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The Market Opportunity for Reusable Identity and How to Get There

Liminal Industry Report // February 2022

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Preface & Executive Summary

The Market Opportunity for Reusable Identity and How to Get There
Preface

We are at the beginning of a paradigm shift. As we continue to progress through digital transformation initiatives, more users create higher assurance digital identities by establishing new bank accounts online, interacting on sharing economy platforms, and exploring more ways to engage with the gig economy. Eventually, we will move beyond solving onboarding problems and focus on better and safer experiences within platforms and ecosystems. To get there, we need to begin working together to explore ways to be more efficient while improving all aspects of the consumer's digital identity. We need to prepare for a shift from digital identity to reusable identity.

This report represents an early POV based on hundreds of engagements with leading identity vendors and identity-forward enterprises on what reusable identity is, what the market opportunity can be, and how to get there. We do not have a clear path defined nor business models validated, but that's the fun part for those who want to attempt to capture the holy grail of identity.

The research was led by Travis Jarae, CEO of Liminal, Jennifer Berry, Managing Director, and Cameron D'Ambrosi, Managing Director. The project team was led by Will Charnley, Director, and Yifan Li, Manager, with support from Victor Appelqvist, Renee Cai, Tiana Lau, and Vatsal Jhawar.

Travis Jarae,
CEO
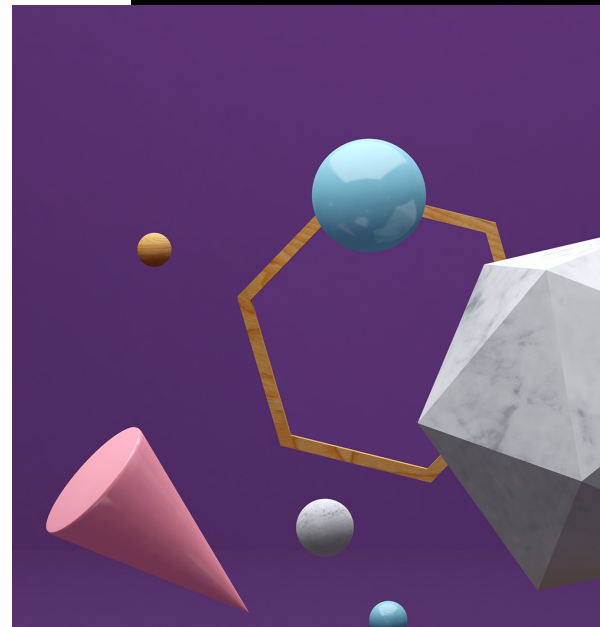
The Market Opportunity for Reusable Identity and How to Get There
Executive Summary

The market is driving demand for reusable identity. Digital identity is undergoing rapid transformation; as consumer-centric solutions go mainstream, we see a demand for interoperable identity credentials that can be integrated across different use cases in the digital and physical world.

Catalyzing events have increased the viability of reusable identity. The internet was built without a foundational identity layer. As companies came online in the dot com boom, they were forced to build 1:1 relationships. In the 2000s, single-sign on (SSO) enabled federated identity and the evolution of 1:N relationships. Reusable digital identity paves a path forward for building N:N relationships that eliminate the fundamental risks created by its predecessor models.

Reusable identity relies on network effects enabled by Personal Identity Ecosystems (PIEs): To facilitate reusable identities, the current paradigm needs to shift to one that supports interoperable networks, public private partnerships, and fully fledged ecosystems – with supporting standards, policies, and trust frameworks – that provide consumers with data mobility.

Market factors have created a $32.8B market TAM for reusable identity in 2022, growing at a 68.9% CAGR by 2027. With a large market for public-and private-led schemes, this market TAM will reach $266.5B by 2027.

Public-led schemes will initially dominate the market TAM, but private reusable identity will account for 60% of the market by 2027. As public and private initiatives expand, they will create a need for public-private partnerships (PPPs).

Three key milestones will unlock the full TAM potential for the reusable market. Personal Identity Ecosystems (PIEs), vertical and use case interoperability, and public-private partnerships (PPPs).
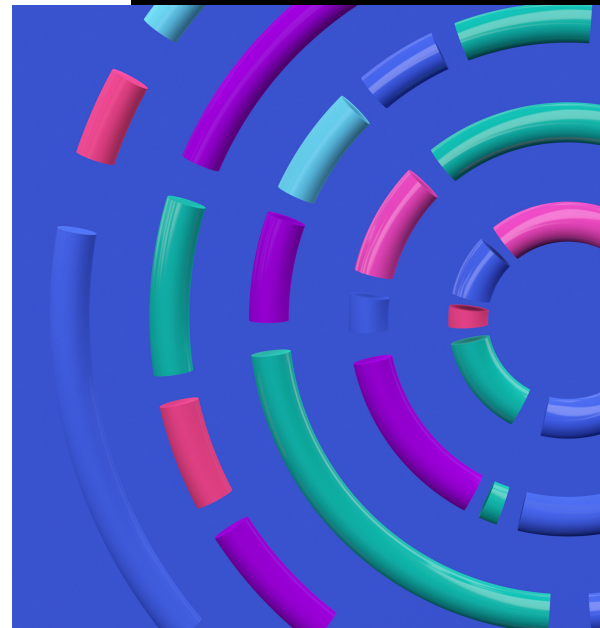
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Reusable Identity Market Overview

We are in the early days of digital identity adoption

The digital identity space is going through a rapid transformation; a shift is currently underway that focuses on customer-centric solutions that enable consumer services well beyond initial onboarding

Digital Identity Adoption (y-axis)

Time (x-axis)

Physical

Digital

We are here

The current digital identity market is indexed to the rate of adoption

The digital identity market must evolve to provide services beyond onboarding

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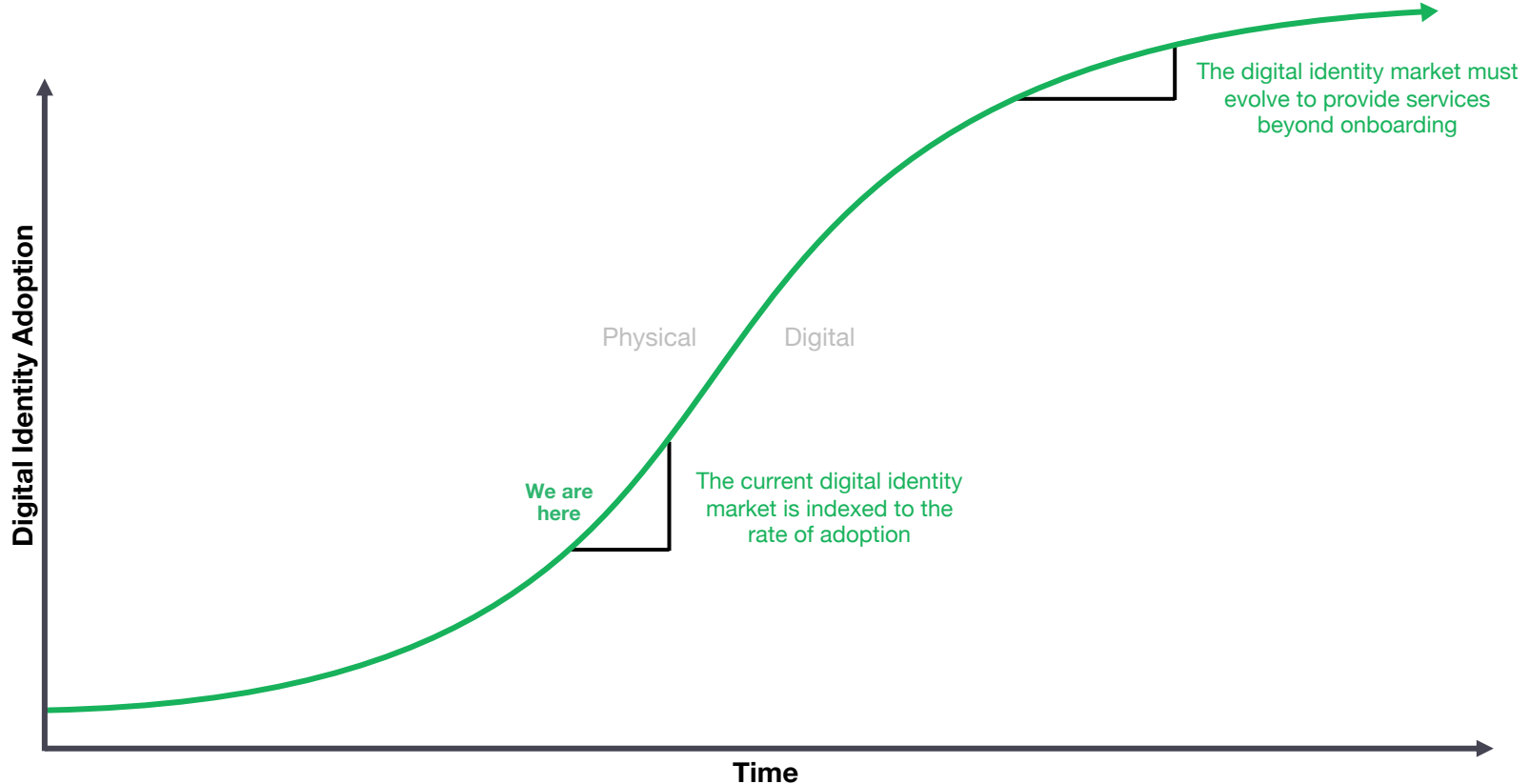
The market is shifting focus to consumer-centric digital identity solutions

Rising consumer UX expectations, ongoing data breaches and global regulatory scrutiny are driving the need for privacy-preserving reusable digital identities, anchored increasingly on the needs of the consumer, and not the enterprise

Enterprise Digital Identity

- Payments & eCommerce
- UX
- Risk & Compliance
- Marketing
- Trust and Safety
- Cybersecurity

Consumer Digital Identity

- Privacy
- Compliance
- Commerce
- Trust & Safety
- Risk Management
- Reputation
- UX
- Data Protection
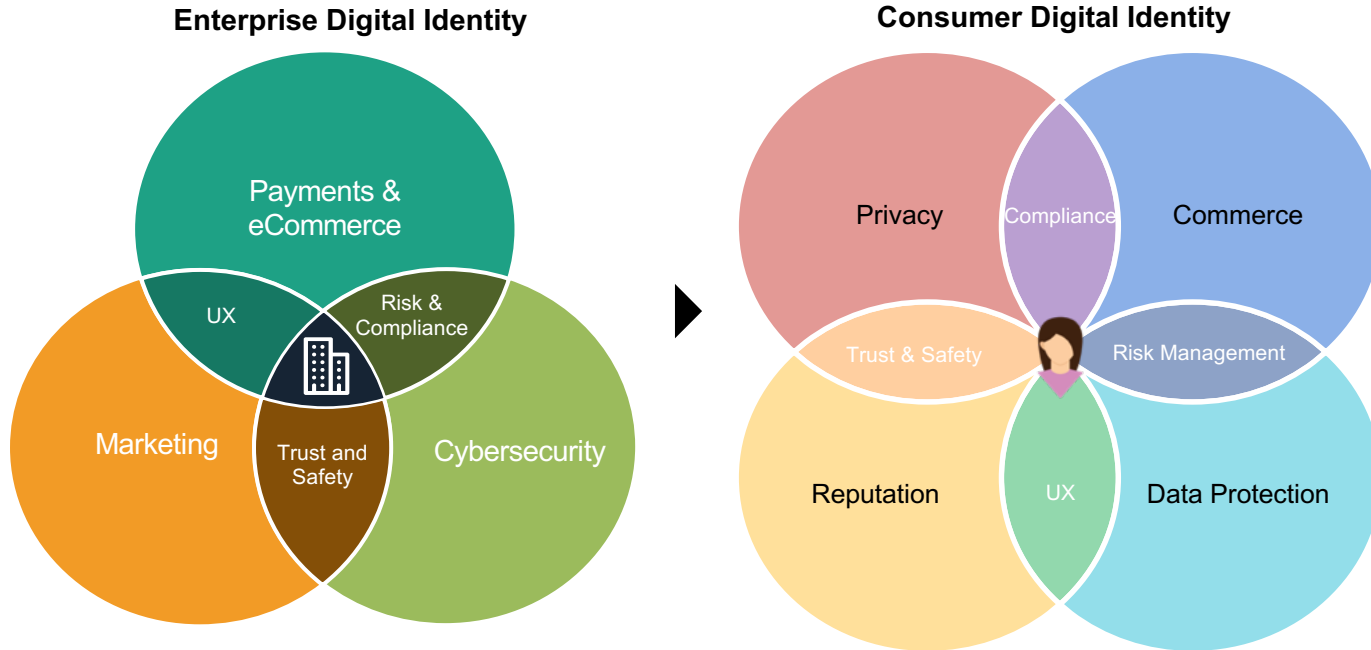
There is a rising need for reusable digital identities that grant consumers better control over their personal information

Reusable digital identities must be rooted in the consumer digital identity lifecycle

In order to succeed, reusable digital identities must meet the needs of enterprise and consumer stakeholders across a fragmented landscape that currently forces users to manage separate iterations of this lifecycle for each account they maintain
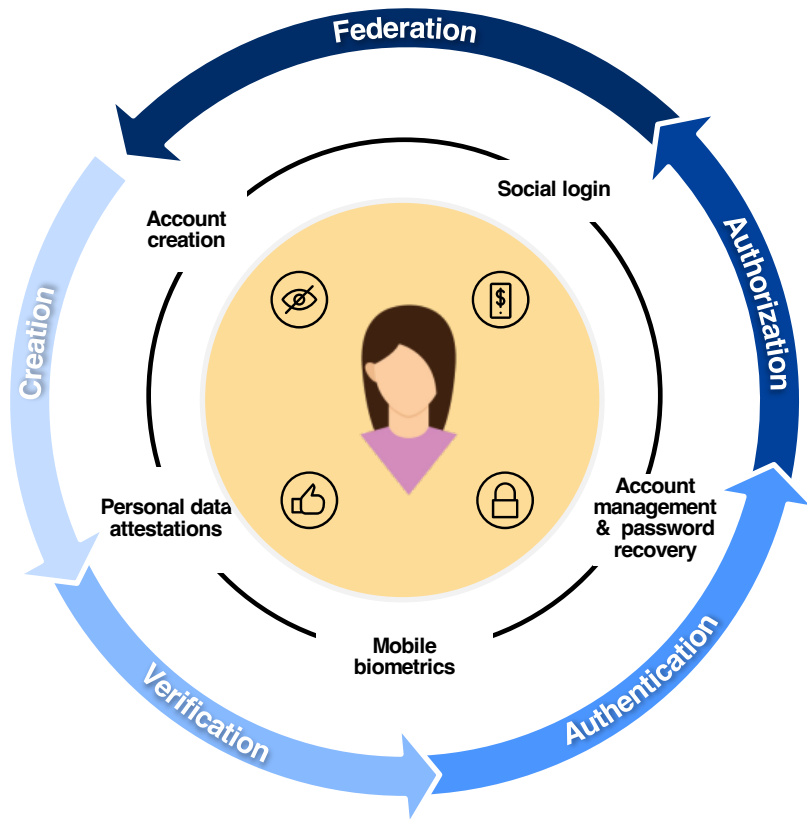
Fragmented Credential Issuers / Relying Parties

Utility Providers · Hospitals · Banks

Employers · Universities · Airlines

Governments · Online Marketplaces · Gaming Platforms

Why do we need reusable digital identity?

