the magstripe card

HOW MONEY BECAME ELECTRONIC
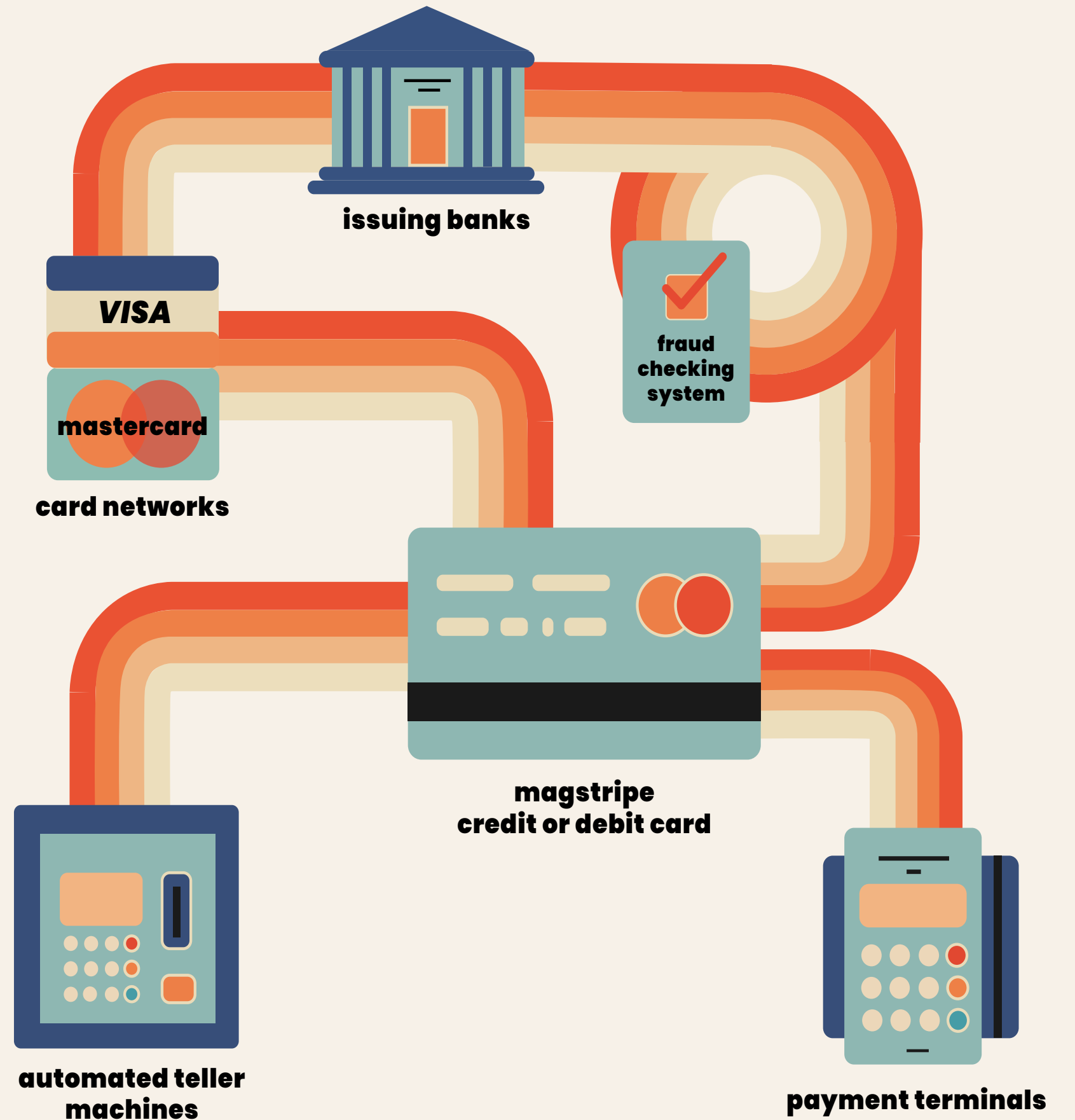
1001 0059 2436 6756 9872

MS. EUGENIE CARTRON

GOOD THRU 12/20

INTERBANK

the electronic payment system

Behind what seems to be today a trivial everyday action – paying for groceries with a credit or debit card – hides a surprisingly complex framework of electronic payment. This system of **complementary products and services** exhibits characteristics of what we call now a **platform**. Emerged in the 70's, it was shaped by one central invention: the magnetic stripe payment card.

issuing banks

fraud checking system

VISA

mastercard

card networks

magstripe credit or debit card

automated teller machines

payment terminals

context

The bank industry is struggling to keep the pace not only with a growing need for cash but a **growing need for cash out of hours**. Their solution: the automated teller machine. Only problem... one still needs to ask a teller for a paper check to use the machine.

