DYNAMICS OF INNOVATION

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WHY BIOMETRICS IN PAYMENT SYSTEMS?

Biometric authentication is a system capable to identify a person based on the inherent physical or behavioral traits associated with that person

Biometric based system is more secure and accurate compared to the traditional system

One-step verification has several inherent problems like intra-class variation, spoofing attacks and failure-to-enroll rate.

CUSTOMER'S NEEDS

MORE SECURE TRANSATIONS

EASIER & FASTER TRANSATIONS

WHICH ARE THE MOST EFFECTIVE TECHNOLOGIES NOW

TECHNOLOGICAL METHOD	PROS	CONS	USES AND INVESTMENTS	MATURITY
Iris Recognition	Speed of matching Low risk of spoof	Might be uncomfortable if wearing glasses	Airport security General identification IRISID	Used for other application
Face Recognition	No contact technology Low cost	Possible spoofing with sofi-sticated masks	Alipay (Alibaba group) - POS and kiosks Apple pay - only associated with smartphones	Used for payments
Veins Recognition	High accuracy Easy to use Low risk of contraffaction Very safe	Not very cheap	Fingopay IRISPAY	In development
Fingerprint Recognition	Low cost Small size	Low security level Medium accuracy	Mytouch Kimaldi	Used in conjunction with physical devices

IRIS RECOGNITION

It exploits mathematical pattern-recognition techniques on images of the iris of an individual's eye

+ PROS

_ Speed of matching (512 bytes)
_ High resistance to false acceptance (FAR: 10^{-7} %)
_ The iris never changes w.r.t. diseases or pregnancy
_ Even genetically identical twins have different iris patterns
_ Liveness detection to prevent spoofing

- CONS

_ Can be used from high distance without consent (up to 40 ft.)
_ Uncomfortable if wearing glasses
_ Could be fooled with images if cameras are cheap

USES OF IRIS RECOGNITION

SECURITY | AIRPORT AND CUSTOM

_ IRIS programme (Iris Recognition Immigration System) at Amsterdam's Schiphol and at 10 UK terminals.
_ Borders: Arab Emirates, India and USA/Canada

VENDORS | SMALL EXISTING COMPANIES

_ Iris ID System (a spin-off of LG electronics)
_ IrisGuard (large scale security)

FACE RECOGNITION

A sensor with two modules:
- one projects a grid of small infrared dots onto a user's face
- the other reads the resulting pattern and generates 3D facial map

+ PROS

_ High user acceptance
_ Easy to integrate
_ Since it's a technology already out in the market, it's one of the cheapest among biometrics technologies

- CONS

_ Factors such as illumination, expression, pose and noise during face capture can affect the performance of facial recognition systems
_ Medium risks level of false acceptance and rejection rates
_ Risk of spoof in case of twins and sophisticated masks

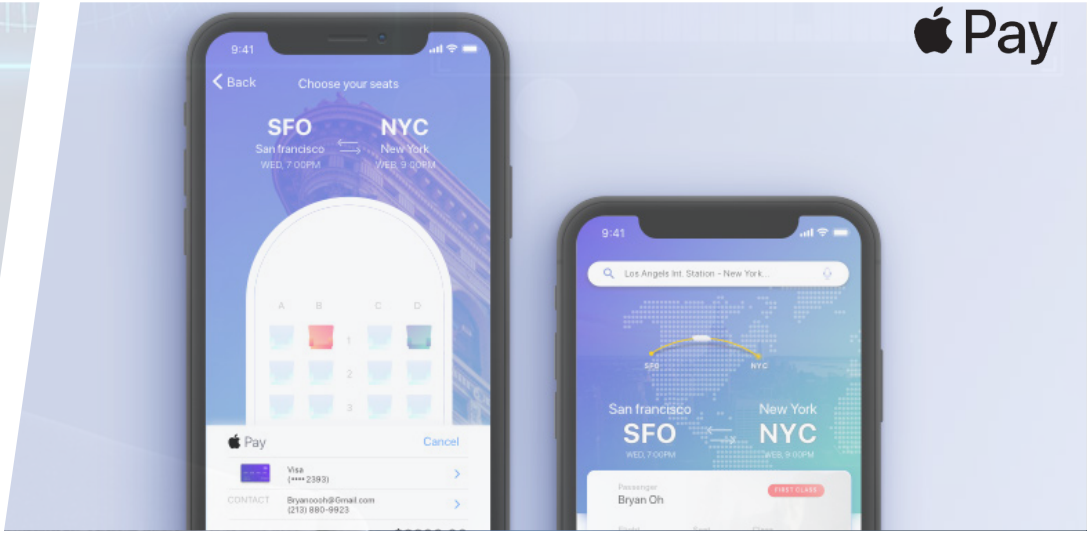
USES OF FACE RECOGNITION

VENDORS | ALIPAY (smile to pay)

_ Main firm in the biometric Point of Sale market
_ 300 cities served, thousands of POS already present
_ Claimed 80% lower cost with respect to traditional self-service POS

VENDORS | MINOR OR POTENTIAL COMPETITORS

_ Start-up like Uniqul in Finland and GS25 in Korea
_ Facial recognition technology already used for mobile payments
_ Large user base, with >200mln iPhones sold yearly and 1.4 bln active devices



VEINS RECOGNITION

Recognition of sub-dermal veins pattern from palm or finger thanks to non invasive and harmless infrared systems
It could be integrated in tablet, mouse etc

+ PROS

_ High accuracy
_ Easy to use
_ Low risk of counterfaction
_ Very safe
_ Accuracy: blood vessel patterns are unique to each individual and difficult to counterfait

- CONS

_ Not very cheap

USES OF VEINS RECOGNITION

VENDORS |FINGOPAY

_ Start-up born in 2016 meant for music events
_ They did not develop its veins recognition technology, but bought a patent from Hitachi and adapted it to a new business model
_ It is a new born company that is addressing to a still small market, there could be risks related to its ability to reach the mass market and scale up into a big and profitable company

VENDORS | IRIS PAY

_ Start-up born in England at the end of 2017.
_ Focused on a way to integrate veins recognition into existing hardware devices for payments.
_ The company is still in a ideating phase and a MVP for the market is being developed. To do so, IRISPay is hiring skilled workers and looking for funds.
_ They launched a Pilot Program in order to cooperate with larger companies.

FINGERPRINT RECOGNITION

The technology is based on recognising fingerprint through optical sensors, capacitive scanners, ultrasound/ultrasonic sensors and thermal line sensors.
It can be used as standaolone or through credit cards instead of the PIN

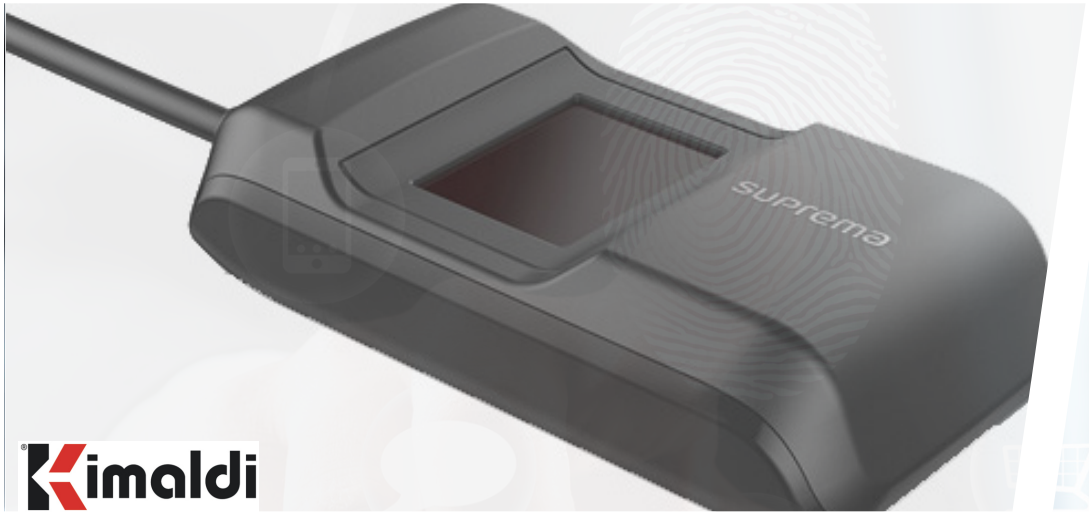
+ PROS

_ Highly unique, easily collectable and permanent throughout a person's lifespan
_ It is now a very stable technology that consumers are familiar with

- CONS

_ If somebody steals your fingerprint, there's no way to get new prints.
_ Artificial fingers that are made of gelatin, are accepted by particular fingerprint devices with optical or capacitive sensors

USES OF FINGERPRINT RECOGNITION



VENDORS | KIMALDI

_ Based in Barcelona, they manufacture and distribute high quality identification hardware since 1998
_ They are committed to carrying out all kinds of projects from a small to a big scale

VENDORS | MYTOUCH

_ Developed at TechColumbus
_ It converts a user's 16-digit credit card number to a unique algorithm that only MyTouch readers can uncode
_ It is yet used in several U.S. hospitals for security purposes, using it for financial purposes is novel.