The internet was built without a foundational identity layer. As companies came online in the dot com boom, they were forced to build 1:1 relationships. In the 2000s, single-sign on (SSO) enabled federated identity and the evolution of 1:N relationships

Previous Digital Identity Solutions (1:1)	Today's Digital Identity Solutions (1:N)
Individual consumers onboard separately with each entity to complete a transaction. Consumers manage hundreds of individual accounts and passwords, and companies are required to build a unique, non-interoperable identity stack.	Digital companies adopt social logins to federate identities to cloud applications. Consumers are accustomed to social logins, where available, as a means of performing transactions across multiple online entities.
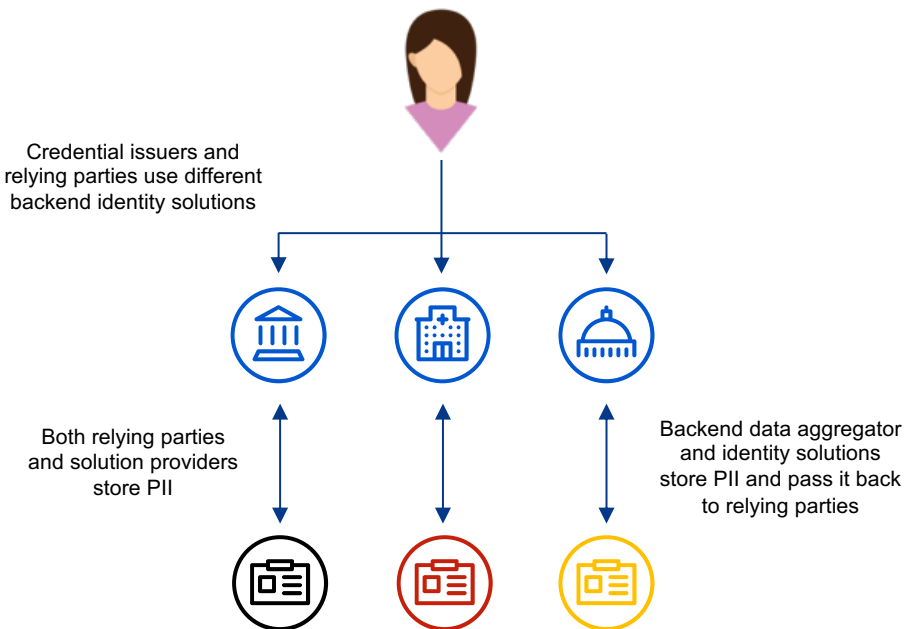
Credential issuers and relying parties use different backend identity solutions

SSO enables federated identity

Federated identities enable 1:N relationships

Both relying parties and solution providers store PII

Backend data aggregator and identity solutions store PII and pass it back to relying parties

Many consumer relationships remain 1:1

1:N relationships introduce efficiencies in data sharing and security

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Today's digital identity solutions are inefficient for consumers and enterprises alike

The transition away from 1:N digital identity solutions and towards N:N reusable digital identities eliminates the fundamental risks created by repeating onboarding processes separately and leading to centralized databases filled with personal data.

Today's Digital Identity Solutions (1:N)

Consumers rely on 1:1 and 1:N relationships, where available. Applications for federated identity remain limited, so consumers must individually maintain a potentially infinite number of digital identities, each wholly separate from the next.

SSO enables federated identity

Many consumer relationships remain 1:1
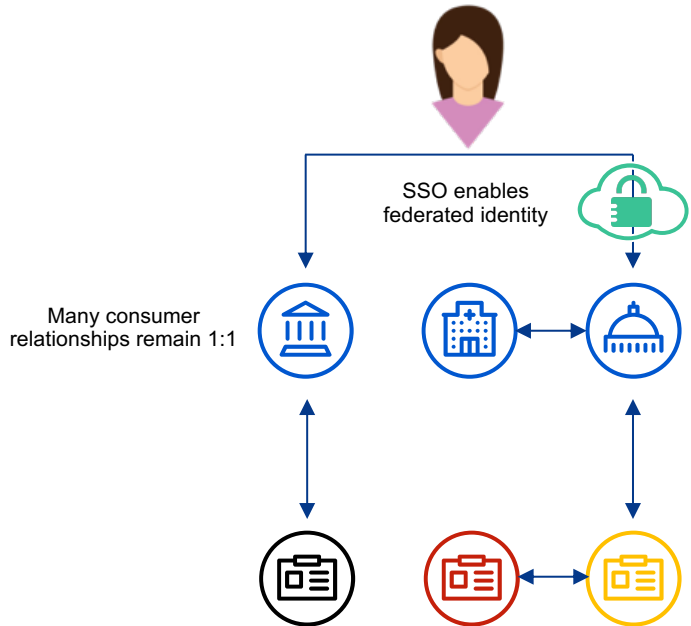
Tomorrow's Reusable Digital Identity Solutions (N:N)

Reusable digital identity is easily federated when transacting with a new entity. A "many to many" relationship provide consumers with unique identities tailored with the minimum required personal information necessary for a given use case.

User onboards with reusable identity and can control where their data is stored

Reusable Identity

Governance layer validates completion and coherence of data

Governance

Enterprises only see and store data permissioned by user

Backend providers give PII to user-controlled credential

Enterprises

Backend Solutions

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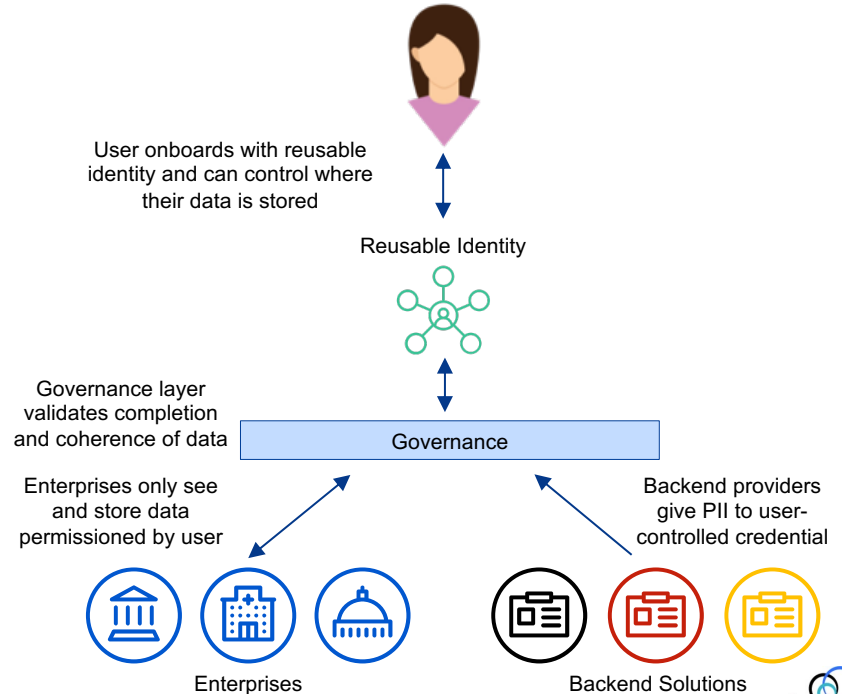
N:N relationships rely on network effects enabled by Personal Identity Ecosystems (PIEs)

To facilitate reusable identities, the current paradigm needs to shift to one that supports interoperable networks and fully fledged ecosystems – with supporting standards, policies, and trust frameworks – that provide consumers with data mobility

Identity Wallets

Consumers engage with identity wallets and personal data stores to have autonomy of identity credentials

Enablement of reusable identities

PIEs

| Relying parties | Relying parties | Relying parties |

Back-end data aggregators and identity solutions
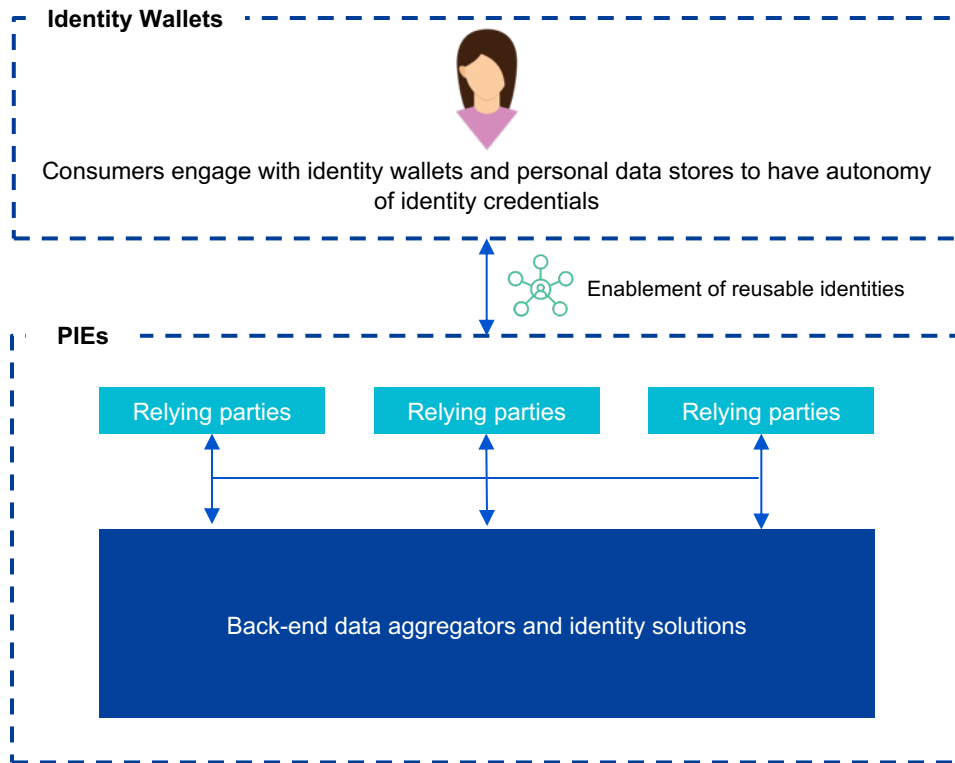
Personal Identity Ecosystems (PIEs)

Personal Identity Ecosystems (PIEs) are user-centric networks that connect multi-sided platforms and are designed to provide users with control over their digital identities and enable privacy, personal reputation management, commercial transactions, and data protection.

Market Shifts Driving PIE Adoption

- In the 1990s, companies built 1:1 relationships with the consumers they serve.

- In the 2000s-2010s, companies transitioned from 1:1 relationship to 1:N relationships by adopting single-sign on and social logins in order to federate identities to cloud applications.

- Consumers demand privacy centric solutions. Over 75% of consumers are interested or very interested in the ability to control or revoke access to their digital identity at any time.[1]

- More governments provide citizens access to services online. Civic identity apps in which government-issued identities are held will account for almost 90% of digital identity apps installed globally in 2025.[2]

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Existing digital identity infrastructure cannot meet rising consumer expectations

As online transaction volumes continue to grow, and mobile internet market share increases, current approaches to identity verification and authentication will fail to meet the expectations of digital-native consumers

Notable Growth Drivers [1]

- As of 2020, there are 4 billion mobile internet users, representing 51% of the global population.

- Civic identity apps, in which government-issued identities are held, will account for almost 90% of digital identity apps installed globally in 2025.

- Trust in digital identities to authenticate both service providers and their customers is going to be an imperative for the continued success of this sector, with a cost burden for reputational protection already measuring in the tens of millions for some organizations.

- Globally, eID initiatives are growing roots. The Scandinavian BankID system has 8 million+ users and was used 5 billion+ times in 2020.