1967

First ATM, in Enfield Town, London, unveiled by sitcom actor Reg Varney in September 1967. Source: Getty.

plastic tape coated with
iron oxide

01
11001101
1000100
1001

CIA officials' identification
information

1
000100
10101010
0110101
1

bank or airline customer
identification information

an IBMxCIA
contract

In the early 1960's, IBM engineer
Forrest Parry is in charge of a
government contract with the CIA
to create **identification badges**
for the agency's officials. He settles
for the old technique of **magnetic
recording**. The information density
allowed by this technique makes
it possible to store on the stripe all
the information needed to identify
a person. With the bank industry's
struggles and airlines' difficulty to
board bigger and bigger planes,
Parry repurposes the idea.

The CIA magnetic badge
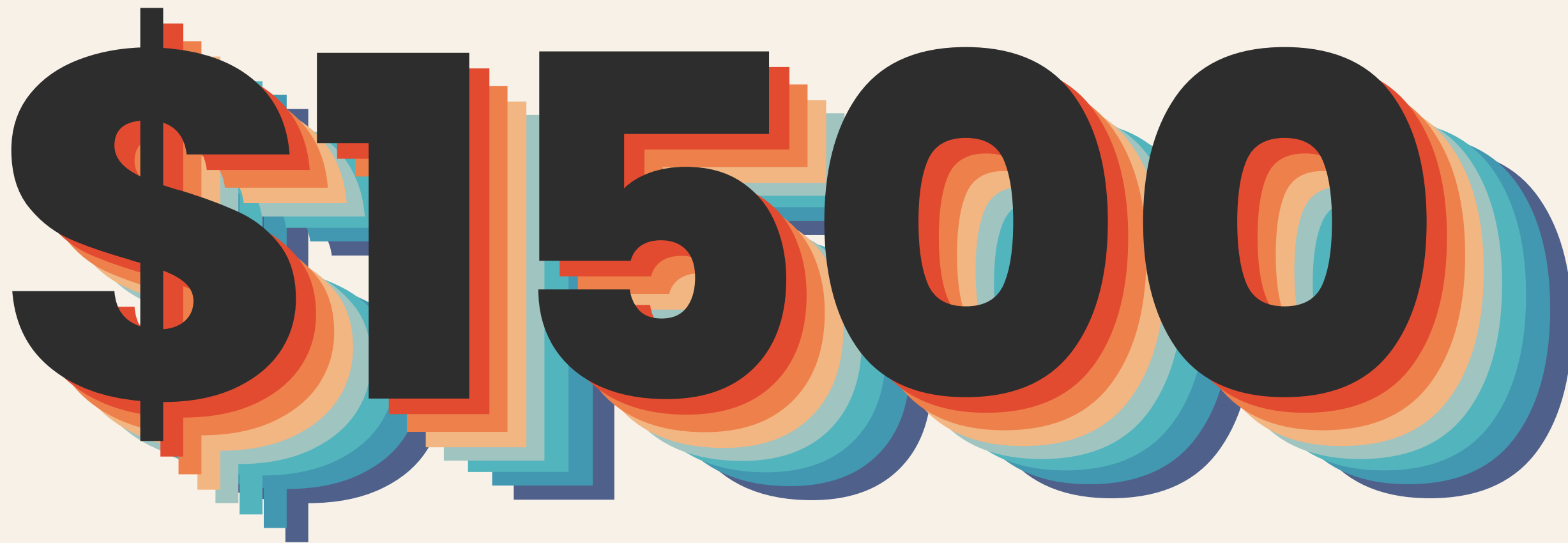becomes a bank card.
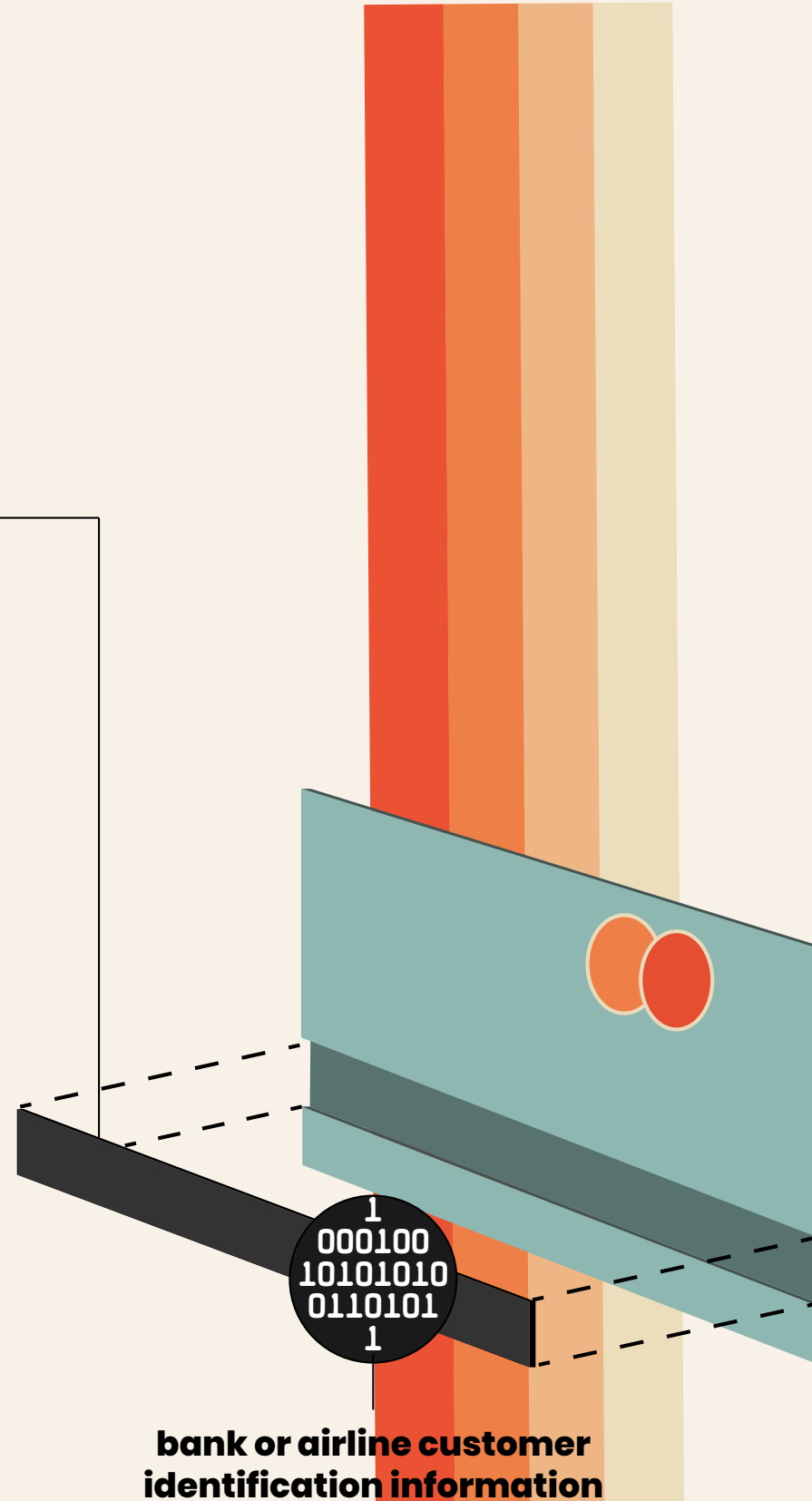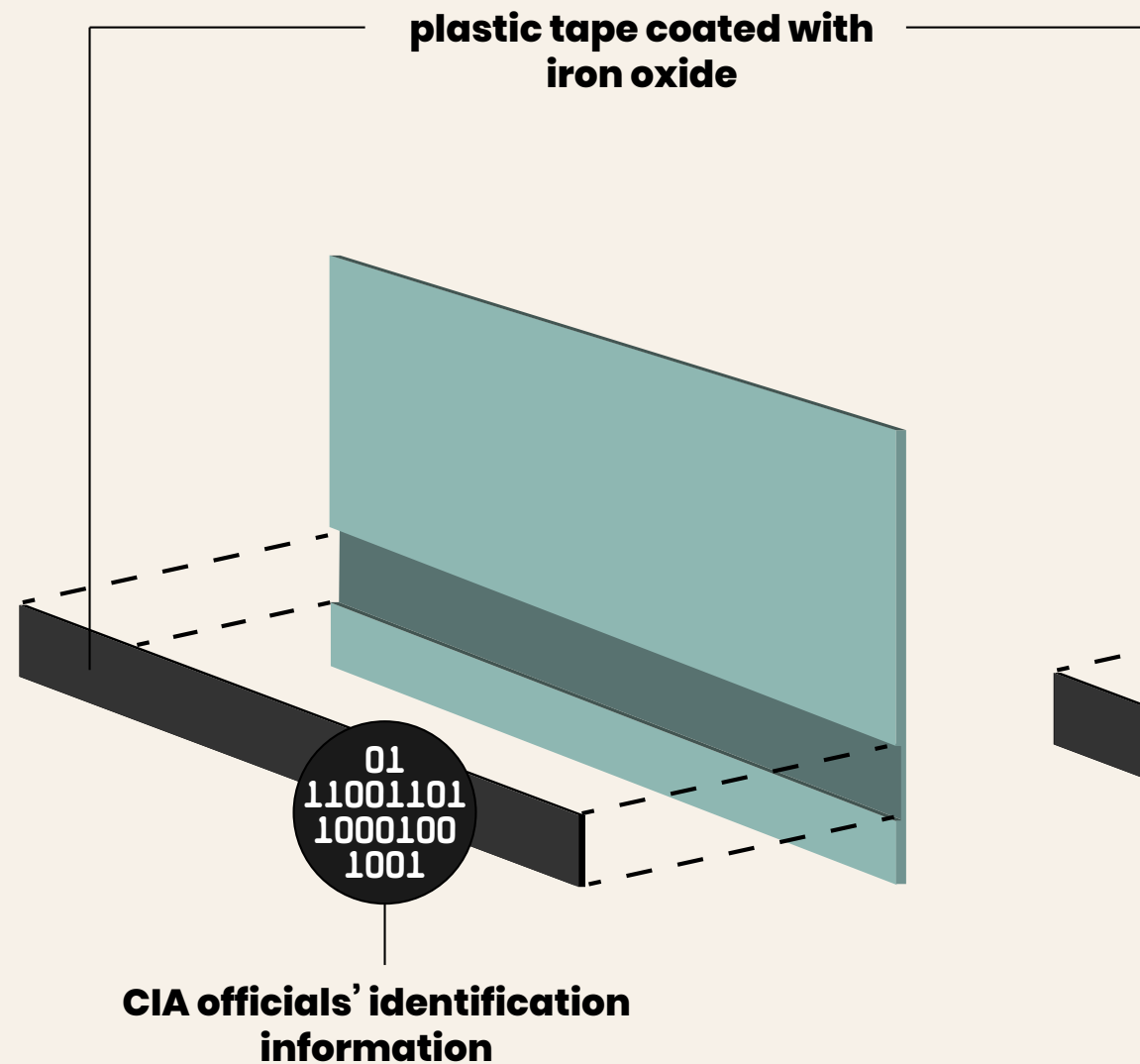
a process innovation