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POSITIVE SOCIAL IMPACTS

_ Saved time within queues and waiting times in the whole payment processes increases overall wellbeing
_ Reduce of street theft due to lack of use of plastic or paper currency
_ Overall intuitive process
_ Beneficial for people who are physically or mentally challenged, since there is not a dependence of an external device in order to shop
_Individualization and distinction of customers

GOVERNMENT INTERESTS

_ The creation of a huge dataset containing information about citizen could be useful also for National Security reasons
_ In the case it works well, it is an extremely safe system, reducing the fraud
_ Flexibility of the payment method, extendible to eCommerce, BitCoin, BlockChain etc.

PUBLIC ENTITIES

Getting people to understand the advantages of the system by using the biometric authentication in massive popular operations such:
- Biometric-data-bank based personal identification (Aadhaar, India)
- Biometric-based voting machines in elections (Brazilian government)
- Travelers recognition in migration services (U.S Custom's and border protection)

FUNDING RESEARCH AND INVESTMENTS

Funding are currently coming from private investors:
- Big firms investing in their R&D (Hitachi, Fujitsu and Alibaba)
- Venture capitalists and other private equity investors providing capital to start ups (Fingopay, which already raised 1.2$ millions, Biyo)
- High growth forecasted for the market (Goode intelligenece forecasts 2.6 billion to use biometrics for payments by 2023)

NEGATIVE SOCIAL IMPACTS

_ Possibly privacy invasive
_ Great effort in collecting the information
_ Massive storage required
_ Necessity to have a proper legislation
_ Lack of confidence in the system

FACTORS PREVENTING RAPID DIFFUSION

_ Find a starting application and a market portion
_ Ethical handling of personal data
_ Possible conflicts with privacy rights
_ Level of accuracy highest possible
_ Need to have a proper legislation before the technology becomes effective
_ People's selective perception

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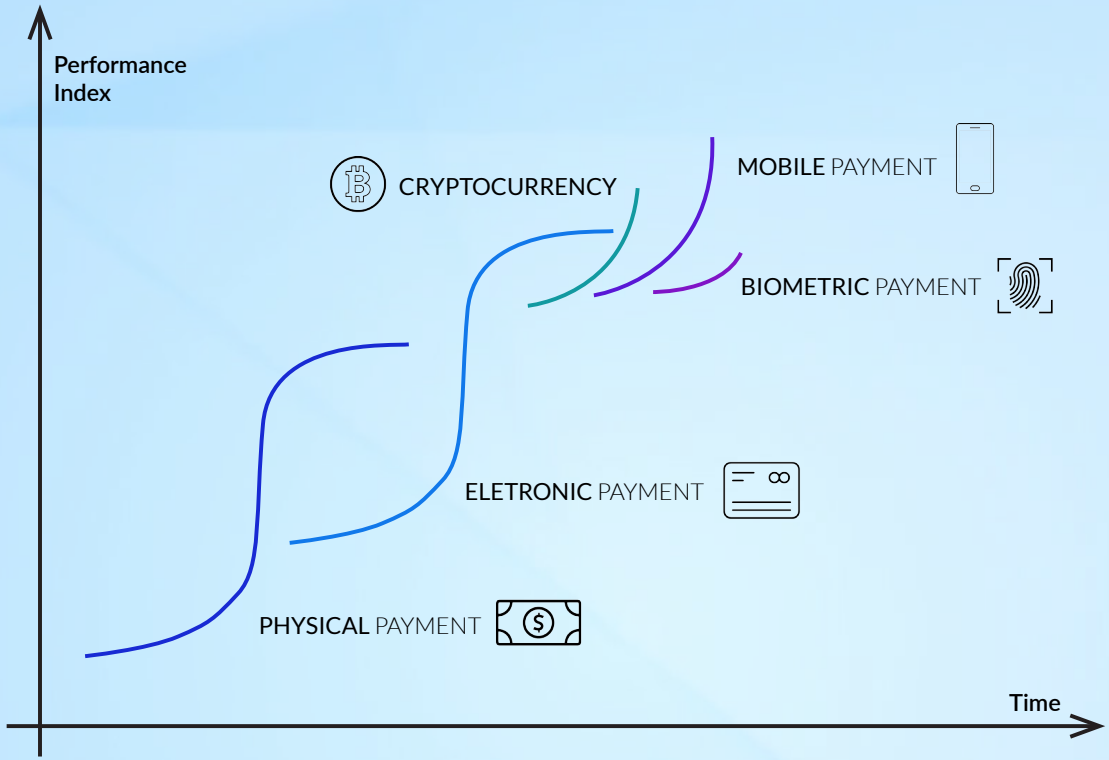


qualitative analysis

S-CURVE OF PAYMENT SYSTEMS

hardware dependent

$$\textbf{Performance index} = 0.5 * \text{Error Rate}^{1} + 0.2 * \text{Speed}^{2} + 0.15 * \text{Easiness of use}^{3} + 0.05 * \text{Physical Disability}^{4}$$

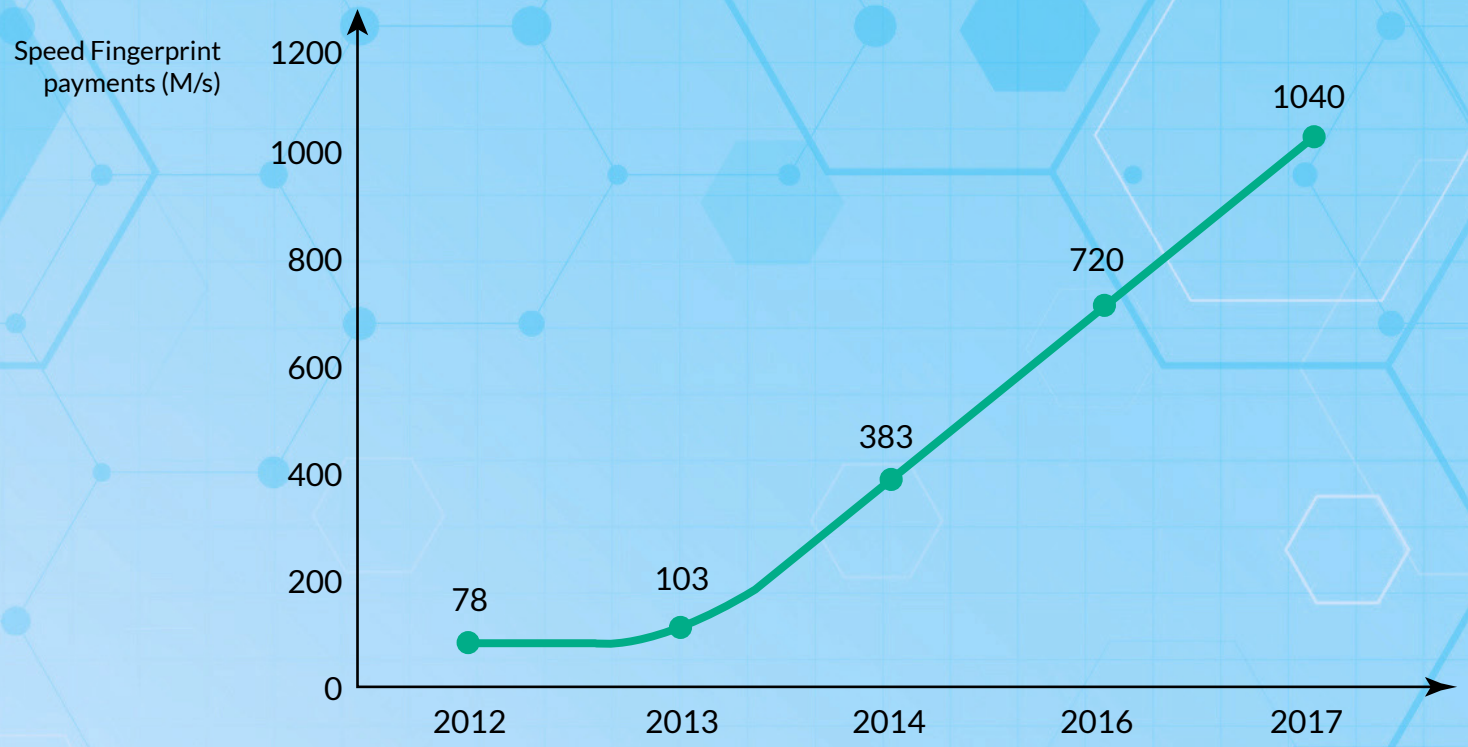
software dependent

[1] Error rate: accuracy, most important driver for payment system's performances: Costumers and Banks are mainly concerned with the Reliability of the service.