Consumer Solutions Positioning and Adoption

Holistic identity approaches drive efficiencies and mitigate risk

Need for digital account opening cements the importance of mobile oriented solutions

Vendors filling void created by nascent government digital identity solutions

Consumer Sentiment Snapshot [2]

88%
Consumers reported that security is their greatest priority when onboarding

39%
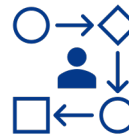Of Consumers appreciate the extra security layer from biometrics

75%
Of Apple users that opt out of third-party app tracking

42%
Of consumers have abandoned an account application due to friction

Common Consumer Journey Issues

Time consuming multi-step onboarding flows

Frustrating and insecure password-based authentication

Repeated requests for the same set of personal identity data attributes

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The social, political, and technological environment is ripe for reusable identity

Eroding public trust, rising regulations, public and private credential growth, and record investment in backend identity solutions, have created the underlying conditions necessary for the emergence of reusable digital identities

1:N SSO

N:N Reusable Identity

2018
Cambridge Analytica erodes public trust:
Creates an increased need for privacy preserving N:N solutions

2019
eIDs gain global momentum:
40+ active eID initiatives with 120 planned for deployment by 2030[1]

2021
Record investment in backend solutions:
Investment has created mature vendors who provide necessary infrastructure

2010s
Social media platforms launch SSO initiatives

2018
EU's GDPR and eIDAS take effect:
eID and privacy regulations set the framework for user-centric identity credentials

2020
Global pandemic drives digital transformation:
Growth in digital consumers exposes issues with legacy systems; new solutions needed

2021
Private-led initiatives gain viability:
Entry by major player like Apple with large user bases

● **Milestone** before catalyzing events

● **Milestone** after catalyzing events

★ **Catalyzing Event** 1:N

★ **Catalyzing Event** N:N

Consumers, relying parties, backend solutions players, and identity providers all stand to benefit from reusable identity, creating a growth opportunity

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Several key drivers underpin the growth opportunity for reusable identity

The shift away from fragmented and expensive siloed infrastructure will be pushed forward by investment in individual components of reusable digital identity, in combination with macro-environment trends
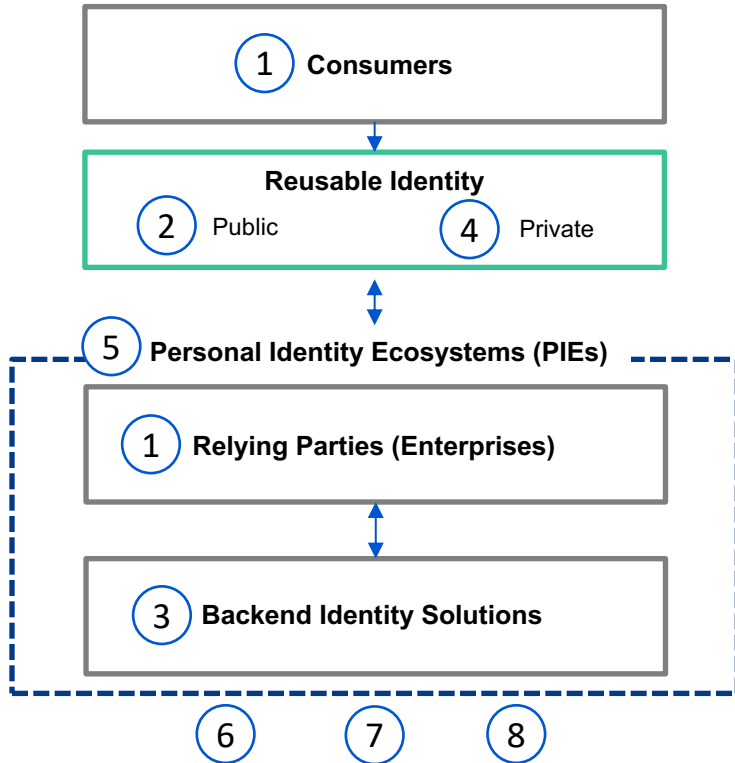
Drivers for Reusable Identity Components

1	Growth in digital commerce creates additional CNP fraud; the average ticket size for CNP fraud increased 9.7% in 2021, increasing the need for reusable identity. [1]
2	Global, public-led eID initiatives have increased by 16% YoY since 2017; strong historical and future growth will fuel demand for reusable identity.
3	Record investment of $34.3B in 2021 into backend identity solutions will establish infrastructure that can support reusable identity initiatives.
4	Private-led initiatives are gaining momentum as larger, recognized brands with consumer scale create reusable identity solutions.
5	As consumers, enterprises, credential providers, and backend solutions mature, there is a greater demand for a PIE to connect parties.

Macro-Environment Drivers

6	Smartphone users are projected to reach $7.5B by 2026.[2] Technological advancements across verticals create mature solutions and drive the need for reusable identity.
7	Global pandemic further propels digital transformation with rapid growth of new and existing online consumers looking for enhanced solutions and positive CX.
8	The rise of device-to-device communication opens market appetite for reusable identity that enables adaption to the evolving identity ecosystem.

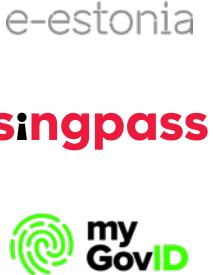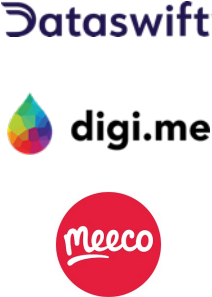# Existing market players must evolve to capture value as PIEs take hold

PIEs unlock future market opportunity for consumer identity by bridging backend identity solutions, consumers, and enterprises together with public and private reusable identity schemes

	Yesterday	Today	Tomorrow
Consumers and Enterprises	Consumers and enterprises were forced to navigate disparate identity systems.	Consumers manage 100+ credentials and cannot protect themselves from fraud.	Consumers call for control over their data, driving demand for privacy-centric solutions.
Public-led Identity Credentials	Regulations like eIDAS drove governments to create public-led identity credential solutions.	In the last 4 years, there have been 15+ new eID programs launched globally.	The rise of global eID schemes leads to wide scale adoption across government use cases.
Backend Identity Solutions	Vendors built disparate solutions that create friction for consumers and enterprises.	$34.3B+ of investments in 2021 created platform solutions that can support complex identity schemes.	Vendors create solutions that support the entire customer journey.
Private-led Identity Credentials	Small community-based initiatives lacked the consumer bases to increase adoption.	Brand names like Apple and Google are introducing scalability via large user bases.	Private-led solutions that build trust and customer adoption offer cross-border viability.
Personal Identity Ecosystems (PIEs)	Companies built 1:1 relationships and incorporated single-sign on to enable 1:N relationships.	PIEs can establish a bridge between 1:N identity systems and into N:N schemes.	Reusable identity needs network effects to transition from 1:N to N:N, necessitating demand for PIEs.

As PIEs continue to gain market traction, they will connect reusable identity into the existing digital identity landscape and leverage existing solutions to reach scale

Governments, personal data stores, Big Tech, consumer digital identity companies, and backend identity solutions will be major players in the future of reusable identities

| Government	Personal Data Stores	Big Tech	Consumer Digital ID	Backend Identity Solutions
e-estonia singpass my GovID	Dataswift digi.me meeco	Apple Google Microsoft SAMSUNG	Allstate Avast 1Password	jumio ID.me onfido okta
Government-led initiatives are already underway, with 40 eID schemes globally with more launching in the next few years.	Personal data stores are in market; more entrants will increase consumer familiarity and lead to greater adoption.	Big Tech have invested heavily in consumer-facing identity solutions and bring large consumer bases.	Consumer identity companies are leveraging their customer bases to expand and create identity wallet solutions.	Major backend players already create reusable identities and have begun to expand across the customer journey.

While major identity solutions have matured to create the conditions for reusable identities, market shifts require catalyzing events to create large-scale change

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Existing solution providers will form the backbone of the new reusable identity market

There are opportunities across the breadth of the digital identity landscape for solution segment providers to participate in both initial consumer onboarding and ongoing use cases throughout the digital identity lifecycle

Core Capabilities of Reusable Identity

Legend:
- Onboarding
- Recurring
- Both
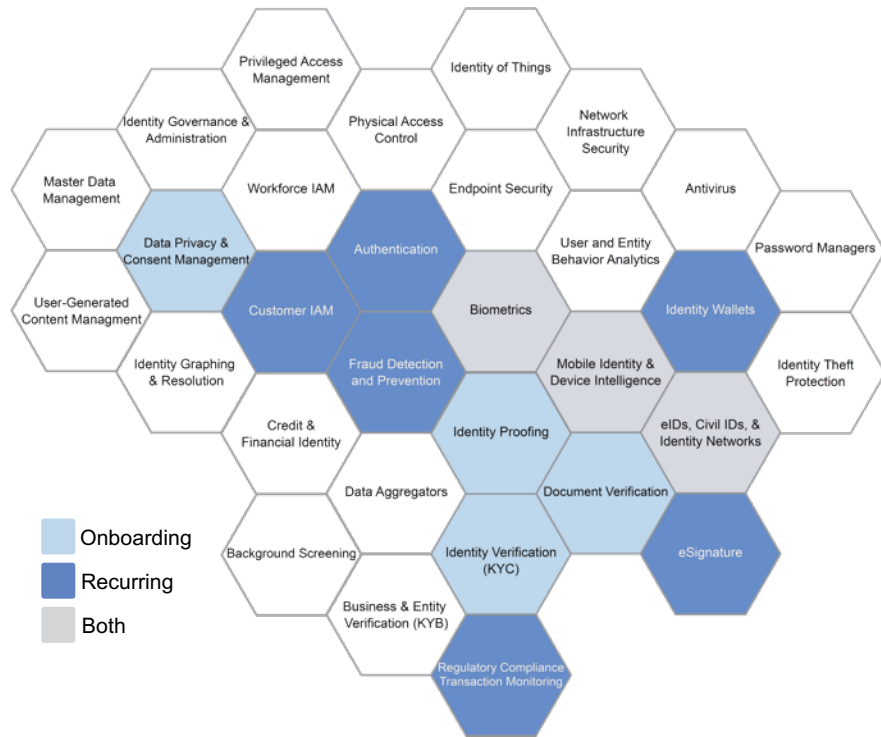
Explanation

Onboarding: Consumers will first need to onboard with what will act as a reusable identity; this process will leverage existing digital identity technology that focuses on customer registration.

Key solution segments include:

- Identity proofing
- Identity verification & KYC
- Document verification
- Biometrics
- Mobile identity & device intelligence
- eIDs, civil IDs, & identity networks
- Data privacy & consent management

Recurring: Once onboarded, consumers need the ability to manage their identity on an ongoing basis for use cases like login, transaction assurance, and to prevent fraud.

Key solution segments include:

- Authentication
- Customer identity access management (CIAM)
- Fraud detection and prevention
- Biometrics
- Mobile identity & device intelligence
- eIDs, civil IDs, & identity networks
- Identity wallets
- Regulatory compliance transaction monitoring
- eSignature

Technological developments across solution segments open more opportunities

Technological advancements in segments such as biometrics, identity proofing, and identity wallets have helped set the stage for reusable identity's success

Core Capabilities of Reusable Identity
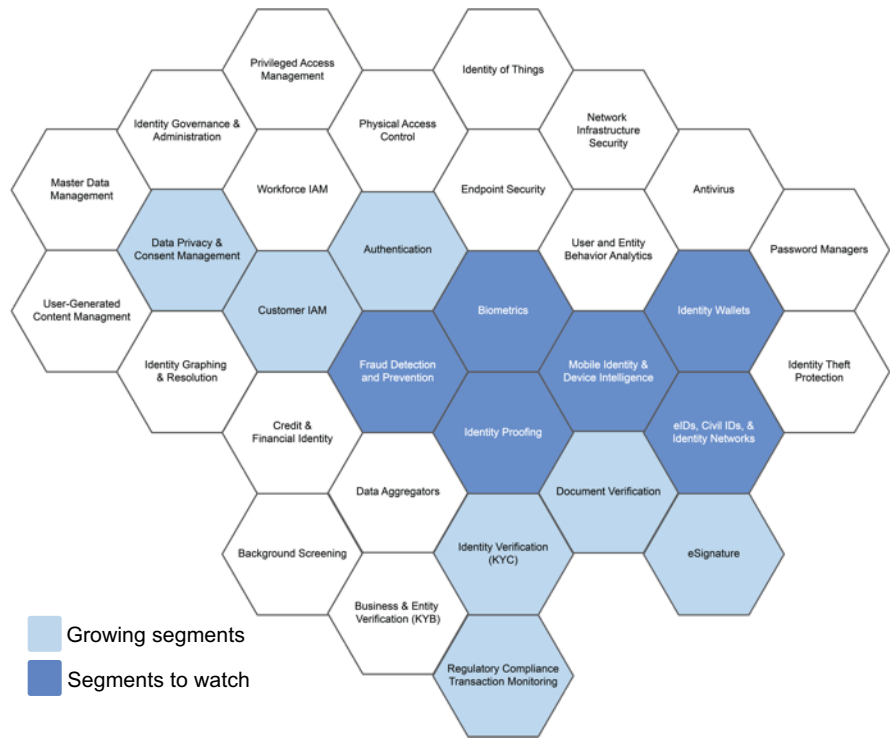
Rationale

- **Biometrics:** The adoption of fingerprint technology on smartphones is increasing biometrics usage, transforming biometrics into a common method of authentication. Different biometric modalities will become more common across verticals, where consumers can use their biometrics to identify themselves

- **Identity proofing:** Identity proofing is higher assurance than IDV and document verification. This results in greater friction, making reusable identity more valuable as consumers only must identify themselves once

- **Fraud detection and prevention:** As fraud attacks grow more sophisticated, identifying risky individuals and legitimate consumers across platforms will become more important

- **Mobile identity & device intelligence:** Consumers are becoming increasingly trustworthy of mobile apps and services for high value interactions, such as with financial institutions and healthcare providers. Reusable identity demonstrates the ability to improve consumer UX across platforms and apps

- **Identity wallets:** The entry of Big Tech players (e.g., Google, Apple) into the digital wallet space will aid the adoption of identity wallets, especially as these players build partnerships that extend additional services to their large user base

- **eIDs, civil IDs, & identity networks:** Public agencies around the world are implementing digital ID initiatives. Even in countries with established eIDs, governments are continuing to innovate. e.g., Estonia is in the process of procuring a new Mobile ID solution by 2022

The impact of reusable digital identity will expand across the full landscape

The initial set of core capabilities that enable market viability for reusable digital identities will grow as increased consumer adoption drives expansion to encompass an increasing amount of features

Core Capabilities of Reusable Identity

Future Consolidation Points from Reusable Identity

A reusable identity must support consumers beyond the onboarding moment

Solution capabilities must solve across the customer journey and cover key use cases in new engagement, registration, login, transactions, and ongoing engagement

Integrated Identity Platform Capabilities

New Engagement	Registration	Login	Transactions	Ongoing Engagement

Orchestration

Network / Signal Sharing

New Engagement	Registration	Login	Transactions	Ongoing Engagement
Lead Generation	Doc Verification	Authentication	Risk Scoring	Fraud and Risk Scoring
Ad Targeting	KYC & IDV	OTP	Trans. Monitoring	A2P Messaging
Identity Resolution	Identity Proofing	UEBA	Sanctions / OFAC	Customer Engagement
Identity Graphing	Biometrics	Biometrics	Chargeback Protection	Two-Way Communications
Credit Screening	Liveness	Liveness	Behavioral Biometrics	Inbound Call Center Fraud
Data Enrichment	Phone Verification	Customer IAM	Transaction Insurance	Communication Scoring
			eSignatures	

As reusable identity builds capabilities across the customer journey, they will meet the rising demand for identity solutions that focus on the needs of the consumer

