open portal
- 300 partners using APIs

**Increase in SME income contribution**

Today Sensedia manages and runs:

- Cielo’s SaaS API Management platform
- The developer experience – via a dedicated team
- An API monitoring service
- API exposure and microservices development consultancy services.

Mission accomplished when it comes to becoming a widely-recognised tech facilitator and innovator.

Find out more about Sensedia and Cielo
sensedia.com | cielo.com.br
Use BaaS to take the lead in the OB race

When Brazil’s Banco Original adopted a Banking as a Service (BaaS) strategy and opened its Application Programming Interfaces (APIs) to third parties, it reaped the rewards.

Ahead of the technology curve
The personal and corporate bank was ahead of the technology curve in 2016, when it was one of the first to connect BOT to its Facebook Messenger, Instagram and Whatsapp accounts. Keen to build upon its reputation as an innovator and expand its technological capacity/customer base, BancoOriginal, launched its BaaS platform in 2019; the same year it launched the first 100% digital account for entrepreneurs and micro-business owners.

Banco Original views a BaaS platform as fundamental to building a partner ecosystem to connect different areas of expertise, which in turn enable it to offer more financial / non-financial products. It also generates high transaction volumes and customer retention, plus provides an additional revenue source.

Digitalising services however is one thing, but sharing them across a wider ecosystem is another, so when developing its BaaS platform, Banco Original partnered with API specialist, Sensedia.

Sensedia helped Banco Original structure its BaaS model and open APIs for third-parties to connect to. Initially focusing on governance and standardisation of the exposed APIs, Sensedia moved onto migrating APIs and services associated with bill payment, card operations (including BOT-connected systems) and account management. This was particularly challenging, given API management was historically run by different companies.

Framework for the future
Having brought everything onto a single easy-to-operate interface, Sensedia was able to standardise, structure, organise and document all Banco Original’s APIs and provide a framework for its in-house teams to maintain existing APIs in the future and build new ones.
Sensedia’s consulting teams helped Banco Original define its BaaS platform and support decision making re; API architecture, modelling, reformatting and structure, and the bank now has an API management platform that’s flexible and simple, enabling it to easily expose, manage and document APIs.

In addition to a full-service provision, which includes money withdrawal using QR codes, investment platforms, insurance, mobile phone top-ups and payment machine supply, Banco Original supports PicPay – the largest digital wallet provider in Brazil with 34 million users – and runs an Original Hub Unit, managing 50+ partnership arrangements with fintechs using its BaaS platform.

**Open competition**

Banco Original believes that whoever manages to combine the best, low cost and differentiated customer experience will be ahead of the Open Banking pack. And with regulatory pressure stimulating competition, technology creating new solutions and customers more receptive to new innovations, this sector is a wide open field, ready to accommodate new players.

But only those fastest off the blocks ... with technology that gives them the agility to compete, will succeed. Judging by Banco Original’s results, the bank is certainly a contender. In January 2019, at the start of its digital journey, Banco Original had 700,000 account holders; at the start of 2021 this had grown to 4 million, an increase of 571%.

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**Original Bank’s five pillars**

- **Innovative**
  
  Our modern and innovative practices ensure we always offer an innovative service to all account holders

- **Simple**
  
  We simplify the relationship between people and money with simple processes and language; something unique in the financial market

- **Transparent**
  
  Our goal is to have transparency in relations and our transactions, being open and true communicators with all stakeholders

- **Reliable**
  
  We guarantee your money is looked after responsibly by top professionals you can trust

- **Close**
  
  We combine technology with a personalised relationship, so each account holder feels unique

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Find out more about Sensedia and Banco Original

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About Sensedia

Founded in 2007, Sensedia is an Integration specialist with offices around the world. Sensedia works with market leaders in varying sectors and its solutions enable clients to extend their digital businesses. Sensedia is one of the main Integration pure players in the world, focused only on its Modern Integration Platform and Strategy & Professional Services around the full lifecycle of API Management and beyond. Sensedia was recognized by Gartner in its Magic Quadrant as a Visionary and by Forrester in its Wave as a Strong Performer.

Find out more at sensedia.com

About the author

Kleber Bacili is founder and CEO of Sensedia, a company specialized in APIs. He has a degree in Computer Engineering from Unicamp, an MBA from FGV and specializes in Entrepreneurship and Innovation at Stanford. He is also a partner of Fundo de Capital semente IVP. Enthusiast for technology, a passionate Palmeirense and father of Helena and Hugo.