What IBM brought to the CIA and then the bank and airline industries is not magnetic storage, that was an old invention. The real deal was the **new hot stamping process** that made it possible to attach the stripe to a plastic card. That made IBM a pioneer and it was Parry's wife invention. However, this stripe technology was **never patented... why?**

a marketing device

Without a network of payment terminals to read them and bank computers answering to them, magstripe cards are useless. IBM knew that very well. At that time, they were trying to **boost their professional computer sales**. The card was not a product, it was a marketing device: a way to sell the card-reading and card-answering computers. The card-making process was not patented because the computers were.

$1500

return in computer sales for each dollar spent on the magstripe card development

Source: IBM.

a quickly standardised method

IBM had no intent to go into the banking business. The plan was to get out of the way and **let the industry take over the production** of magstripe cards. Standards were necessary to spread the production. The IATA and ABA set those standards for their respective industry thanks to a **multitrack magnetic recording system**. They were adopted as US standard in 1969, even before the card was rolled out, and became world standards two years later.
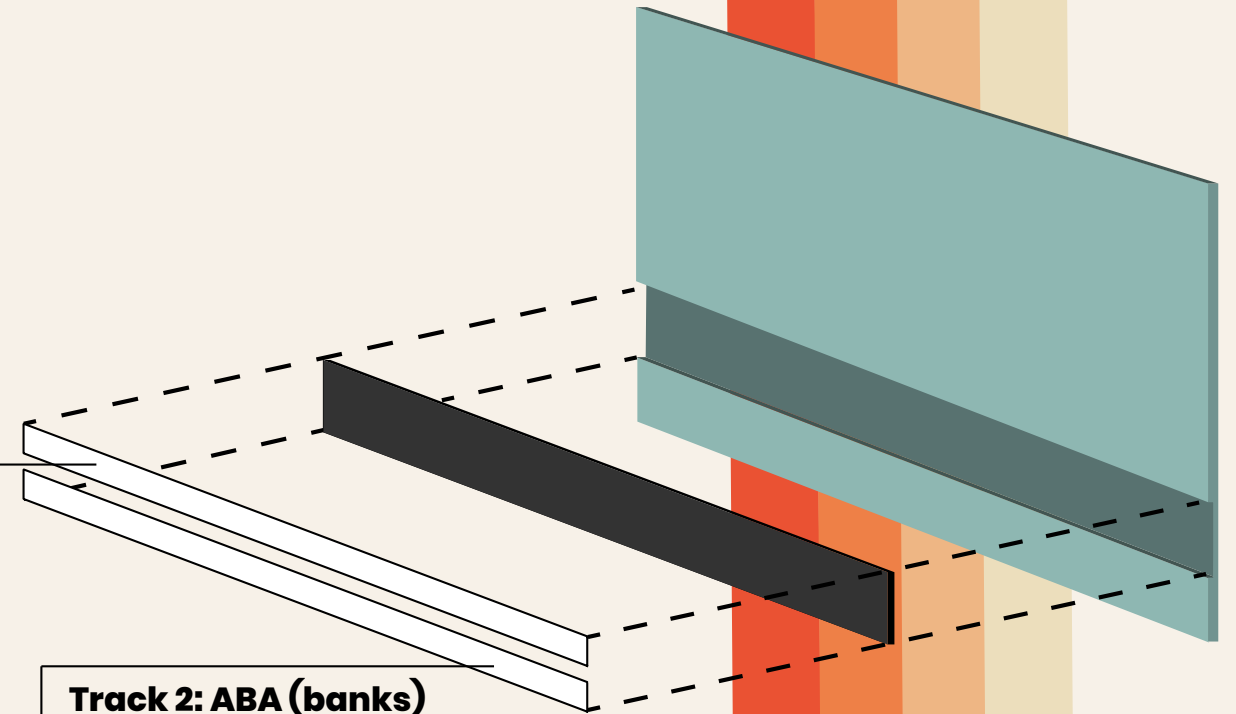
Track 1: IATA (airlines)
210 bits/inch

Includes:
- name
- primary account number
- expiration date
- discretionary data

Track 2: ABA (banks)
75 bits/inch

Includes:
- name
- primary account number
- expiration date
- discretionary data
- service code precising interchange rules and authorisation processing

an add-on fraud checking service

The payment system based on the magstripe card was promising but the stripe had a terrible weakness: it **could be counterfeited** easily. IBM saw an opportunity to use the **database systems** it was selling to check each transaction with the customer's payment historic. The card itself couldn't be made more secure, but another **complementary product** could make it safer.

SABRE network, the largest civil data processing in 1964, used by American Airlines to maintain accurate information on passengers. It was then used for financial authorization and verification. Source: IBM.