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Market Demand Drivers

Broken digital identity infrastructure is driving demand for change beyond the status quo

Evolving consumer demands, growth in government-led initiatives, support across the capital markets, expressed interest 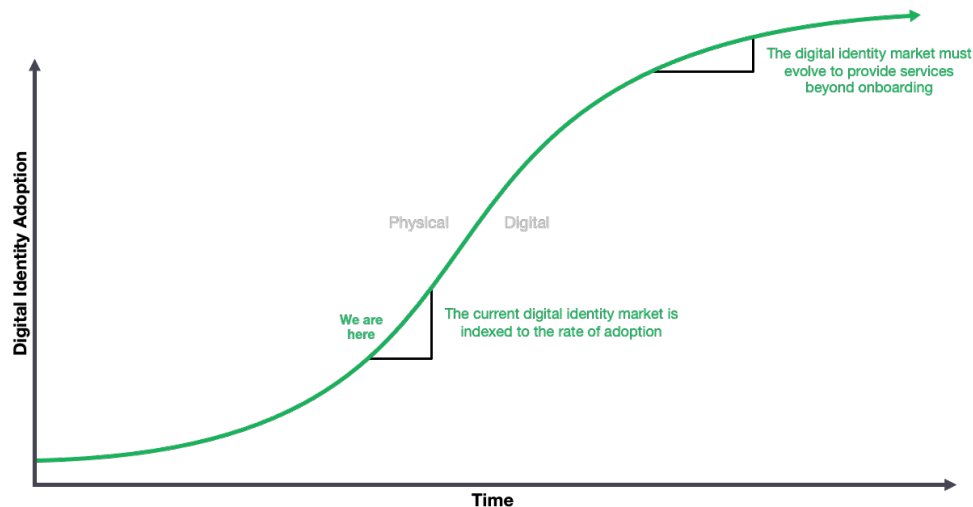from consumer platforms, and the introduction of PIEs are several of the market demand drivers paving the way for reusable identity


Market Demand Drivers for Reusable Identity

- **Evolving Customer Demands**: Rising UX expectations, ongoing data breaches and global regulatory scrutiny are driving the need for privacy-preserving solutions, anchored on the needs of the consumer, and not the enterprise.

- **Growth in Government-Led Initiatives:** The introduction of electronic ID (eID) initiatives around the globe are going well beyond proof of civilian identity, unlocking access to benefits and services across the public and private sectors.

- **Support Across the Capital Markets:** There has been a record amount of investment into backend identity solutions in 2021, with 123 deals accounting for $34.3B of capital.

- **Interest from Consumer Platforms:** Large-scale consumer platforms offer customer reach and ubiquity that can propel identity solutions at scale across industries and borders.

- **Introduction of PIEs:** Many organizations are capable of building, launching, and maintaining a personal identity ecosystem of their own; however, cross-industry participation and collaboration will be requisite for meaningful adoption.

The need for reusable identity can be attributed to improved focus on consumer demands

As consumer behavior continues to influence product development, the drivers of commerce, privacy, reputation, and data protection are paramount; for enterprises, this indicates a calibration across compliance, UX, risk management, and trust & safety
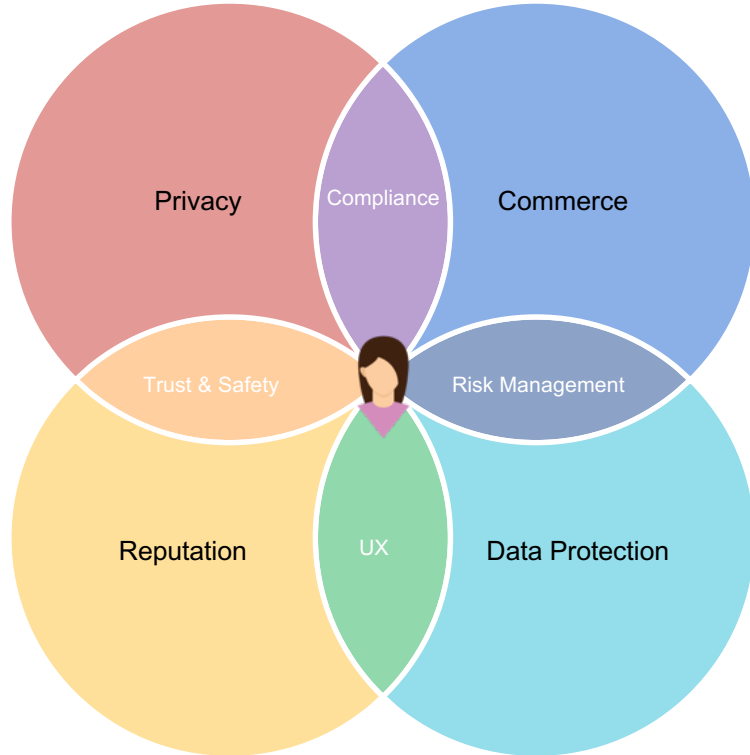
Consumer shifts

Privacy	Consumers are focusing more on data privacy as 86% of consumers indicate they care about data privacy.[1]
Commerce	A sharp rise in global eCommerce sales realized a 38% YoY growth in Q1 of 2021.[2]
Data Protection	79% of consumers are willing to invest time or money to better protect their privacy demonstrating increased importance consumers are placing on their consumer identity.[1]
Reputation	Interoperable reputation scores can streamline onboarding for 'good' users, improving trust and safety across businesses.

Enterprise shifts

|	
Compliance	Enterprises are focusing on improving their compliance capabilities to support evolving regulations, with a 5-year CAGR of 12.5%.[3]
Risk Management	Enterprise risk management boomed since the pandemic; prioritizing strong data protection policies create competitive advantage.
UX	52% of consumers say they are willing to pay more for better CX, highlighting its importance in the product development lifecycle.[4]
Trust & Safety	Enterprises invest heavily to build trust and safety with their consumers. e.g., Airbnb spends $50MM a year in payouts to its guests and hosts who have bad experiences.[5]

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Globally, government-backed eIDs have been gaining traction in the last five years

The number of eID schemes identified and tracked by Liminal has almost doubled from 2017 to 2021. With more private sector players joining forces with government agencies, we anticipate future reliance on reusable identity to further consumer adoption

Number of Countries with Announced eID Schemes
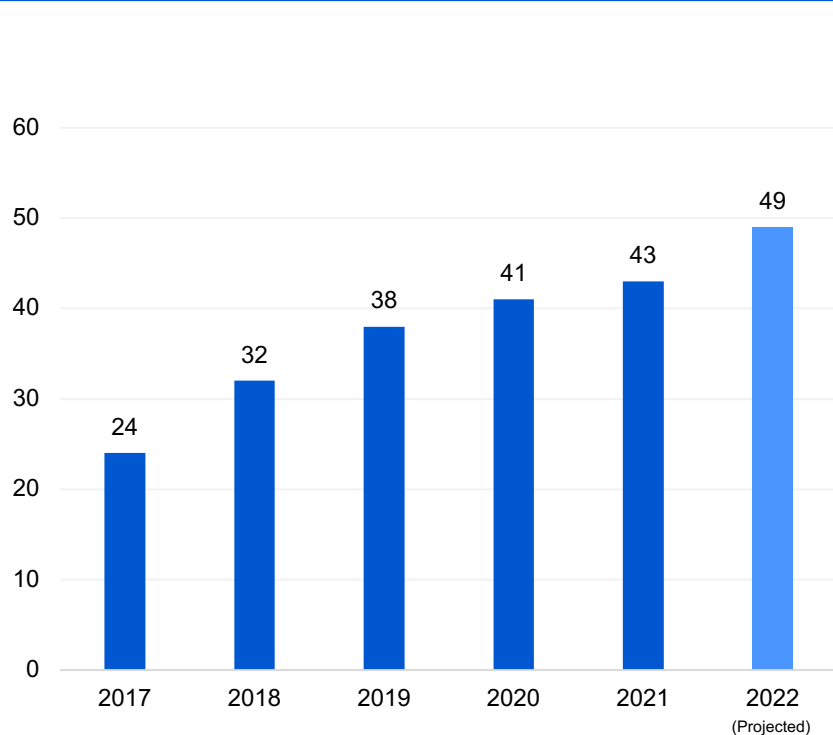
Types of Initiatives

Government agencies driving eID schemes. Responsible agencies are often specialized public entities such as the Digital Transformation Agency (Australia) and the Government Digital Service (UK).

Private sector companies driving eIDs. Heavily regulated industries such as finance, telcos, and healthcare have become natural sandboxes for experimenting with eID initiatives (e.g., Sweden's BankID).

Public-private partnerships (PPPs). Governments are entering into collaborative partnerships with the private-sector to meet the growing need for digital identity amongst their constituents (e.g., Singapore's SingPass).

Market Trends

eIDs propelling reusable identity schemes: eIDs have been gaining momentum over the last five years, growing at 15.7% CAGR by scheme count.[1] With more private sector players creating partnerships with governments globally, the market is expected to gain further traction.

A growing number of PPPs. The line between public and private models is becoming blurry. Successful eIDs typically require input from both parties. Public-led schemes can use private vendors to run parts of projects, while private schemes benefit from government support (e.g., access to registries).

PPP – an attractive model. Public initiatives often face efficiency issue. For instance, Gov.UK Verify intended to verify 25mm users by 2020; in reality, it only had ~7mm registered users in May 2020.[2] PPPs bring potential benefits like increased efficiency and continued tech enhancement.

Record financial investment have propelled the market to build supporting capabilities

There has been a record amount of investment into backend identity solutions in 2021, with 122 deals accounting for $32.2B of capital; this capital has been used to create robust identity platforms capable of supporting the reusable identity market

Total Invested in Backed Identity Solutions[1] (USD $ Billions)

Year	Value
2017	10.0
2018	8.7
2019	25.6
2020	17.0
2021	32.2
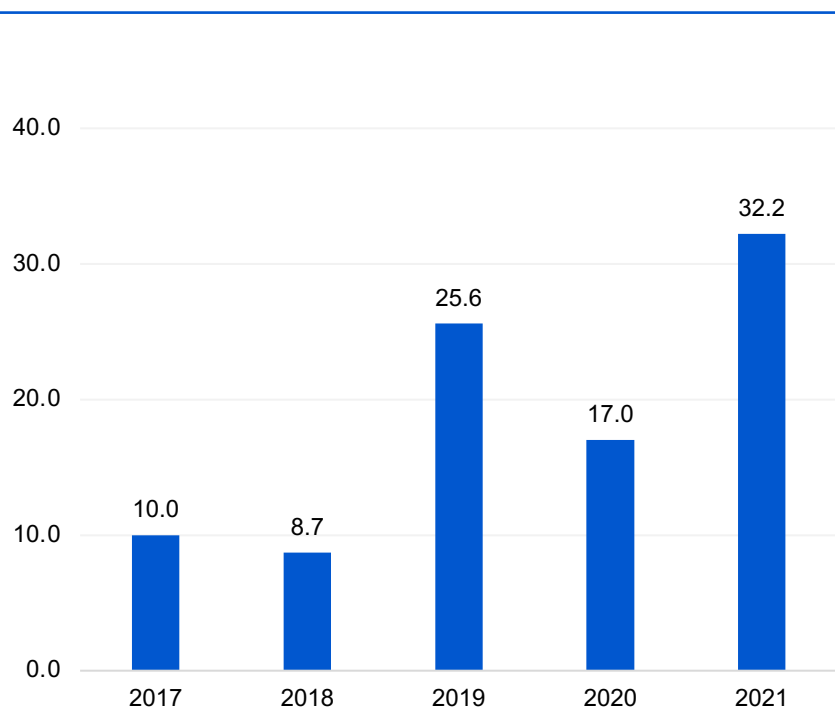
Key Market Platform Consolidation

May 3:
Okta Acquires Auth0
for $6.5B

okta   Auth0

June 1:
Mitek acquires ID R&D
for $49mm

Mitek   ID R&D

June 9:
Mastercard acquires
Ekata for $861mm

mastercard   EKATA

Nov 19:
GBG acquires Acuant
for $736m

GBG   acuant

Dec 9:
Avast acquires
Evernym

Avast   evernym

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Strong consumer brand platforms with scale are priming the market opportunity

Early entrants have the necessary technology but have struggled with user adoption; as recognized consumer brands like Apple and Google enter the space, they will unlock additional market opportunity for meaningful adoption and at scale

L4: Pure consumer-controlled interactions
L3 + usability, interoperability, and focus on user experience

L3: Identity and privacy as core business drivers
L2 + users' interests and values as guiding principles

L2: Privacy and consent mgmt. as fundamentals
L1 + recognition that privacy is a human right

L1: Organization-centric approach
User data is accumulated and monetized

Market Opportunity

evernym
digi.me
YOTI
ID.me
meeco
Verified.Me
trinsic
inrupt
Dataswift

Allstate
NortonLifeLock
Avast
experian
Microsoft
Google

0MM   2.5MM   25MM   250MM   2.5B

Consumer Platform Scale (Number of Users)

Early Entrants   Recognized Brands

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The success of PIEs will span across industries, with no single vertical as a frontrunner

The future of PIEs requires trusted networks within an integrated ecosystem; no single vertical is uniquely positioned to capture the market opportunity alone

PIE Market Opportunity

Trust (High / Low) vs Ubiquity (Low # of users / High # of users)