[2] Speed: delays, stongly influences the quality of the service.

[3] Easiness of use: intuitivity of the device for costumers and low difficulty in installing for merchants, stongly influences the quality of the service.

[4] Physical Disability: accessibility by disabled people. i.e. veterans withou arms who would find difficulties in paying using finger or veins recognition, or blind people in using iris recognition.
We should also include the accessibility of the service to everyone.



quantitative analysis

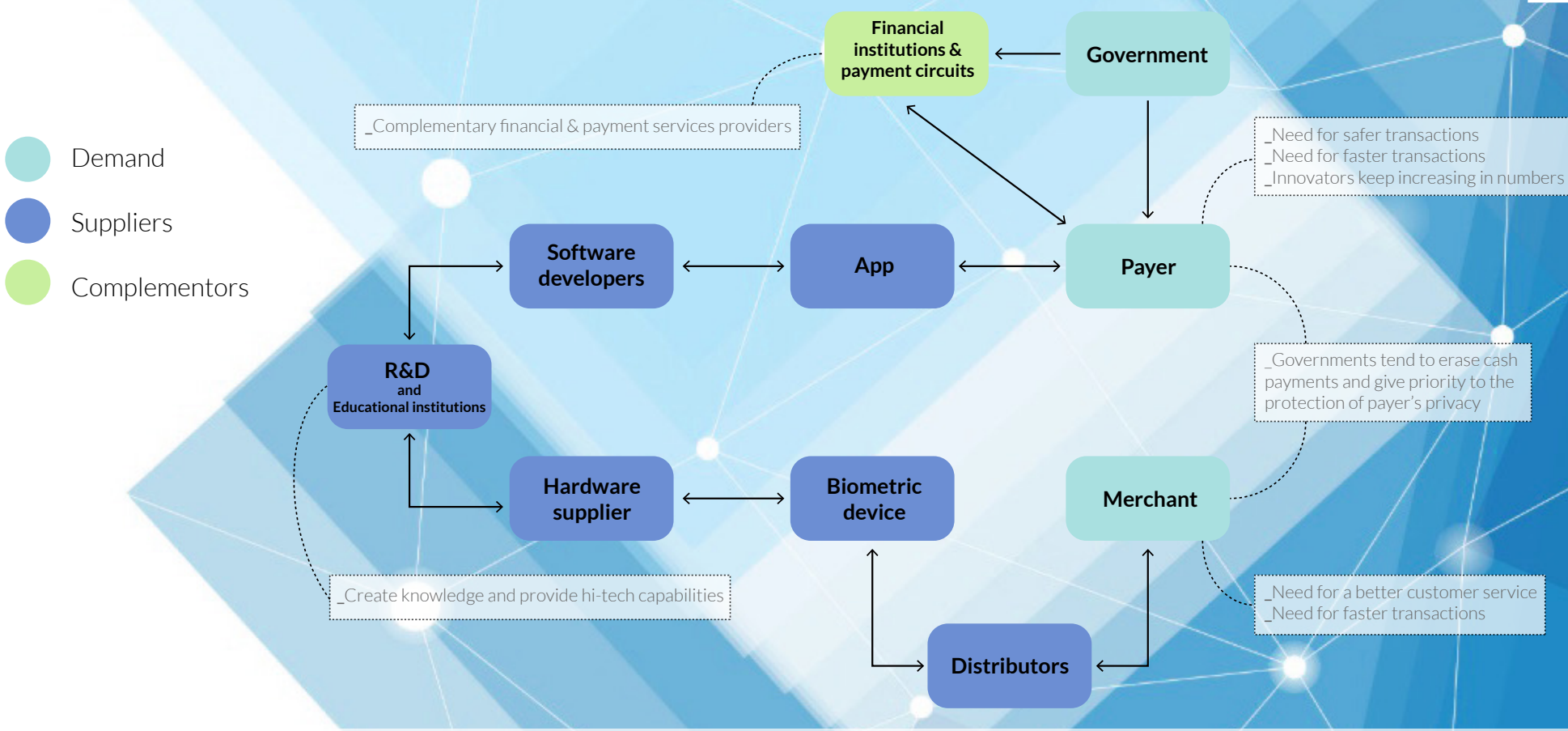
BIOMETRIC TEMPLATE COMPARISON

This graph describes performances of the most critical software subsystem for biometric payments: the template comparison algorithm. The numbers on the y-axis represent the milions of comparisons per second (in this case of fingerprint but similar trends apply to all the different technologies). From the curve we can deduce that we still are at the beginning of the diffusion phase.

ALTERNATIVE PAYMENT TECHNOLOGIES

Alternative technologies competing to define the next s-curve paradigm:

- E-wallet (Satispay, ApplePay...)
- Peer-to-Peer transaction systems (Paypal)
- Other biometric payments with low reliability but improving capacity (voice, gaint, hand) or new methods to use in retina and DNA recognition payments in an easier and less invasive way
- Banks developing other advanced technologies directly matches with highly customized financial services.



A COMPREHENSIVE PARADIGM

_ Complementors includes providers of financial services such as banks and other financial institutions. These services could increase the value of biometric payments systems since people who are using it could also use date to better customize services.

_ R&d: Universities providing high-level technological knowledge and skills, research centers, start-ups and big companies which are carrying out research and development activities within the company. This institutions are already well developed contributing to the overall technologial development.

_ Governments: would implement some regulations for the protection of the privacy, could be interested in monitoring data for public security.

_ How could needs of payers and merchant evolve: they will require higher level of service,in particular higher performances in terms of speed and accuracy.

_ Meaning: fast and trasparent transaction, increasing safety for the individual and the society at large. Their evolution: the meaning associated with this technology will reinforce.

WHAT KIND OF INNOVATION BIOMETRIC PAYMENT SYSTEM MIGHT BE?

incumbents — financial institutions & merchants

OTHER PAYMENT SYSTEM COMPANIES (VISA, MASTERCARD...)	OTHER CASHLESS PAYMENTS (SATISPAY, APPLE PAY...)	BANKS	SMALL SELLERS (SHOPS, STREET MARKETS...)	BIG COMMERCE (DEPARTMENT STORE...)
Radical Innovation	Radical Innovation	Incremental Innovation	Incremental Innovation	Incremental Innovation
Competence enhancing	Competence destroying	Competence enhancing	Competence enhancing	Competence enhancing
Peripheral innovation	Core innovation	Peripheral innovation	Peripheral innovation	Peripheral innovation
Sustaining innovation	Disruptive innovation	Sustaining innovation	Sustaining innovation	Sustaining innovation

If we include payment circuit companies in our business model as partners and not as competitors we will collaborate with them by contributing to the mutual increase of value.

We will compete with these companies which provide different solution to satisfy the same needs of the same costumers. (substitute services)

For all the intermediaries biometric payment systems can be a very useful tool, however not so revolutionary because of the indifference of the costumers.