1964

CHICAGO

O'HARE INTERNATIONAL AIRPORT

## an exclusive product

In January 1970, the first batch of magstripe cards floods the **mailboxes** of American Express customers in the Chicago area. **American Express, American Airline and Chicago O'Hare collaborated** to install the first automated ticketing kiosks in the airport. The operation is a success: even United Airlines customers cross the 250m long terminal to use the kiosks.

a monopolistic diffusion network

Card networks are incredibly well positioned to change habits. Their existence as an **intermediary** guarantees customers that their card will be accepted by a large range of merchants and guarantees merchants that the card is backed by trustworthy banks.

Without having on board the two main credit card programmes of the time, VISA and Mastercard, the invention was limited in its acceptation. Only when the two giants started using magstripe cards in the 1980s, thanks to cost reductions, did the **invention spread at scale through their large network** of banks, merchants and customers.

subscribing customers

mastercard

VISA

associations
(or card networks)

accepting merchants

member banks
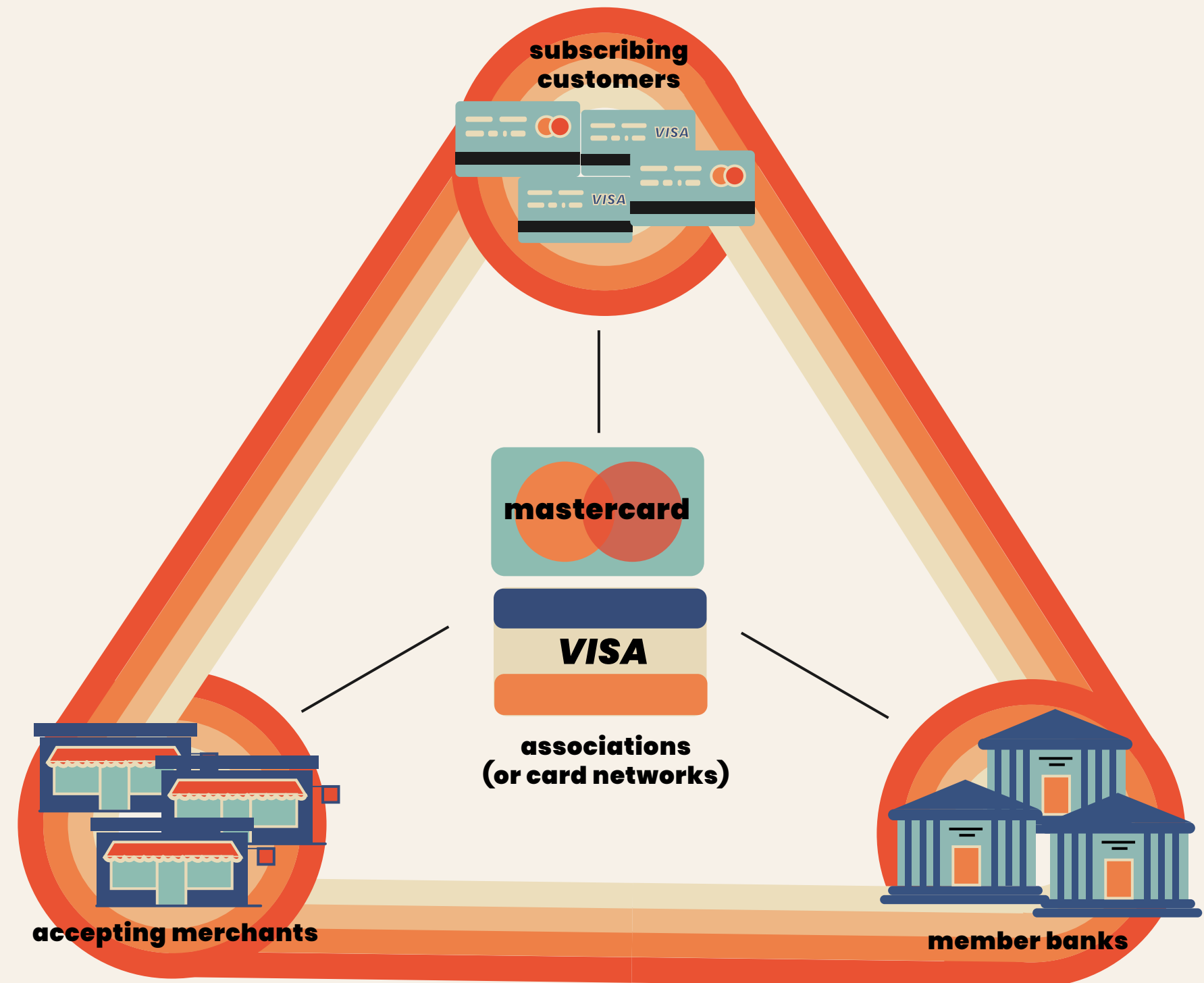
a distributed innovation process