- Market Opportunity
- Financial Institutions
- Payment Networks
- Govt.
- Telcos / ISPs
- Big Tech
- Personal Data Stores
- Exceeding expectations
- Meeting expectations
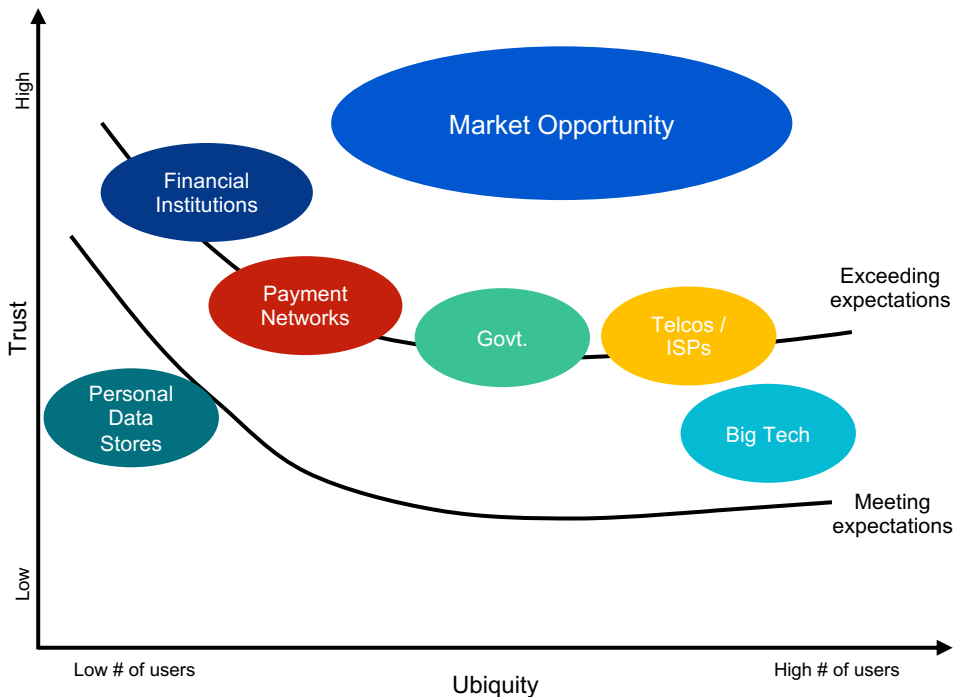
The Current Role of Industry Verticals

- **Personal data stores (PDSs):** PDSs could have a pivotal role as decentralized points of PII aggregation, but this would be dependent on their ability to connect into PIEs in order to scale and create value

- **Financial institutions:** Competing banks and credit unions are adept at building collaborative relationships. However, financial institutions may lack the ubiquity needed to truly add value to the enablement of PIEs

- **Payment networks:** The potential lack of interoperability between the largest card brands may throttle ubiquity

- **Governments:** Governments have a high degree of ubiquity and have been demonstrated to work collaboratively, e.g., eIDAS, but suffer from low trust, and weak defenses against cyberattacks

- **Telcos / ISPs:** Telcos may have the ubiquity needed for access to consumers; however, these organizations have generally done a poor job in building consumer respect and gaining trust

- **Big tech:** While some Big Tech companies have been trying to cultivate public personas around privacy, the actions of a few may have proved disqualifying in terms of how little trust the public has in the use their PII

Liminal

04

Reusable Identity Total Addressable Market Size

Methodology for Market Sizing

We used a bottom-up approach to size the global market and validated our findings with top-down analysis; we focused on use cases across the entire customer journey and analyzed twelve unique adoption and pricing scenarios

Key criteria	Description
Scope	**We conducted a detailed 5-year market sizing for the reusable identity market.** The opportunities were assessed across eight key verticals, and in alignment with Trust-over-IP Layer 4.
Methodology	**The Liminal team built the model from a bottom-up approach.** ▪ First, the team mapped key use cases for each of the eight identified verticals, looking across geographic and sub-vertical focus areas. ▪ Second, the team evaluated the assurance levels for each vertical across three identified use cases. ▪ Through vendor research, the team also developed pricing assumptions for each assurance level and geographic region. ▪ Third, the team calculated the annual customer volume (count), the addressable market size (in dollars), and a 5-year forecast of all addressable markets. ▪ Fourth, the team analyzed twelve different adoption and pricing scenarios; based on the current market dynamics ▪ Finally, the team validated the model using a top-down approach
Use Cases	**The model focuses on use cases across the customer journey** including segments like biometrics, identity verification (IDV), document verification, identity proofing, user and entity behavior, fraud detection, mobile identity, customer access management, and authentication.
Geography	**The model encompasses the entire global market.** Specifically, the geographies can be broken down into North America, Europe, APAC, LATAM, and MEA. There is a more detailed breakdown of North America into Canada, U.S., and Rest of North America for Avast's purposes.
Verticals	**The model assessed eight key verticals: financial services, healthcare, travel, government, digital commerce, entertainment, sharing economy, social media.** They were further broken down into 19 sub-verticals for a more comprehensive analysis.
Results	**At moderate adoption and moderate pricing, the reusable identity market TAM sits at $20.4B in 2021, growing at a 68.9% CAGR to reach $266.5B by 2026.** Separately, the 2021 onboarding TAM is $5.6B and ongoing is $14.8B.

Our scenarios found the 2026 TAM to be between $133B and $533B globally

Liminal analyzed twelve scenarios of different adoption and pricing growth combinations; based on our analysis, the reusable identity market will reach a TAM of $133B – $533B in 2026, and will grow at a CAGR between 50% – 91% from 2022 – 2026

TAM Trajectories by Adoption and Pricing Plans

USD ($) billions
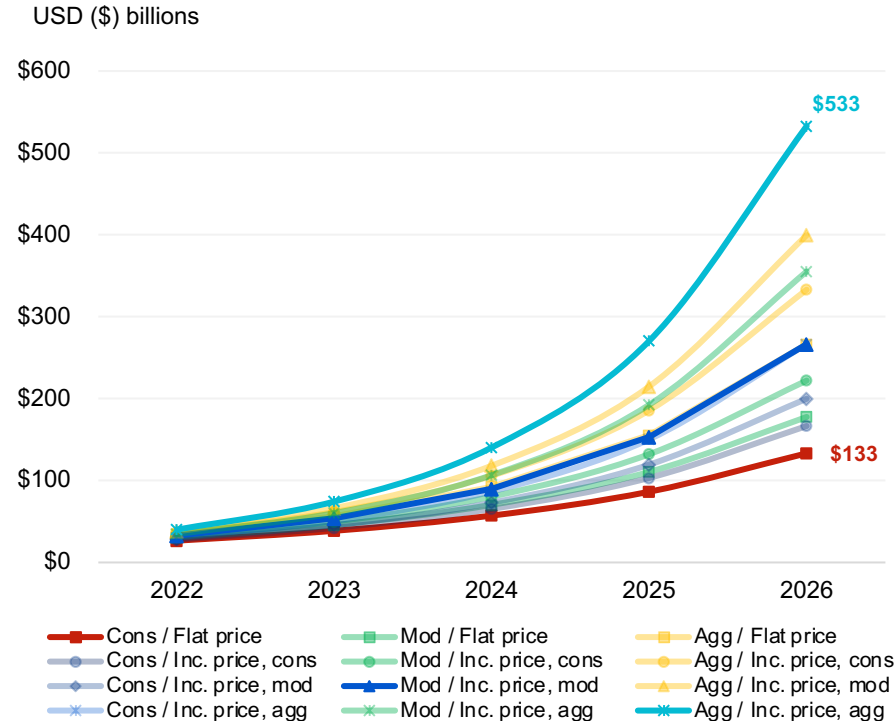
TAM	2022	2023	2024	2025	2026	CAGR
Flat pricing[1]						
Conservative	**$27**	**$39**	**$57**	**$86**	**$133**	**49.6%**
Moderate	$30	$46	$70	$111	$178	55.7%
Aggressive	$35	$56	$93	$155	$266	66.2%
Increasing price, conservative[1,2]						
Conservative[2]	$28	$42	$65	$103	$167	56.4%
Moderate	$32	$50	$80	$132	$222	62.8%
Aggressive	$37	$62	$106	$186	$333	73.8%
Increasing price, moderate[1]						
Conservative	$29	$45	$73	$119	$200	62.2%
Moderate	**$33**	**$54**	**$90**	**$153**	**$267**	**68.9%**
Aggressive	$38	$66	$118	$215	$400	80.2%
Increasing price, aggressive[1]						
Conservative	$31	$51	$87	$150	$267	71.8%
Moderate	$35	$60	$107	$193	$355	78.9%
Aggressive	**$40**	**$74**	**$140**	**$271**	**$533**	**90.9%**

Legend:
- Cons / Flat price
- Cons / Inc. price, cons
- Cons / Inc. price, mod
- Cons / Inc. price, agg
- Mod / Flat price
- Mod / Inc. price, cons
- Mod / Inc. price, mod
- Mod / Inc. price, agg
- Agg / Flat price
- Agg / Inc. price, cons
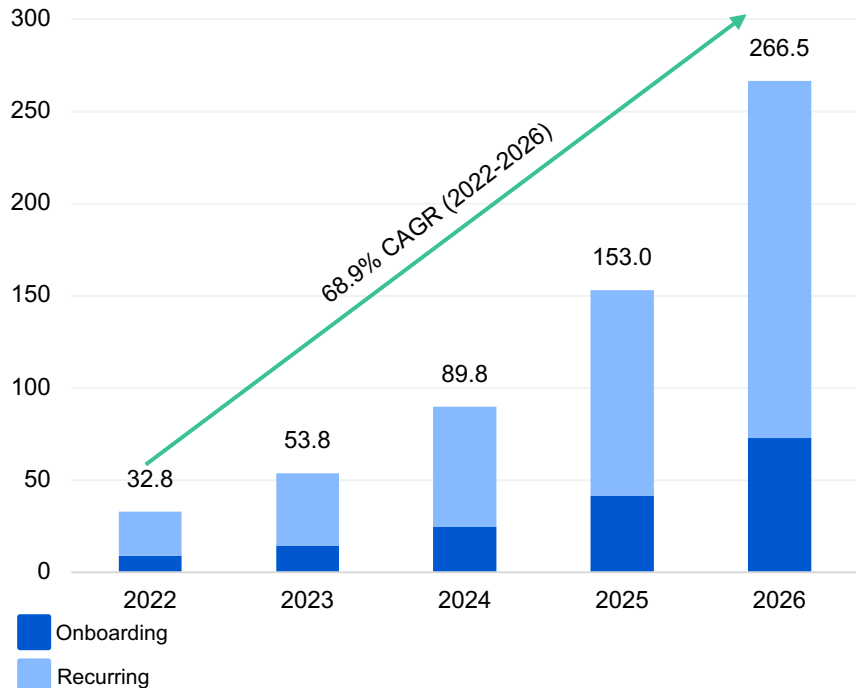- Agg / Inc. price, mod
- Agg / Inc. price, agg

Notes: 1. Pricing plan assumptions see appendix 2. Interpretation: assuming pricing increases conservatively between 2021-2026, under a conservative adoption scenario, the 2021 TAM is $19B, growing at 56% to $167B by 2027

The global market size for reusable identity will reach $266.5B by 2027

This nascent market is poised for strong growth by 2027 with a 68.9% CAGR, driven by the predicted expansion from high assurance verticals into all verticals

Reusable Identity TAM (2022 - 2026)[1]

USD ($) billions

Bar chart values: 2022: 32.8; 2023: 53.8; 2024: 89.8; 2025: 153.0; 2026: 266.5. Green arrow labeled "68.9% CAGR (2022-2026)". Legend: Onboarding (dark blue), Recurring (light blue).

TAM Scope

- **TAM represents the size of the global reusable identity market** and analyzes the market opportunity onboarding and ongoing support across eight core verticals: financial services, travel, digital commerce, entertainment, sharing economy, healthcare, social media, and government.

- **Onboarding use cases** include identity verification & KYC, document verification, identity proofing, biometrics, and fraud prevention.

- **Ongoing use cases** include authentication, fraud prevention, account monitoring, compliance and transaction monitoring, customer IAM, eSignature, and data privacy and consent management.

TAM Analysis

- TAM is $32.8B in 2022 and projected to grow at a CAGR of 68.9% to exceed $1T by 2029. Strong growth is projected beyond 2026, driven by network effects from the increased adoption.

- Onboarding initially accounts for 27.2% of TAM but its percentage slowly decreases over time, creating a shift towards ongoing support.

- Ongoing support will reach $193.8B by 2027. This covers use cases such as re-authentication, transaction verification, and account recovery.

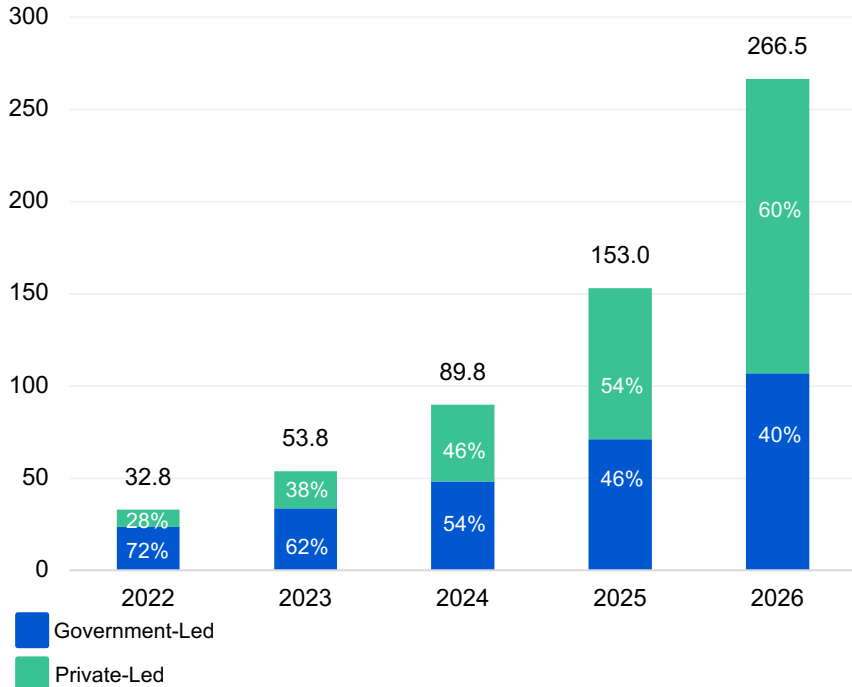**Notes**: 1. Model is built on moderate adoption and moderate pricing

eIDs are dominant today, but private-led identity schemes have a larger 2026 TAM

With 40+ global schemes, public-led reusable identity schemes account for 72% of the TAM in 2022. Eventually, private initiatives will surpass public schemes by 2024 and consumers will need solutions that can create public-private partnerships (PPPs)

TAM Breakdown: Government- vs Private-led

USD ($) billions

Year	Total	Private-Led	Government-Led
2022	32.8	28%	72%
2023	53.8	38%	62%
2024	89.8	46%	54%
2025	153.0	54%	46%
2026	266.5	60%	40%

■ Government-Led
■ Private-Led

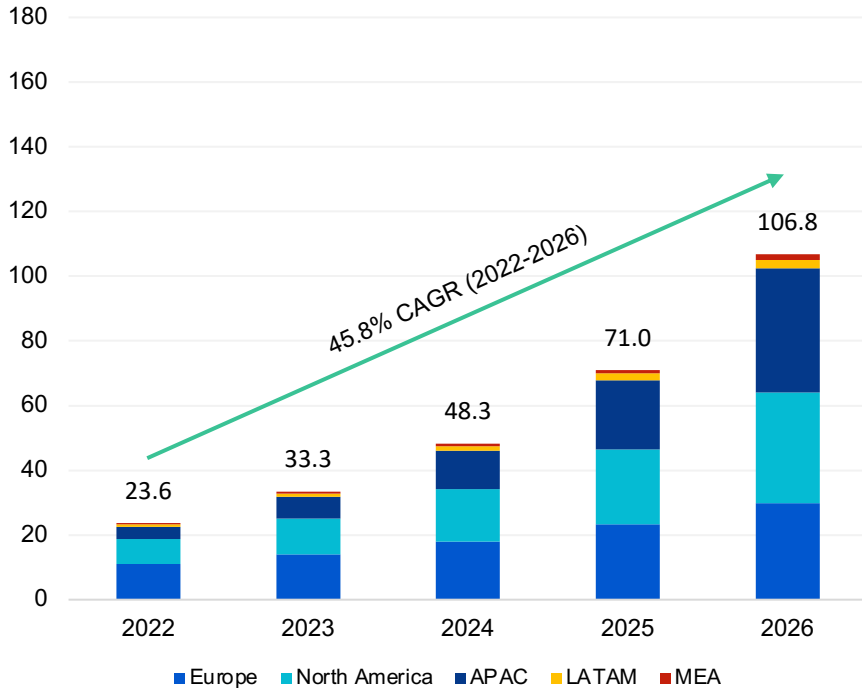## Public and Private Market Explanation

- **Initially, government-led initiatives dominate the 2022 market TAM.** Public-led schemes and current eID programs have the highest market viability due to adoption rates and public registry access.