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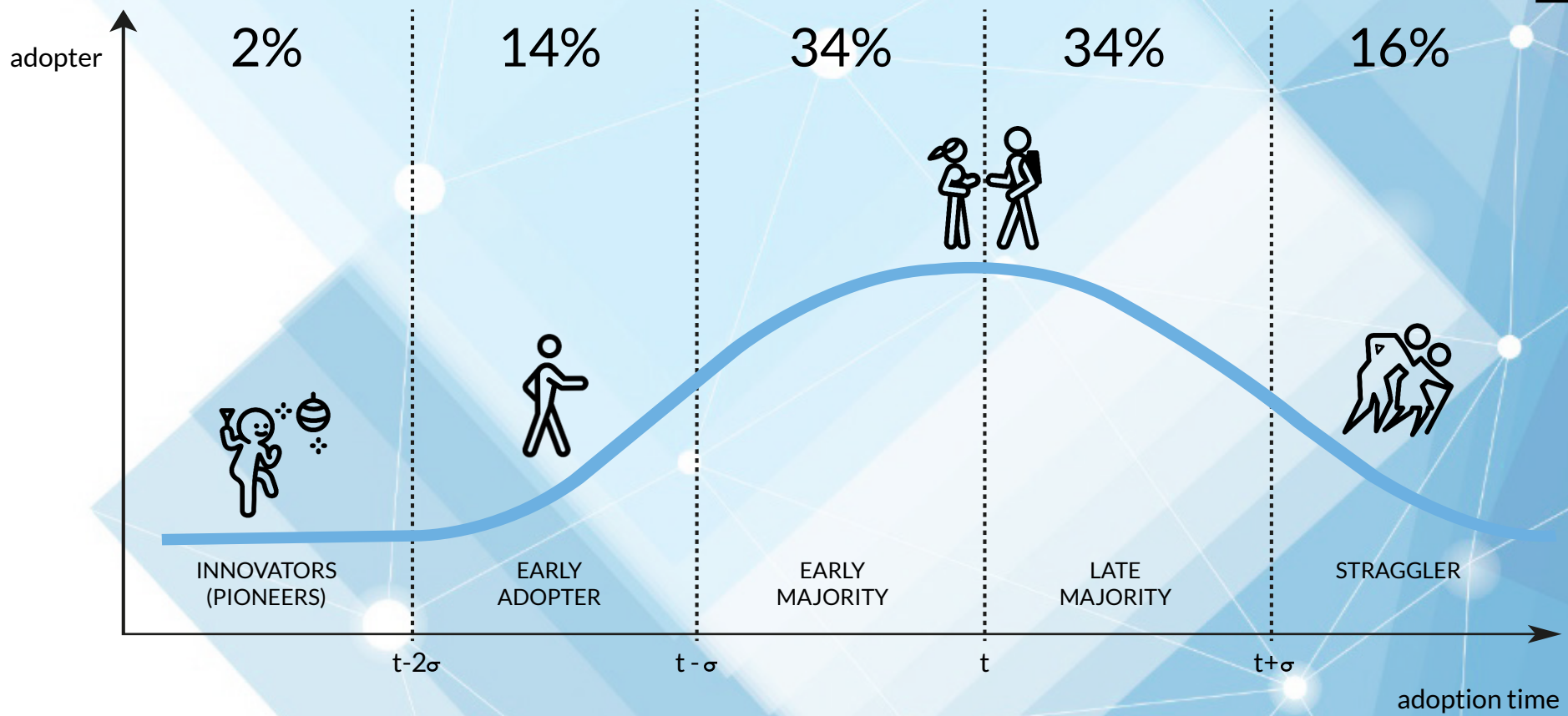


ROGERS MARKET SEGMENT

PAYERS	Young people that make frequent and small value payments. For example binge drinkers or fast food users.	People aware of biometric security methods, with an education >2 years of college and an income level >$56K year. Regular users of alternative payment methods.	People who eventually use e-wallet, peer-to-peer and contactless card payment methods.	People who eventually use credit/ debit cards.	Older traditional people who only use physical money and are concerned about security issues of new technologies of payment.

ATTITUDE OF MERCHANTS IN THE DIFFERENT PHASES

Innovative merchants in the fields of fast food business interested in reducing the waiting times. Entertainment places where methods of payment result uncomfortable.

Merchants who deal with innovative and visionary clients that are likely to pay with the most recent innovative technologies (i.e. Silicon Valley Companies).

Merchants that need to implement the technology in order to be competitive with the ones who have already adopted it.

Skeptical merchants with unaffected profit. Since the cost of the new technology has decreased or the brand image needs a reinforcement, they buy it.

Merchants that live in an environment not reached by the communication channels of the company.

PAYERS

Young people that make frequent and small value payments. For example binge drinkers or fast food users.

People aware of biometric security methods, with an education >2 years of college and an income level >$56K year. Regular users of alternative payment methods.

People who eventually use e-wallet, peer-to-peer and contactless card payment methods.

People who eventually use credit/ debit cards.

Older traditional people who only use physical money and are concerned about security issues of new technologies of payment.

CROSSING THE CHASM

MARKETING STRATEGY

Use of inventive incentives and rewards for using the biometric paying system.
Promotion of the security, the comfort, the easiness and rapidness of using biometric payment systems.
Use of a publicitary statement such “would you forget your head at home if it wasn’t attached to your shoulders, don’t worry we got you cover”.
Public events where you invite the users to use the system to “buy” something (Mock of paying ice cream cones with biometrics)

TECHNICAL STRATEGY

Guaranteeing the security of the system by incorporating single and multifactor vein face scanner system.
Constantly improve the software security, user’s data base capacity and user interface.
Reduce the cost of production by improving the assembly process

DEGREE OF VERTICAL INTEGRATION (VI)

The vertical integration (VI) impact of each member of the supply chain is calculated by summing the weight of each effect. If this value is > 0, it will be integrated. Each weight, that ranges from –5 to +5, quantifies the benefit of the effect and the value zero is assigned when vertical integrating or not doesn't make a difference.

DEPARTMENTS	PROS OF VI	CONS OF VI	COST OF VI	VI IMPACT
HARDWARE DEVELOPMENT	Increasing learning (+3) New capabilities (+3) Economies of scale (+4)	Lower flexibility (-3) Lower efficiency (-5)	-5	-3
SOFTWARE DEVELOPMENT	Higher customization (+1) Increasing learning (+3) Faster manteinance (+2) Higher control (+3)	-	+2	+11
R&D	Higher control (+5) Lower transaction costs (+3)	Less knowledge (-2)	-2	+4
DISTRIBUTORS	Better customer-merchant relationhip (+5)	Less coverage (-2) Higher risks (-2)	-5	-4
CLOUD	Higher confidence of pri-vacy of data (+3)	Less scalability (-2)	-2	-1

CURRENT STANDARDS

Current electronic payment technology is based on EMV and two ISO standards, one regarding the hardware of the card, the other the messaging system between the circuit and the client and merchant banks.
The main mobile payments platforms (Apple pay, Google pay) keep using these standards with slight modification, while minor players (Satispay) tend to implement proprietary solution.

Due to the nature of biometric data, proprietary solution could be preferable in order to simplify the privacy and legislative aspect by not involving third parties in the exchange.

On the other side the entry barrier for a proprietary solution are too high, therefore we choose to adopt the tokenization and cooperation with current payment circuits.

HARDWARE

_ ISO 7813: Standard for financial transactions cards
_ ISO 7811: Recording technique for magnetic stipes
_ ISO 7816: Integrated circuits cards (chip and PIN)
_ ISO 14443: Contactless integrated circuits

MESSAGING

_ ISO 8583: Standard for financial transactions cards originated interchange messaging.

The performance parameters used on the y-axes of the graphs are:

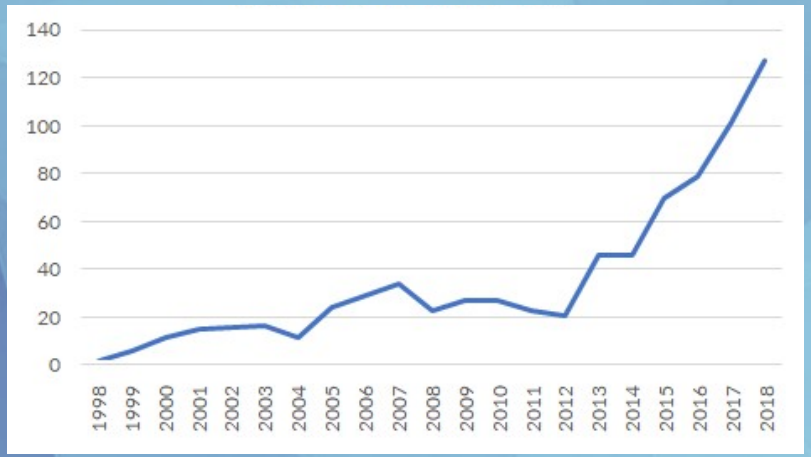
1.
Rate of innovation
Could be measured by the number of patents

2.
Technical performances
We refer to the performance index of the previous slides

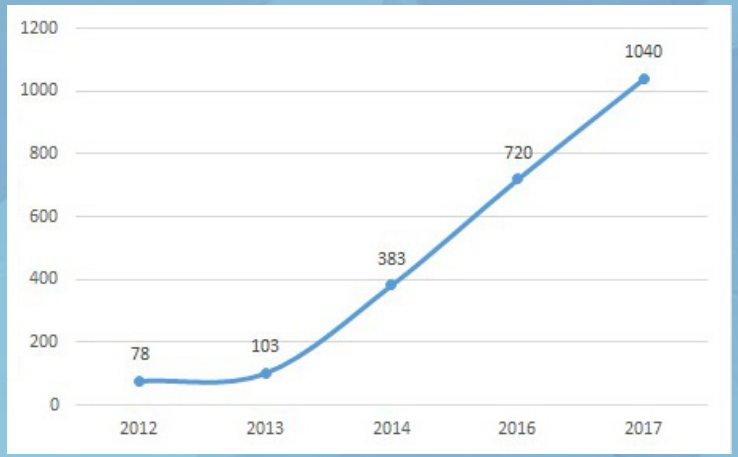
3.
Number of active firms
Number of firms who have already launched a product. We refered also to technology readiness level