What is striking with the emergence of the magstripe payment system is how **serendipitous, organic and cumulative** this innovation process was. The magstripe card is embedded in a network of **technological, economic and social interdependencies** that made its development a collective process. What makes the magstripe card a happy ending product story is exactly this capacity to **produce an innovation as an ecosystem**, rather than as a standalone firm.

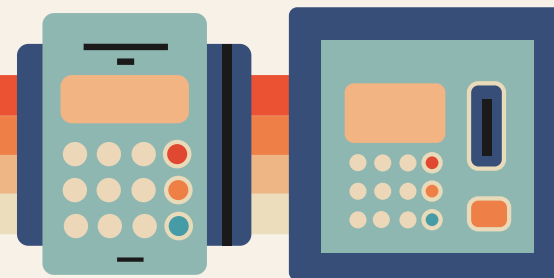19th century magnetic storage inventors...

CIA

IBM

CPU, pin pads, transducers, general purpose computers, public switched telephone network technologies...

American Airlines + Chicago O'Hare
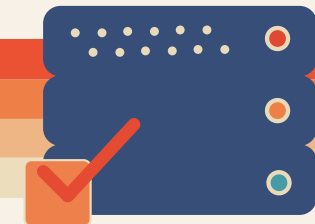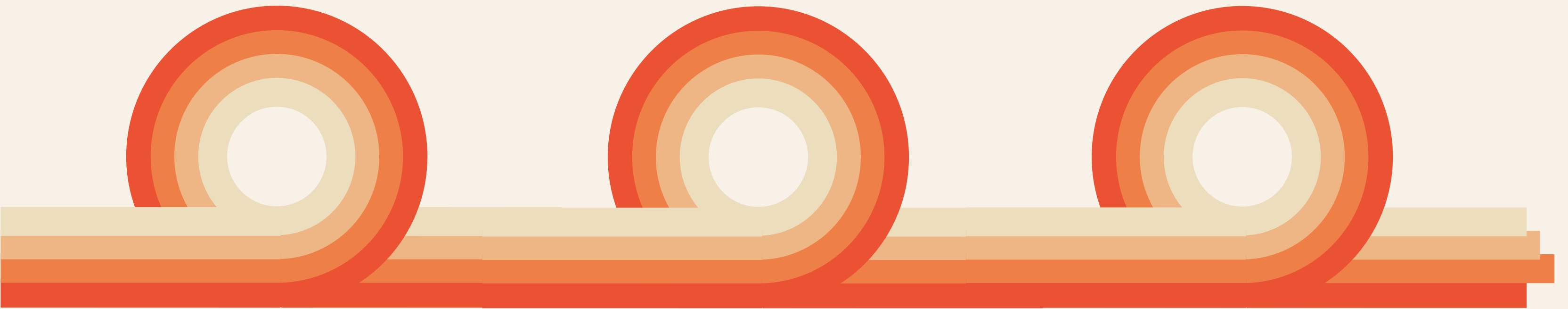
IBM

IBM

IATA + ABA + ISO

VISA + mastercard

Data processing technologies...

IBM

All banks

ISO

magstripe card

reading terminals

information architecture

fraud checking service

a non-linear responsive development

Similarly to the way most modern **platforms** developed, money didn't become electronic by following a traditional sequence of siloed activities. The very design of this system was fundamentally intricated with marketing and production questions: **customer acceptability and profitability were by design features** of the card. The success of the magstripe payment system may well stems from its **iterative development**, a highly responsive and user-constrained process.

a lasting legacy

The magstripe card has been challenged through its lifecycle. The **chip card** emerged, providing a more secure information storage solution. More recently, **mobile phone** payments are on the rise, questionning the very existence of our plastic cards. But even if these new technologies take over, they rely heavily on the legacy of the swipe-and-sign system.

The magstripe card may be dead, but the **information structure** and **dematarialised payment framework** it shaped will be around for a long time.