- **The market is shifting in 2023.** The predicted rise of PIEs alongside the entry of large commercial brands (Apple, Google) drive the growth of reusable identities.

- **Private-led reusable identities will grow in commercially-focused verticals.** Enterprises in commercial verticals like e-commerce and marketplaces will increase the demand for private-led reusable identity.

- **By 2024 there will be rising demand for Public-Private Partnerships (PPPs).** PPPs will gain traction because they unlock cross border commerce and intergovernmental networks.

Notes: 1. Model is built on moderate adoption and moderate pricing

Private-led opportunities will exceed those of government-led from 2025 onwards

Government-led initiatives are estimated at $24 billion in 2022, with a 45.8% CAGR through 2026; the private-led market is only at $9.2 billion in 2022 but is expected to rise rapidly to $160 billion by 2027, particularly driven by growth in APAC and North America

Government-led TAM by Geography

USD ($) billions

45.8% CAGR (2022-2026)

23.6 33.3 48.3 71.0 106.8

2022 2023 2024 2025 2026

■ Europe ■ North America ■ APAC ■ LATAM ■ MEA

Private-led TAM by Geography

USD ($) billions

104.3% CAGR (2022-2026)

9.2 20.3 41.7 82.0 159.5

2022 2023 2024 2025 2026

■ Europe ■ North America ■ APAC ■ LATAM ■ MEA

Liminal
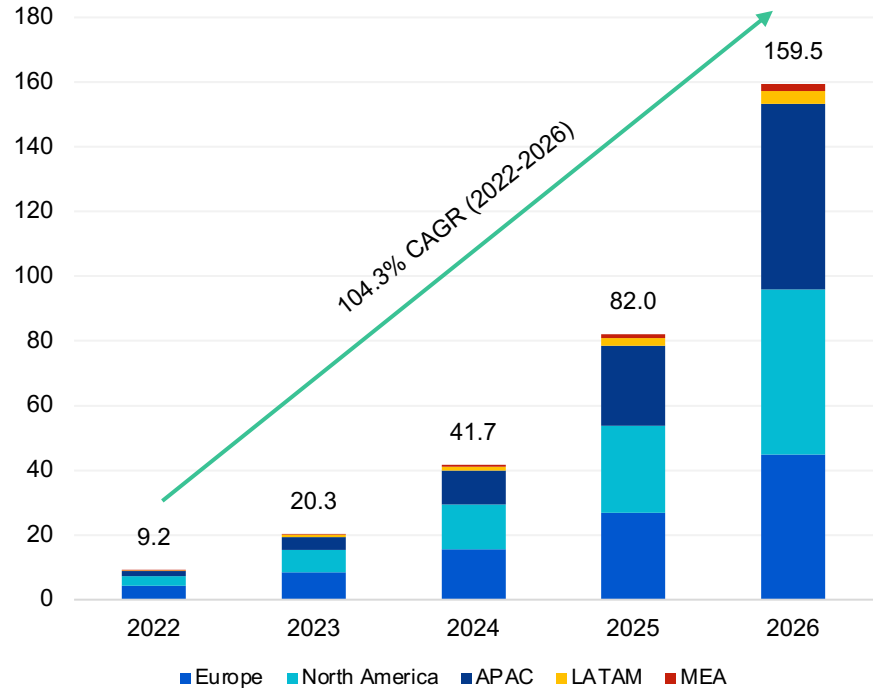
Europe has the largest TAM in 2022, but is surpassed by APAC and North America

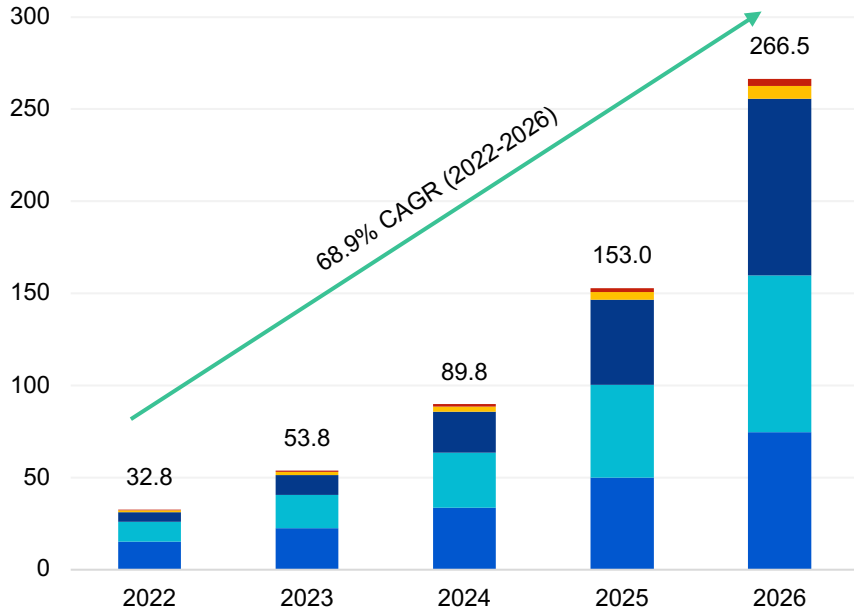In 2022, Europe has the largest potential market TAM due to the relative success of public led eID schemes across the region; however, with strong growth projected in both North America and APAC, those regions will surpass Europe in TAM by 2027

Total TAM by Geography[1]

USD ($) billions

Regional Breakdown

Europe: $15.2B in 2022, 49% CAGR through 2026. Currently, has the highest potential adoption based on existence of 22 eID schemes across the region.

North America: $10.8B in 2022, 68% CAGR through 2026. Lower initial penetration due to nascency of mDLs and challenges of previous initiatives (SecureKey).

APAC: $5.3B in 2022, 106% CAGR through 2026. Success in Singapore, Pakistan, and Australia, but the largest countries have not had success yet.

LATAM: $1.1B in 2022, 58% CAGR through 2026. Initiatives in Peru, Argentina, Brazil, and Columbia have had initial success, but growth has slowed.

ME&A: $0.5B in 2022, 71% CAGR through 2026. Government-led initiatives in Nigeria, UAE, and Kuwait have had strong growth adoption rates to date.

Liminal

Financial services, digital commerce, and government are the largest markets

The top three verticals of financial services, digital commerce, and government collectively make up 78% of the 2022 TAM; however, strong growth will create multi-billion market TAMs in all the verticals analyzed by 2027

Total TAM by Vertical[1]

USD ($) billions

68.9% CAGR (2022-2026)

| Year	Value
2022	32.8
2023	53.8
2024	89.8
2025	153.0
2026	266.5
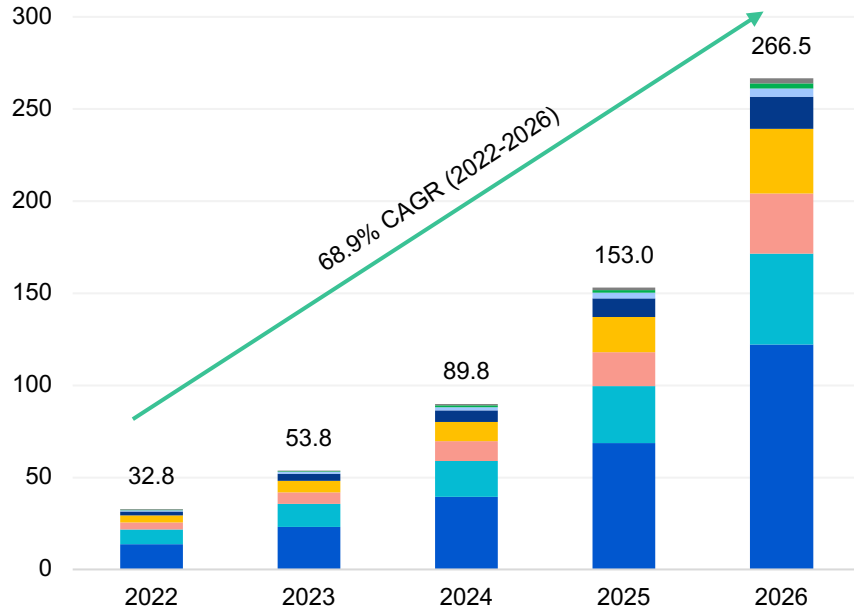
Vertical Breakdown

Financial services: $13.8B in 2022, 72% CAGR through 2026. Key use cases in digital banking, payments, remittance, lending, BNPL, investments, and crypto.

Digital commerce: $8.04B in 2022, 58% CAGR through 2026. Key use cases in eCommerce and P2P marketplaces.

Government: $3.8B in 2022, 71% CAGR through 2026. Key use cases in identity renewal, online services, and payment distribution.

Entertainment: $3.6B in 2022, 77% CAGR through 2026. Key use cases in online and physical gambling, gaming, and streaming services.

Social media: $2.3B in 2022, 66% CAGR through 2026. Key use cases center on fraud prevention and age assurance.

Travel: $0.7B in 2022, 62% CAGR through 2026. Key use cases center on digital booking and curb-to-gate security.

Sharing Economy: $0.3B in 2022, 74% CAGR through 2026. Key use cases center on both user and 'worker' onboarding, authentication, and fraud prevention.

Healthcare: $0.2B in 2022, 83% CAGR through 2026. Key use cases center on digital and telehealth, with physical use cases still unproven.

Liminal

A $769MM serviceable obtainable market of reusable identity today

The current SOM is estimated at $769MM, which represents 3.9% of TAM or 22.6% of private-led TAM. As the reusable identity market gains traction and network effects take hold, the SOM is expected to grow rapidly

Reusable Identity TAM, Private-led TAM, and SOM (2021)

TAM
$20.4B

Private-led TAM
$3.4B

Obtainable Market
$769MM
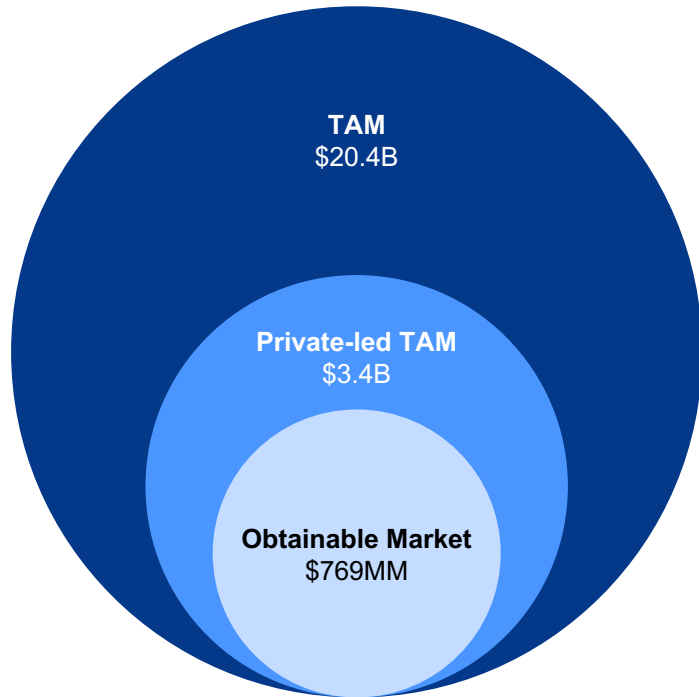
TAM Analysis

- **TAM aligns with the combined revenue of the core solution segments**. The combined revenue of the core solution segments that reusable identity can replace is estimated at $19.7B in 2021, which aligns with the TAM of $20.4B.[1,2]

- **Market is nascent:** The reusable identity market is currently dominated by public-led initiatives, with 83% of the addressable TAM led by the public sector.

SOM Analysis

- **2021 obtainable makes up 22.6% of private-led TAM.** Based on the combined relevant revenue of 44 identity wallet / eID vendors globally, SOM is estimated at $769MM, or 22.6% of private-led TAM.[2]

- **Reusable identity opens market opportunities limited by friction tolerance:** Today, solutions come from various segments like identity proofing, authentication, mobile ID; however, with reusable identity streamlining UX, SOM is expected to fill market white-space and expand to private-led TAM.

- **Network effect will further boost growth:** While current opportunity is limited to $769mm, as participation from a growing number of private and public sector players increases, network effect is expected to exponentially boost adoption of community-based identity wallets / eIDs.