4.
Size of the market
Revenues per year related to biometric hardwares.

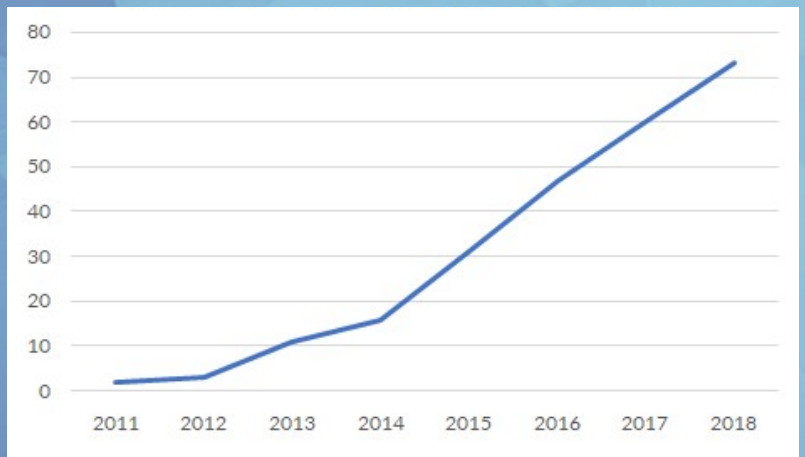
1. NUMBER OF PATENTS PER YEAR



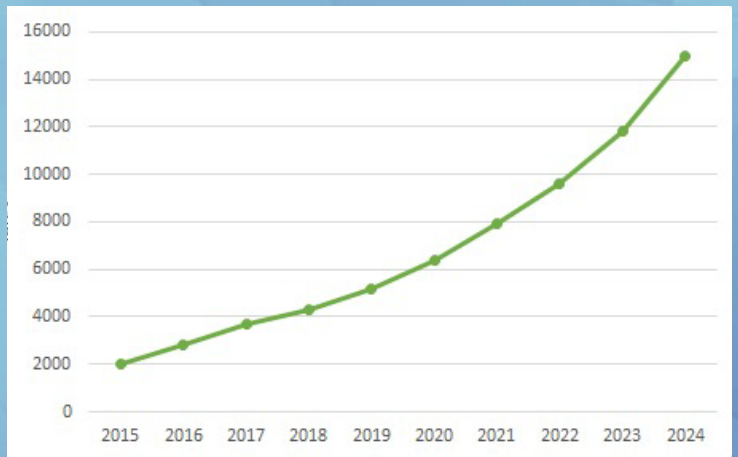
2. BIOMETRIC TEMPLATE COMPARISON



3. TOTAL NUMBER OF START-UPS according to *angels.co*



4. SALES PER YEAR



ABERNATHY-UTTERBACK MODEL APPLIED TO BIOMETRIC PAYMENT SYSTEM

Factors influencing possible candidates from their emergence (face, veins, finger, iris recognition):

- Market acceptance, what costumers think is the most easy and fun to do
- Easiness of implementation and use
- Security performances
- Aviability of complementors,suppliers and software developers

COMMENTS

Since 2013 the number of patents per year, start-ups created, speed of finger-print payments have risen significantly we can deduce that occurred a significant technological improvement which speed up the process of further technological and product development, attracting a higher number of firms.

Sales per year are going at a lower rate with respect to technological improvement due to a retarding effect in developing an effective business model and complementary asset in order to sell effectively the new products.

Looking at the graphs we can locate the current phase along time still in an initial phase, between the liquid and transaction phase: although the technology was recently developed for payments, the high growth in the product development, performances, number of active firms.

Since we are in a very initial phase, a reference design has not already emerged: technologies' performances are not far from each other and their relative position could change in short time.

LOCK-IN EFFECT

CONTACTLESS

People who are used to pay with credit card could use a service with improved speed and convenience without much additional effort to change behaviour.

PAYMENT SYSTEMS ON SMARTPHONES

By leveraging on something you use every day, payments systems based on smartphones could add some functionalities and manage additional partnerships: not much effort required to payers to integrate the new payment method with their daily life or to the company to build trust.

STRENGHT OF LOCK-IN EFFECT

Higher among more traditional and older people

Should leverage on additional convenience, do not need to own a smartphone or a credit/debit card, trackabilty (possibility to track costuer data in an easier way and personalized services), higher security.

In order to convince people to break their habits it is not enough to leverage on the great advantages the new system offer. Building trust with customers could widely reduce the skepisism of people towards biometric payment methods. A good campaign of advertising, together with the quality of the product is the key of its success.

MARKET

FIRST MOVERS ADVANTAGE

Concerning biometric payment, the first movers are start-ups (Fingopay, Biyo, Nxt-id etc.) or established companies (Mastercard, Alibaba etc.)

+

Start-ups could make themself known and create brand awareness, start building relationships and trust with merchant, distributors, banks, payers and other complementors.
Being able to build strong ties with other players in the supply chain could create entry barriers and more efficiency (higher costumer service level and lower costs). Established companies, which are investing in new technology, could also rely on strong brand image and costumer base, which could help them in introducing successfully the technology on the market.

-

These companies, start-ups and incumbents, are testing the market and the technology, they might need to modify the device software and hardware features, which leads to invest more money with respect to firms that will enter in a further stage.

COMPANIES ANALYSIS

FINGOPAY

Stage of development
product validation

Pre-money valuation
40M €

Funding
1,4M €

Source
crowdfunding

Market conditions
high chance of growth, no incumbent

iris

Stage of development
initial concepting

Funding
seed-round (undisclosed amount)

Market conditions
high chance of growth, no incumbents

Alipay™

Stage of development
establishing

Revenue
100M €

Business
part of Alibaba group

Market conditions
main actor in the sector, 500K users

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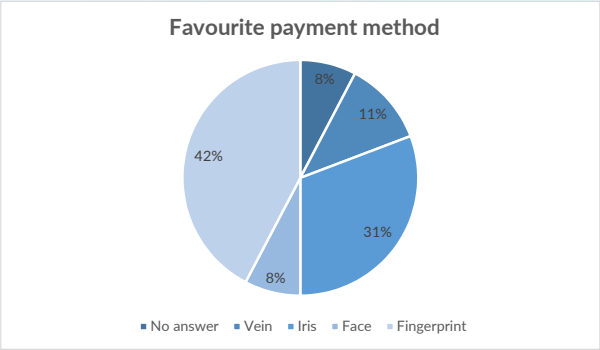
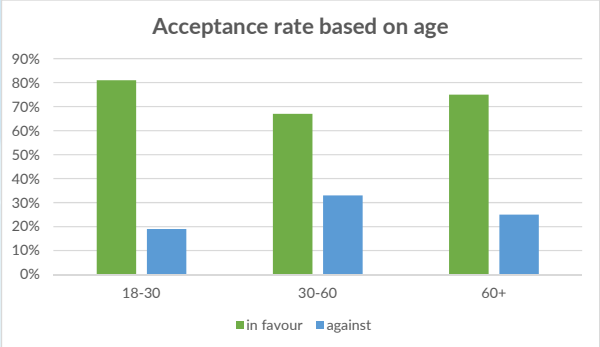


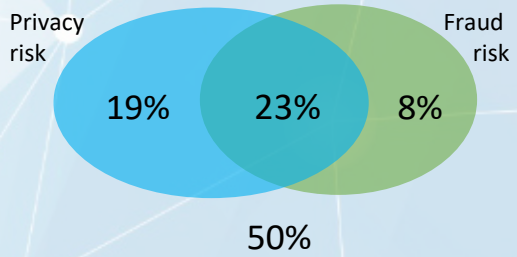
Consumers prefer fingerprint technology as it is very close to what they are already familiar with.



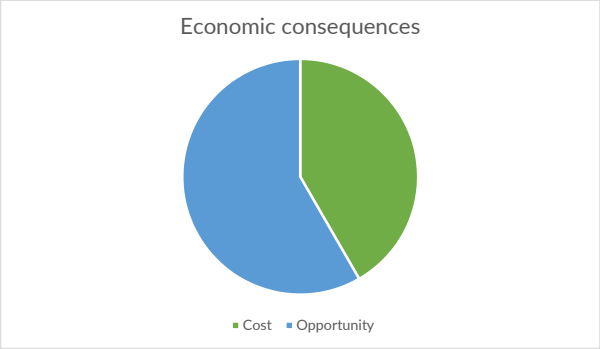
Even though the majority is in favour, it is interesting to note that adults are the group with the highest resistance.

worries and uncertainties

The largest perceived threat is privacy. However, if well regulated by the government, it wouldn't be critical.