1970   1980   1990   2000   2010   2020   2030   2040

2%
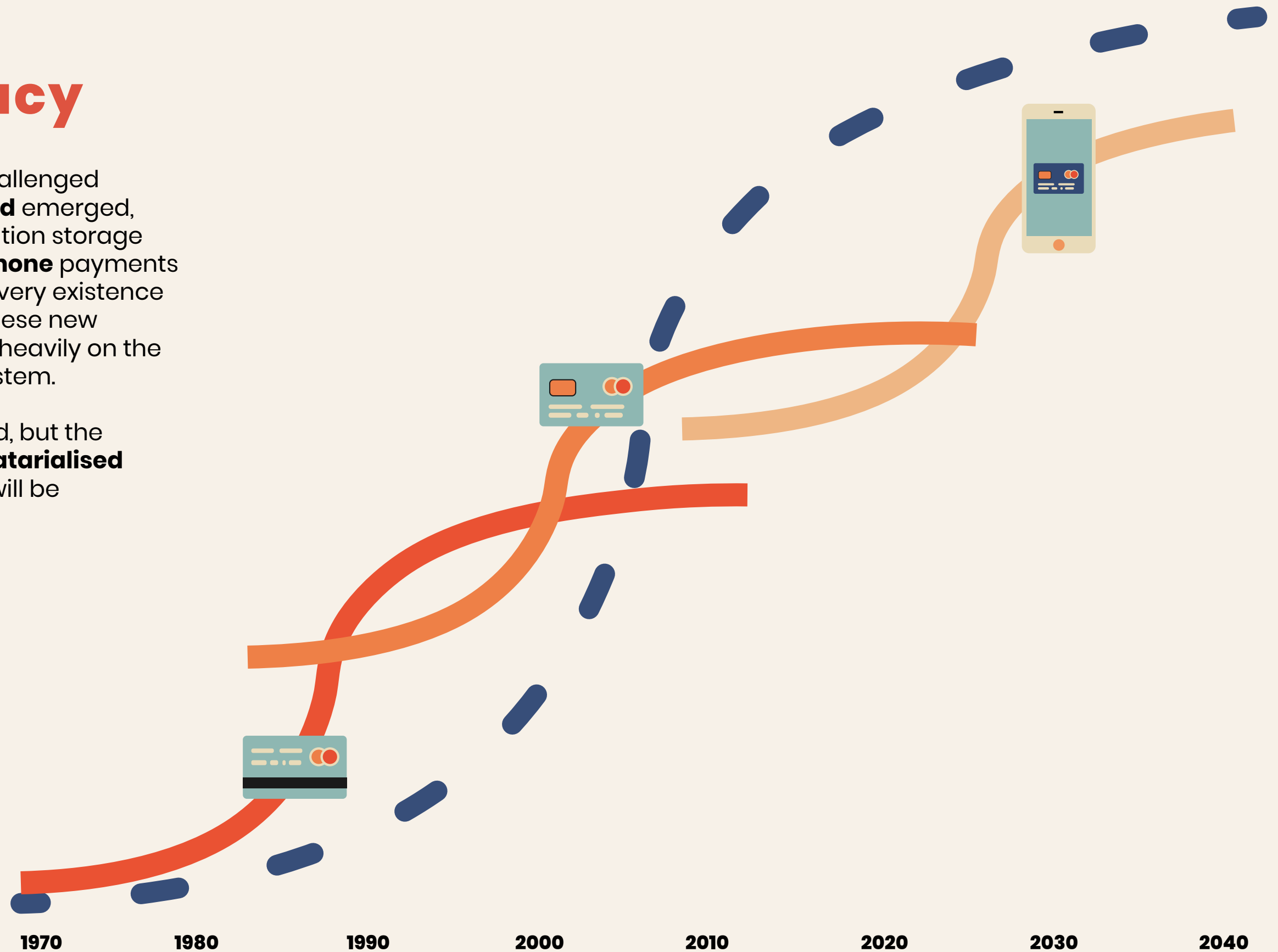
is the average fee *per transaction* charged by card networks VISA and mastercard to merchants. Can we really say the risks and rewards of the electronic payment innovation are fairly shared?

Source: valuepenguin.com and BBC

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