Liminal

Explaining the gap between today's identity wallets and the total TAM

The two biggest factors that contribute to the wide gap between the total TAM at $20.3B and the current penetration of reusable identity today at $769MM are the nascency of public eID initiatives and the market dominance of legacy identity vendors

Reusable TAM to Today's Market Penetration

(in $USD Billions)

Waterfall Explanation
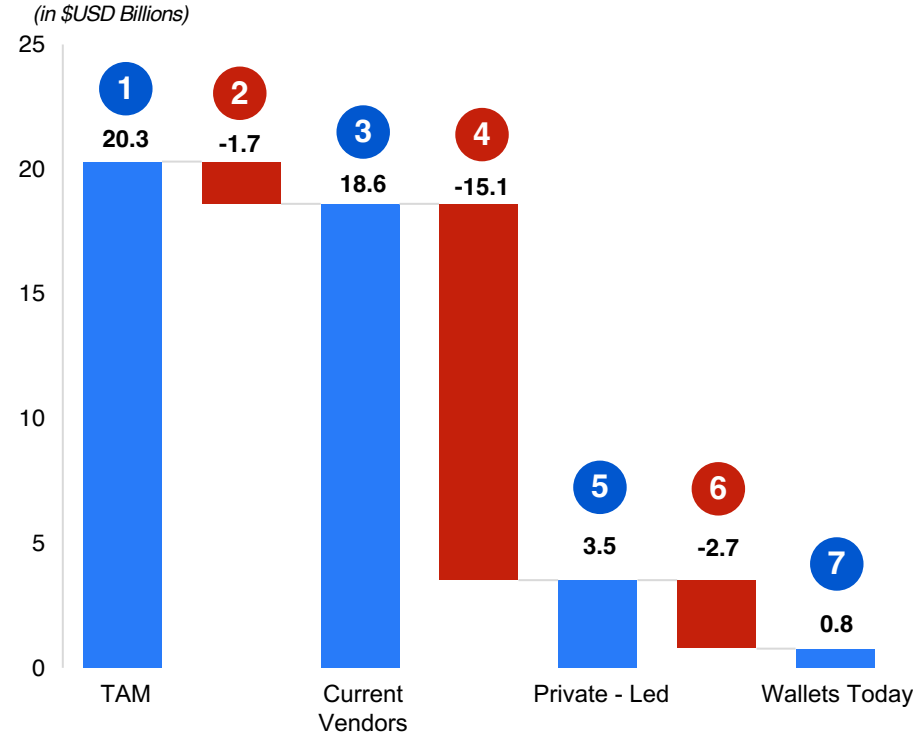
1. **TAM, $20.3B:** The TAM identified by Liminal for the reusable market in 2021.

2. **TAM – Current Vendors Gap, $1.7B:** The gap between replacement technology / solutions today and the reusable identity TAM.

3. **Current Vendors, $18.7B:** The total estimated 2021 revenue for solutions that a reusable identity would supplement (e.g., proofing, biometrics, etc.).

4. **Current Vendors – Private – Led, $15.1B:** Liminal's market sizing estimates only 17% of the $20.3B TAM is accessible to private-led wallets in 2021.

5. **Private – Led, $3.5B:** The potential market for private-led reusable identity in 2021 based on Liminal's market sizing findings.

6. **Private – Wallets Today, $2.7B:** The gap between the total TAM for private-led reusable identity and solutions in market today.

7. **Wallets Today, $0.8B:** The estimated revenue of the 44 vendors Liminal analyzed across private-led wallets today.
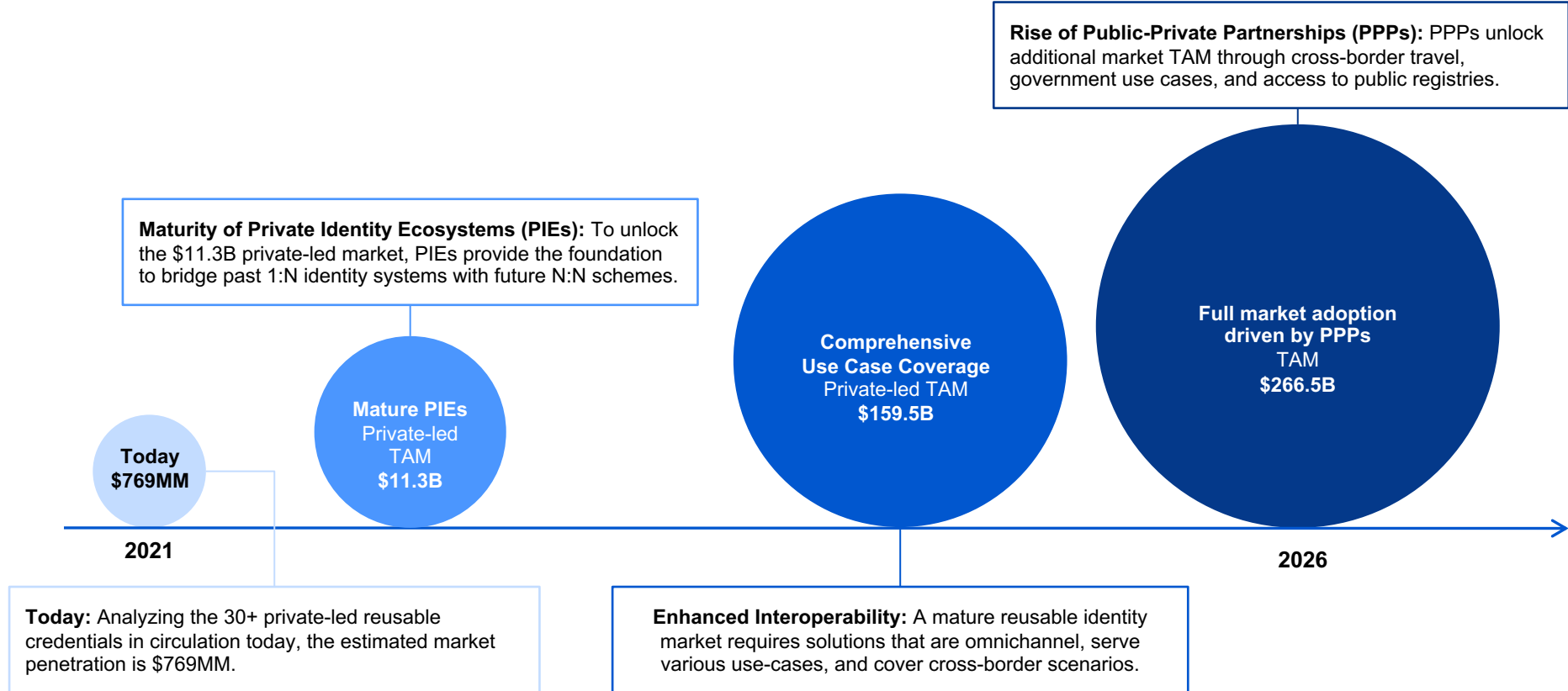
05

Key Milestones for Growth

There are three key milestones to reach the full market potential

To realize the potential of a $266.5B reusable identity market by 2027, three milestones are critical to facilitate the transition – the maturity of private identity ecosystems, enhanced interoperability, and public-private partnerships

Rise of Public-Private Partnerships (PPPs): PPPs unlock additional market TAM through cross-border travel, government use cases, and access to public registries.

Maturity of Private Identity Ecosystems (PIEs): To unlock the $11.3B private-led market, PIEs provide the foundation to bridge past 1:N identity systems with future N:N schemes.

Full market adoption driven by PPPs TAM $266.5B

Comprehensive Use Case Coverage Private-led TAM $159.5B

Mature PIEs Private-led TAM $11.3B

Today $769MM

2021

2026

Today: Analyzing the 30+ private-led reusable credentials in circulation today, the estimated market penetration is $769MM.

Enhanced Interoperability: A mature reusable identity market requires solutions that are omnichannel, serve various use-cases, and cover cross-border scenarios.
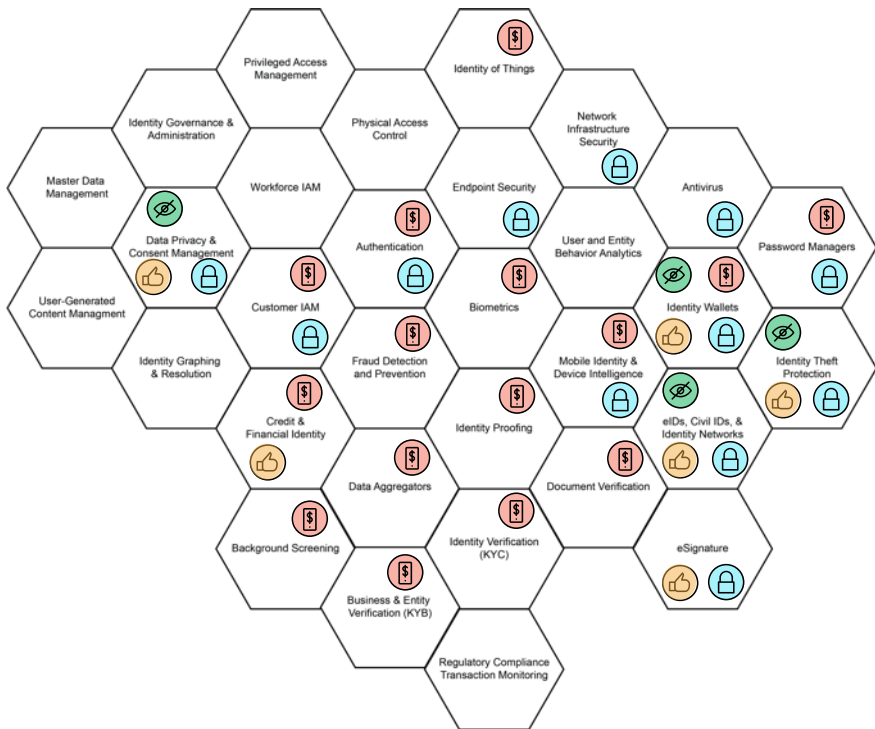
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Mature PIEs require a focus on privacy, commerce, reputation, and data protection

Mature PIEs will allow consumers to manage their identity and corresponding credentials online, creating an opportunity for companies to disrupt the status quo by simplifying the relationship between consumers and their digital identities

Landscape Overview

Market Overview

Privacy: Privacy is the consumer's ability and right to own, control, restrict, remove and protect their digital identity. As Apple's iOS 14 demonstrated, there is a growing demand for solutions who can provide transparency and privacy control directly to end consumers, which creates an opportunity for PIEs. 65% of consumers agree that data privacy is one of the biggest issue faced by society. [1]

Commerce: The ability for organizations to offer solutions that can facilitate commerce will be fundamental to enabling PIEs since many of the components enabling commerce today are also likely to be used in trusting identity credentials within a PIE. In 2021 there were 2.14B digital buyers, offering a massive opportunity for organizations to service a growing market.[2]

Reputation: In today's world, people must build their reputation on a site-by-site basis and lack portability across like-minded platforms. PIEs that can build portability and federation into a wide range of identity credentials that can be used to infer or create a reputation. As the global gig economy grows, the introduction of a portable form of identity that could be federated across multiple platforms would be imperative for continued success in this sector

Data protection: PIEs offer the ability to mitigate the risk of third-party fraud and large-scale data breaches. For businesses, the broader adoption of integrated fraud and identity networks leverages data, signals, and verified credentials across an ecosystem of shared providers. For consumers, the ability to self-manage their data reduces the liability of organizations to collect, process, and safeguard PII that is lost to cyberattacks and data breaches.

PIEs are necessary to unlock the large market opportunity for reusable identity
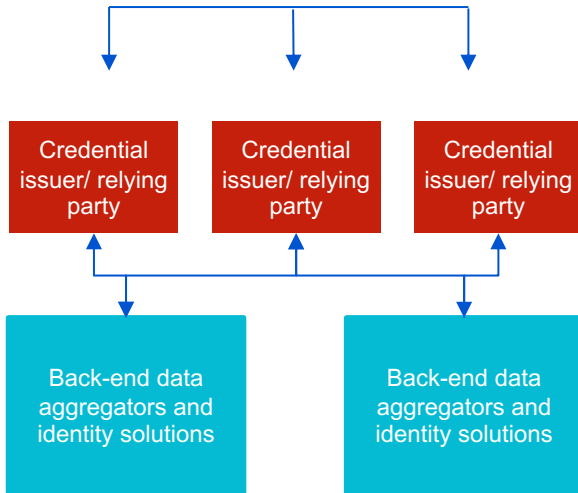
To evolve today's fragmented frameworks to one that supports many-to-many relationships between consumers and service providers, PIEs must take an orchestrated approach across ecosystem participants to unlock market potential

2010s: 1:N	The shift to N:N	2020 & Beyond: N:N
Adoption of social logins to federate identities to applications; supports 1:N relationships	PIEs require network effects to bridge the divide between 1:N relationships and N:N relationships	N:N relationships allow users to store and manage their identity across many providers
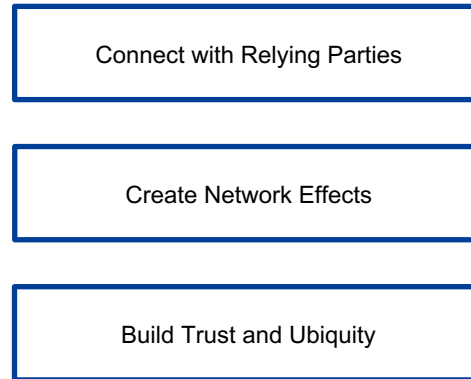
2010s: 1:N

Federated identities enable 1:N relationships

Credential issuer/ relying party

Credential issuer/ relying party

Credential issuer/ relying party

Back-end data aggregators and identity solutions

Back-end data aggregators and identity solutions

The shift to N:N

Connect with Relying Parties

Create Network Effects

Build Trust and Ubiquity

2020 & Beyond: N:N

Consumers engage with identity wallets and personal data stores to have autonomy of identity credentials