MERCHANTS



Some merchants do not see biometric payment as a necessary expense, they are definitely positive about conforming if it becomes widespread.

Biometric payments are seen as a way to tempt costumers to spend more.

Merchants are generally afraid to entrust small start-up, different from usual and physical bank.

In spite of this, they feel safe about the technology, even if they do not know it.

PAYERS

If I had to imagine a biometric payment system I would definitely go for the fingerprint

Salvatore, 59 years-old, unemployed

I wouldn't like the iris recognition because I wouldn't be able to wear glasses at all times

Stefania, 25 years-old, researcher

Faster and easier

Guido, 22 years-old, student

It wouldn't really change my everyday life

Antonino, 23 years-old, student

Everything is being digitalized, so we would be moving in the right direction

Antonella, 62 years-old, employed

worries and uncertainties

I have understood, however it seems to me something very complex. If they steal my fingerprint, they'll get all my money, pota!

Sandra, 70 years-old, retired

If I provide my biometric data to third parties for other applications, would they be able to use them to pay on my behalf?

Matteo, 23 years-old, student

In case of a scam, it would be difficult to prove that it wasn't me

Flavia, 55 years-old, employed

I couldn't be able to send my grandson to get groceries for me since I cannot give him my identity as I do now by giving him my PIN

Elvira, 75 years-old, retired

MERCHANTS

If you can not defeat them, join them

Riccardo, 50 years-old, pizza chef

Of course it would be risky, but what isn't?

Barbara, 56 years-old, saleswoman

I need guarantees

Augusto, 56 years-old, estate agent

In a small town, I think it would be useless due to the habits of my usual customers

Federica, 26 years-old, bartender

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OUR TECHNOLOGY CHOICE

A wireless device consisting in a screen, a finger vein recognition component and a sophisticated double camera for face recognition.

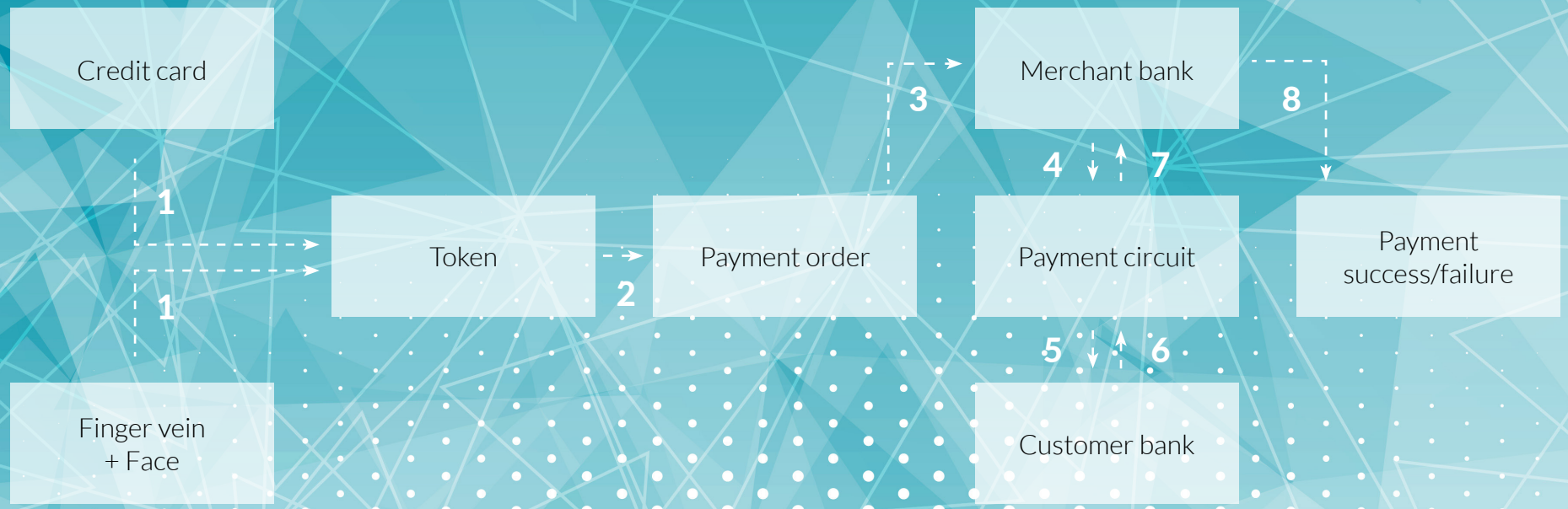
WHY THIS CHOICE?

_ Veins recognition is the most accurate method

_ From the market research interviews we inferred that customers feel more comfortable using their finger as biometrical authentication

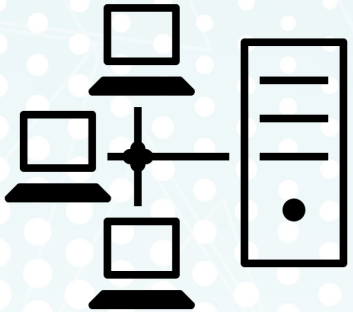
_ Face recognition is used as a second factor of authentication in order to reduce the risk of frauds and limit attackers

_ The two chosen technologies are less invasive than others, consistently with interview data



INTEGRATING IN A PAYMENT CIRCUIT

The payment process is somewhat similar to the digital mobile payment like Apple Pay. However, for our case, the token is fed by a biometric input instead of a combination of smartphone and credit card.



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BUSINESS MODEL CANVAS

Pay

Key Partners

VISA, Mastercard, Banks, Merchants

Key Activities

Process payments, Development and Maintainence, Marketing, Security, Agreements

Key Resources

Brand, Touch ID, NFC antenna, Licensing Agreement, IT Infrastructure, Payment Tokenizations

Value Propositions

Secure mobile transactions, no need of physical card

Customer Relationships

Automatized Online Relationship, APIs, iOS SDK

Channels

Merchants, Apple Store, Apple devices

Customer Segments

iPhone owners, merchants

Cost Structure

Patents,Customer Assistance, Mantainance, Legal and Insurance

Revenue Streams

Free, Fee on credit card transactions, Contribution to the Apple Ecosystem

BUSINESS MODEL CANVAS

B-NOV

Key Partners

Payment circuits, Banks, Hardware Suppliers

Key Activities

R&D for hardware and software, database management, after sale service (assistance and maintainance), legal and fiscal administration, marketing and communication

Key Resources

Software, hardware, talented people, copyright, database

Value Propositions

A payment system that allows merchants to widen and deepen interactions with customers simple and fast user experience, A two factor (veins and face recognition) biometric payment system allowing for ease of use and accuracy

Customer Relationships

Automatized service, Customer Assistance, personal assistance for merchants, codevelopement for big clients

Channels

eCommerce, personal selling

Customer Segments

Consumers
1st Milan (test phase)
2nd Big cities in Europe
3rd Mass market

Merchants
1st Entertainmentand street food
2nd Public transportation, big firms
3rd Mass market

Cost Structure

Hardware Manufacturing, Marketing, IT infrastructure, Maintainance and Assistance

Revenue Streams

Transaction fee for merchants, Free for payers

BUSINESS MODEL CANVAS

comments

Key Partners

VS ApplePay Both companies rely on banks and payment circuits to deliver their services.

Key Activities

VS ApplePay Our value proposition requires a set of activities and resources which are similar to the ones of ApplePay, even though the adopted technology is different.

Key Resources

VS ApplePay While the front end hardware is different due to the technology, the underlying IT infrastructure and other resources are similar

Value Propositions

A two factor authentication method allows for enhanced security because it exploits two separate parts of the body: finger veins and face. This decreases the risk of attackers making people pay against their will.
A face recognition payment system increases accessibility for disabled people.

VS ApplePay Two factors instead of one, different biometric technology, no need of smartphone, higher accuracy and security.

Customer Relationships

Co-creation in collaboration with big retail and fast food companies, involving the company in the production.

VS ApplePay Co-developed products, personal selling to make our system known, provide additional information.

Channels

VS ApplePay Innovators will be engaged through personal selling to build trust and facilitate adoption. Promotions, such as free trials and one month fee reduction. Online advertising will be brought on to create brand awareness in order to reach early adopters.

Customer Segments

The first segments that will be addressed will be small businesses (street food trucks, cinemas, amusement parks): people need to pay quickly and without reaching their pockets. Moreover, these businesses would be easy to reach and to test and evaluate our system. In a later stage the customer base will be expanded to the public transportation sector, eventually involving the government for a better control of ticket payments.

VS ApplePay Since Apple is an established company with a strong brand reputation it has a wider share of the market. It is currently addressing to all iphone owners for the payers' segments

Cost Structure

VS ApplePay For applepay the hardware is not a cost because it leverages on devices already on the market

Revenue Streams

VS ApplePay The ways in which the companies generate revenue are similar, since they both leverage on the transaction fees charged to merchants.

FINANCING PLAN

1 ANGEL INVESTMENT

High risk direct funding from a private person or crowdfunding necessary to develop a prototype

Dates April 2019
Amount 500K €
Activities initial costs, hire team members, MVP

2 SEED ROUND

First big round of funding. No more than 2M €. At this stage there is still a null revenue

Dates January 2020
Amount 1M €
Activities Testing with innovators, validate, evaluate

3 SERIES A

Includes a mix of old and new investors. Generally over 5M €. Production starts at this stage

Dates January 2021
Amount 6M €
Activities improve HW/SW quality, start production

4 SERIES B

Like Series A, with richer investors joining the funding. At this stage the market reach is in expansion.

Dates June 2022
Amount 10M €
Activities advertisement and further deployment

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GENERAL PATENTS' ANALYSIS
INTELLECTUAL PROPERTY AND STANDARDIZATION
VEINS PATENTS'ANALYSIS

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PATENTS' LANDSCAPE

The main stategies we will use to protect our intellectual property will be:

Network externalities Being a double sided businnes, the number of users is by itself a protection

Copyrigth and patents On the software and underlying optimization algorithms

Timeline number of patents, last 20 years

The general trend shows a quite exponential growth in the study of this technology.

Filters: Biometric payment as keyword in claims, title, abstract and claims
Number of patents (only one per family) : 1827

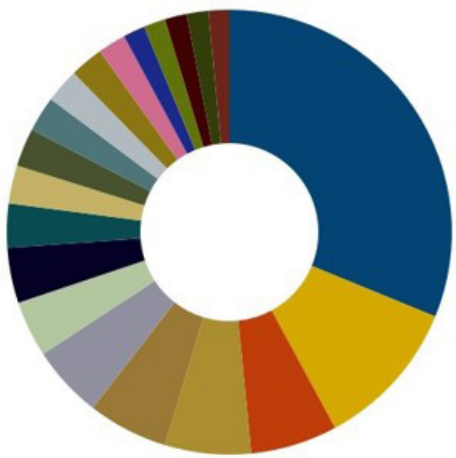
GENERAL PATENTS' ANALYSIS

USA, Japan and China are the most active Nations. The applicants are mostly incumbents but also start-ups are present. Patent technology sub-fields are shown in the pie chart adopting CPC code.

The general trend shows a quite exponential growth in the study of this technology.

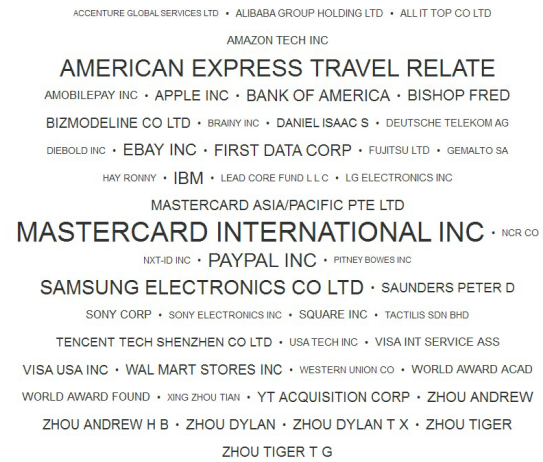
Filters: Biometric payment as keyword in claims, title, abstract and claims
Number of patents (only one per family) : 1827

Geographic dislocation

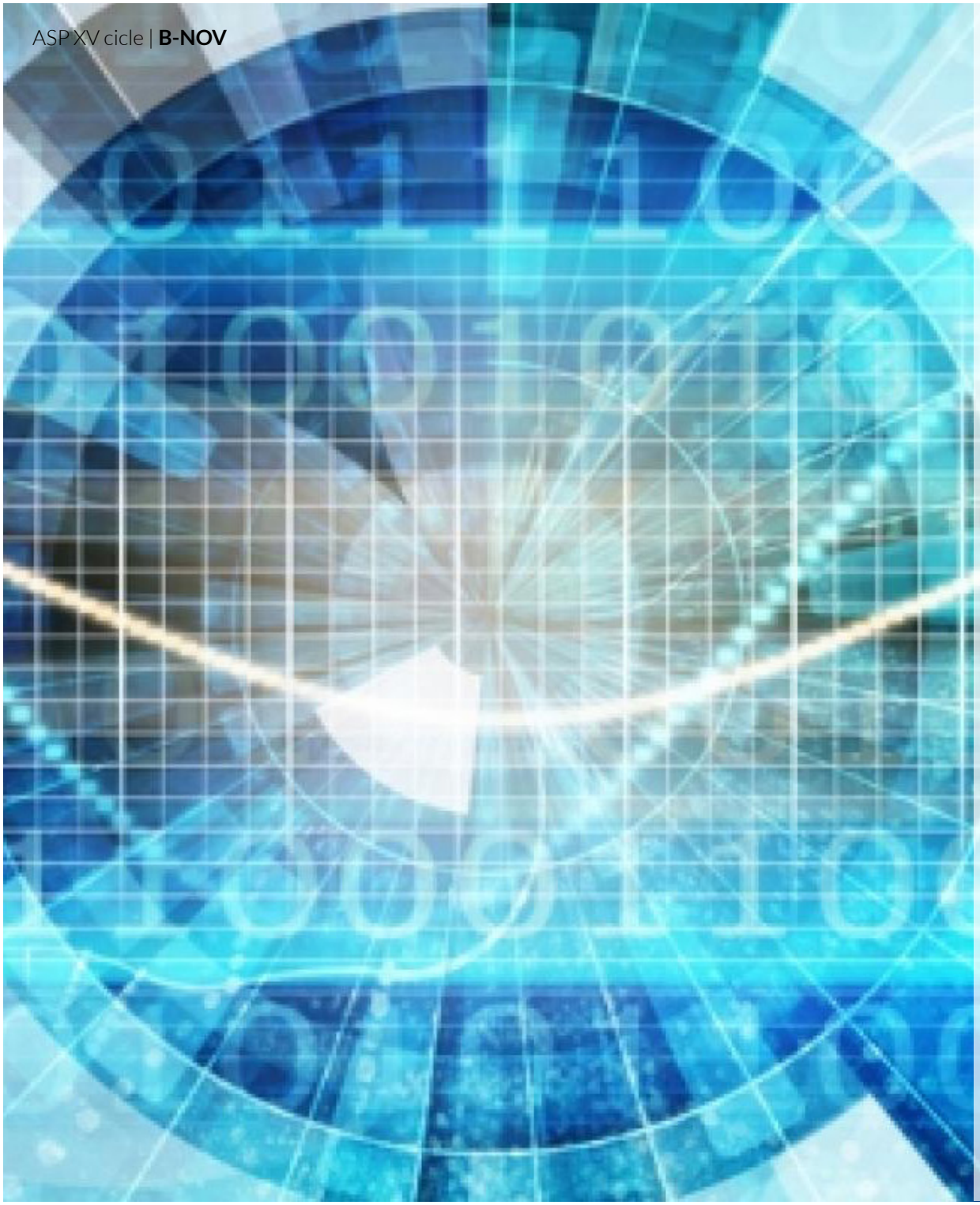


- **G06Q20/00 (1102 patents, 31%)** Payment architectures
- **G06Q30/00 (386 patents, 11%)** Commerce
- **G06F21/00 (223 patents, 6%)** Security arrangements for protecting computers
- **H04L63/00 (221 patents, 6%)** {Network architectures or network communication protocols for network security }
- **G07F7/00 (206 patents, 6%)** Mechanisms actuated by objects other than coins to free or to actuate vending
- **G06Q40/00 (186 patents, 5%)** Finance;Insurance;Tax strategies;Processing of corporate or income taxes
- **G07C9/00 (144 patents, 4%)** Individual entry or exit registers
- **G06Q10/00 (142 patents, 4%)** Administration;Management
- **H04W12/00 (113 patents, 3%)** Security arrangements
- **G06Q50/00 (98 patents, 3%)** Systems or methods specially adapted for specific business sectors
- **H04L9/00 (98 patents, 3%)** arrangements for secret or secure communication
- **G07F17/00 (91 patents, 3%)** Coin-freed apparatus for hiring articles;Coin-freed facilities or services

CPC code subdivision



Applicant



INTELLECTUAL PROPERTY AND STANDARDIZATION

From this preliminary patent analysis it emerges a patent concerning a device we'll use for our purposes. Furthermore finger vein recognition is frontrunner technology that we're going to spread as much as possibile.

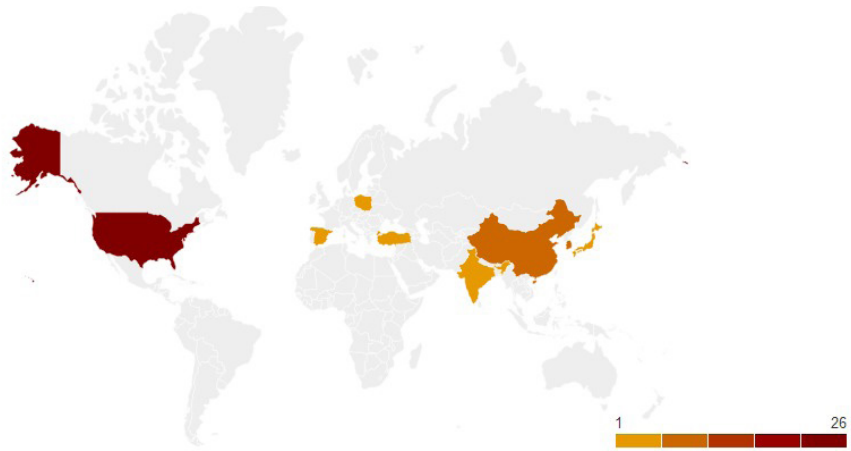
The idea of giving away full disclosure of the patented in invention is to enrich the total body of technical knowledge in the world. According to this statement, the intellectual property will help to shape the biometric payment industry. By progressively increasing the performance of already existing systems, since they are made known to the public knowledge, the offer to the market of better systems will help to create the dominant design of the biometric payment system. With said design, the fundamentals of the new payment system paradigm will take form.

VEINS PATENTS' ANALYSIS

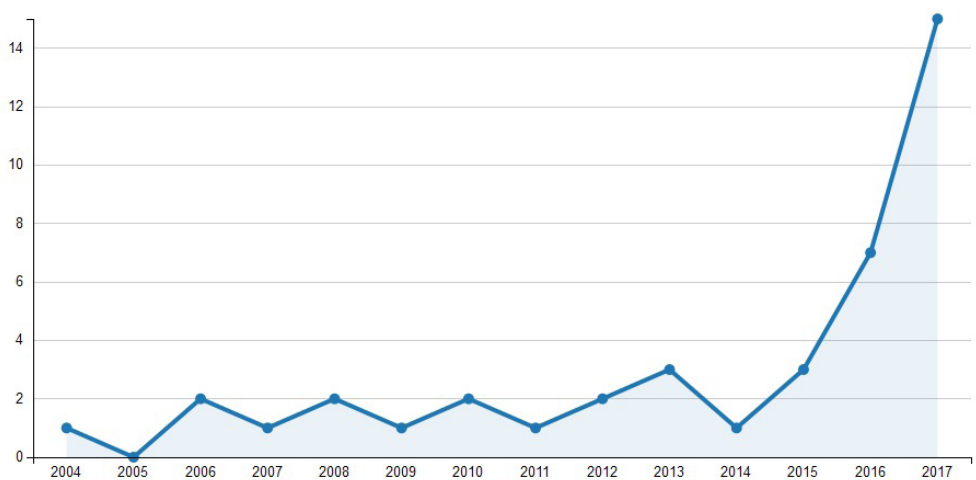
Now the same analyses are performed taking into account only the vein recognition. We can say that the behaviour of time trend and the geographic dislocation don't change significantly. Particularly significant are patents that join this new technology with the previous one (POS)

Filters: biomentric payment, vein recognition as keyword in title,abstract, claims
IPC code: G06Q20/00 Payment architectures

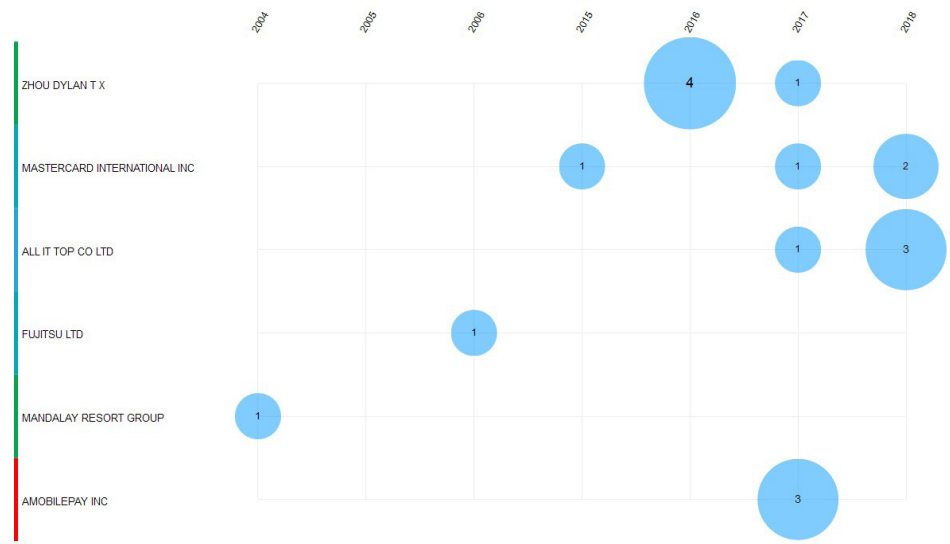
Number of patents(only on per family) : 53



Geographic dislocation



Trendline number of patents



Applicant vs time

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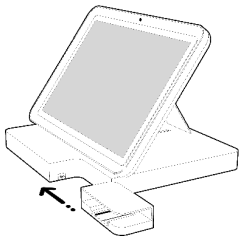
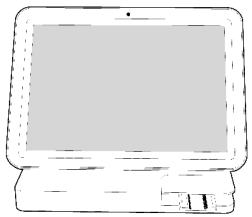
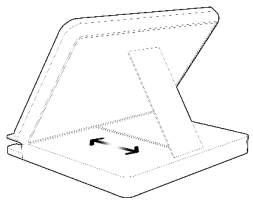


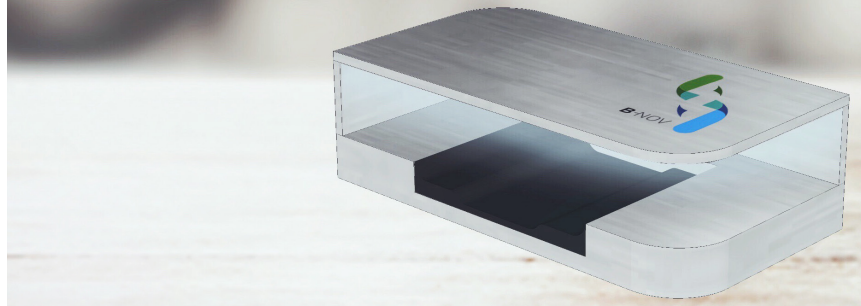
MODULARITY
_ Menchants can choose the right solution for their business



USER INTERFACE
_ Possible future developments
_ Advertisments
_ Friendly user experience



ADJUSTABLE
_ Accessibility
_ Portability
_ Ergonomity



BIBLIOGRAPHY

_ E. Phelps (2013), *Mass flourishing: how grassroots innovation created jobs, challenge and change*, Princeton University Press
_ P. Thomond, F. Lettice (2002), *Disruptive innovation explored*, Cranfield University
_ J. Fletcher, P. Howard; D. Mody et al. (2017), *A study of biometric security technology acceptance and Primary authentication*, Pace University
_ A. Kumaraswami, R. Garud; S: Anzari (2018), *Perspective on disruptive innovations*, Wiley on-line library
_ M. Assink (2006), *Inhibitors of disruptive innovation: a conceptual model*, European journal of innovation Management

SITOGRAPHY

_ Irisid.com, J. Daugman, *How Iris Recognition Works*
_ chinadaily.com.cn, Alipay, *Upgrades facial-recognition system*
_ Fingopay.com/about, *Fingopay uses veins recognition technlogy*
_ findbiometrics.com/solutions/vein-recognition, *General information about veins recognition technique*
_ indinero.com/resources/startup-funding-rounds-roadmap
_ patentinspiration.com
_ innovatrics.com/biometric-technology, *Where speed matters?*
_ angel.co/companies