PIEs

Credential issuer/ relying party

Credential issuer/ relying party

Credential issuer/ relying party

Back-end data aggregators and identity solutions

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Increasing interoperability will expand the market into low assurance use cases
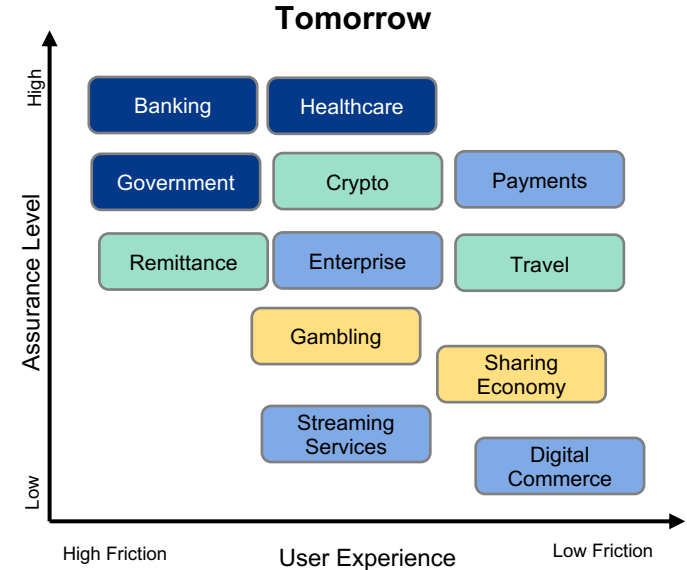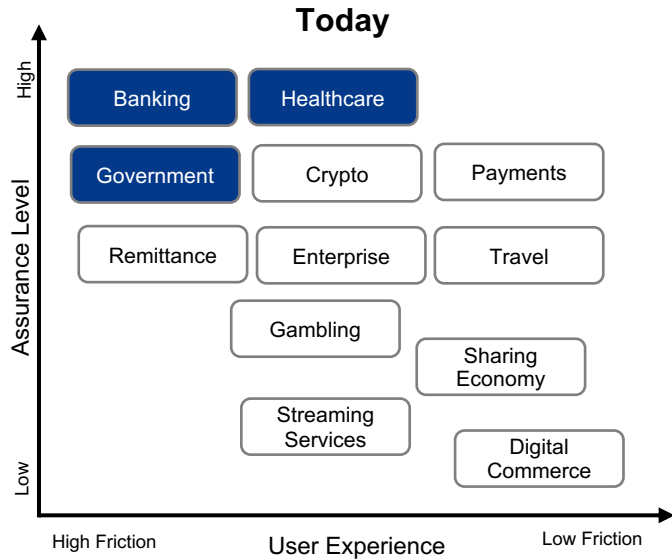
Reusable identity is currently present in high assurance use cases such as banking, but increasing interoperability will help reusable identity expand into low assurance use cases such as social media

Today

Assurance Level (High / Low)

- Banking
- Healthcare
- Government
- Crypto
- Payments
- Remittance
- Enterprise
- Travel
- Gambling
- Sharing Economy
- Streaming Services
- Digital Commerce

User Experience (High Friction / Low Friction)

Tomorrow

Assurance Level (High / Low)

- Banking
- Healthcare
- Government
- Crypto
- Payments
- Remittance
- Enterprise
- Travel
- Gambling
- Sharing Economy
- Streaming Services
- Digital Commerce

User Experience (High Friction / Low Friction)

| Digital - Physical Use Cases	Customer Experience Focused	Cross-border
As consumer adoption increases, digital reusable identities will unlock physical use cases in verticals like gambling, asset sharing, and ride sharing.	As more consumers onboard into reusable identities, the lower friction provided by these solutions will unlock viability in verticals like digital commerce.	Given the complexity of leveraging identity solutions cross-border, reusable credentials will provide increase assurance without adding additional friction layers.

Public-private partnerships will unlock full market potential

Private-led initiatives with government involvement, such as access to government data bases, accreditation, and / or access to government portals, are best positioned to unlock full market potential

Public-led
- Access to government registries
- Government accreditations
- Regulatory and policy support
- Provides access to government services with the reusable identity
- Government initiatives may face efficiency issues, e.g., Gov.UK Verify intended to verify 25MM users in 2020 but only achieved ~5MM[1]

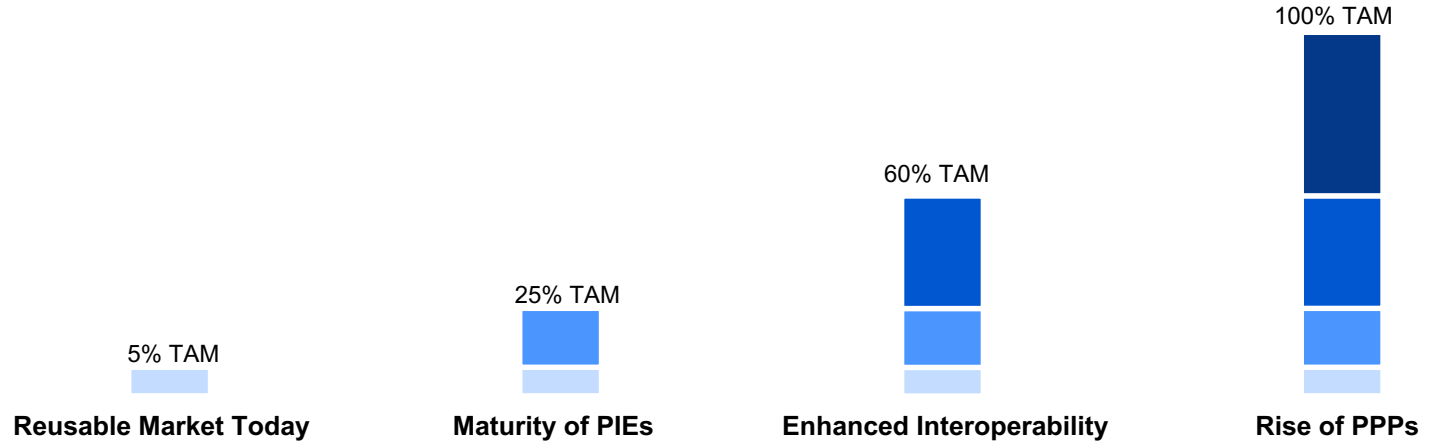**Public**　　**PPPs**　　**Private**
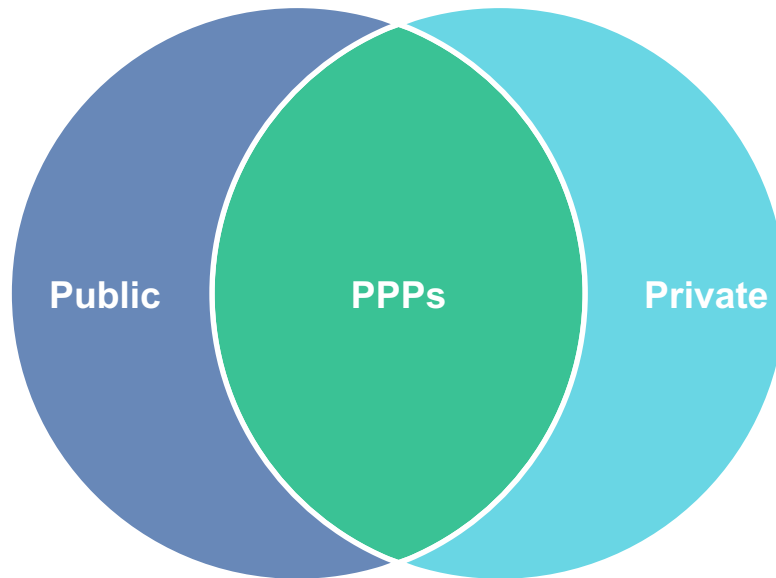
Private-led
- Technology development / innovation
- Infrastructure design
- System maintenance
- Introducing alternative data / signals
- Industry partnerships
- Facilitating cross-border partnerships
- Scandinavian BankID system has >8MM users and was used >5B times in 2020[2]

Public-Private Partnerships (PPPs)
- A one-stop-shop solution facilitates access to both public and private services
- A high assurance solution backed by both government data and alternative signals
- A reliable system with ongoing innovations / competitions among service providers
- ID.me built a strong network through government partnerships, holding contracts with 22+ U.S. states, reaching a $1.5 billion valuation in March 2021[3]

Liminal

Key milestones unlock 20 – 40% of TAM

As percentages of 2026 TAM, private-only milestones like the maturity of PIEs and enhanced interoperability will unlock 60% or $159.5B of TAM; PPPs will connect public and private schemes to create market attainability for 100% of the TAM

	Reusable Market Today	Maturity of PIEs	Enhanced Interoperability	Rise of PPPs
Precent Unlocked	5%	20%	35%	40%
Amt. of TAM (2026)	$13.3B	$53.3B	$93.3B	$106.6B
Explanation	Without PIEs, adoption is limited to small community-based identity initiatives.	PIEs enable reusable identity to cover high-assurance use cases.	Interoperability to low assurance verticals, e.g., physical use cases, unlocks more TAM.	PPPs bridge public and private schemes and ensure adoption through public registries.
Key Use Cases	Community focused (e.g., students)	High assurance credential (e.g., financial services)	Lower assurance verticals (e.g., eCommerce)	Cross-border & government access (e.g., border entry)

Chart labels: 5% TAM, 25% TAM, 60% TAM, 100% TAM

Liminal

06

Overview of Liminal Strategy Partners

![Liminal logo]

The digital future is Liminal. We're guiding the way.

Liminal is a boutique strategy advisory firm serving digital identity, fintech, and cybersecurity clients, and the private equity and venture capital community.

We see the solution to complex digital challenges not only as 'what', but 'how.' We don't just tell you about the destination, we show you how to get there.

What we do

Advisory Services

We advise the world's most innovative leaders on building, buying, and investing in the next generation of integrated digital identity platforms and technologies.

- Market Intelligence
- Go-to-Market
- Growth Strategy
- Transaction Services

Research

Through our proprietary database, Link, we monitor thousands of companies across digital identity. Our insights allow us to predict and understand trends before they happen.

- Market Sizing
- Tailored Research
- Published Research

Industry Engagement

Our community consists of influential individuals redefining the digital identity ecosystem. We are conveners – connecting people, initiatives, and projects defining this evolving space.

- Executive Summits
- Private Events
- Webinars
- Podcasts

Our industry-focused approach allows us to provide unique service offerings

Focused Engagements

Ongoing Retainer Services

Annual Membership

By the numbers

Since 2016, we've supported hundreds of companies with launching new products, breaking into new markets, and realizing max value at exit

Liminal

Advised on
$5.5B+
in client M&A activity since 2019

Supported
40+ product launches
in **65+** countries

Generated
$200M+
in new portfolio company revenues since 2018

Published
100+
webinars, whitepapers, and research reports in 2020

Access to
300+
SMEs in our executive network

Hosts
100
industry executives and investors at the Liminal Summit in May 2022

Recorded
250+
State of Identity podcast episodes

Manage a proprietary database of
1,000+ companies across
30 solution segments

We work with amazing companies

We are well-versed in the evolving operational, financial, technological, and regulatory environment we serve.

We provide private equity firms, strategic, and investors with independent and actionable advisory to uncover hidden value pools across the digital identity ecosystem.

Private Equity & Investors

Advent International — GLOBAL PRIVATE EQUITY
Great Hill PARTNERS
Avenir
Sumeru
ALEPH
Crestview
SPECTRUM EQUITY
Mayfield
PSG
CORSAIR

Strategics & Solution Seekers

airbnb
stripe
Google
Uber
EQUIFAX
Avast
twilio
ENVESTNET Yodlee
experian
KIRKLAND & ELLIS LLP
NortonLifeLock
MiTek
SIDEWALK LABS
Allstate IDENTITY PROTECTION
CHASE

Solution Providers

onfido
authID.ai
Trulioo
jumio
MICROBLINK
GDC GLOBAL DATA CONSORTIUM
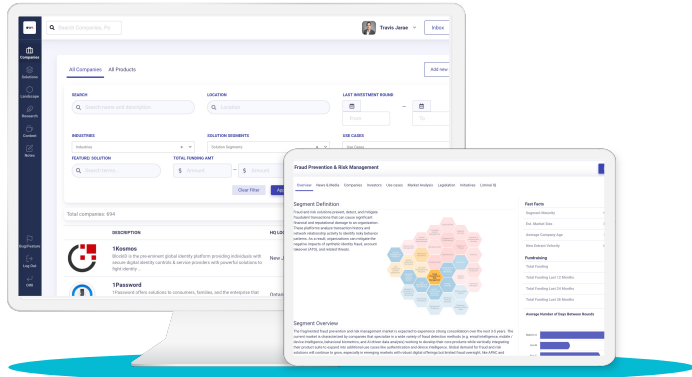BioCatch
SOCURE
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Our proprietary tools track the microtrends that help inform strategy

Our market intelligence platform, Link, was built specifically to monitor the market for new entrants and potentially disruptive trends

Collection

We identify specific attributes based on terms and keyword string searches for patent filings, proposed legislation, financials, and movement of individuals across companies and projects. We combine this information with data supply economics through our network

Analysis

Automated data collection and analysis using knowledge graphs

Human-collected intelligence is layered on top of the knowledge graph

Validation

Constantly validated by hundreds of service providers, end-users, and investors

As a result, we see the world a bit differently – not as a "what" but as a "how"

To make sense of an industry landscape dominated by platforms and enablers, we analyze how each company and product in each market segment interacts with and influences other market segments based on dominant data sources.

Liminal Leadership

TRAVIS JARAE
Founder / CEO
Travis.Jarae@liminal.co

- **15+ years experience** leading teams across focused on **go-to-market strategy and product management**
- **Currently CEO of Liminal and MD at Ginkgo Ventures**
- **3x founder** - Power Mailers Direct (direct mail automation for financial advisors), Power Auto (direct-to-consumer auto auction access), and Canon (private company ratings platform)
- Previously digital identity **@ Google**, strategy **@ Deloitte**, and analyst **@ Citi**
- B.A., Finance, **University of South Florida**

JENNIE BERRY
Managing Director
Jennie.Berry@liminal.co

- **15+ years experience in financial services and technology,** leading teams through digital transformation and organizational effectiveness initiatives
- Previously **Chief of Staff to the CEO of Deloitte LLP** and management consulting **Manager at Deloitte**
- Previously **Senior Analytics Manager at Bloomberg** in equities and equity derivatives
- B.A., Economics, **Columbia University**
- M.B.A., **Stern School of Business, NYU**

CAMERON D'AMBROSI
Managing Director
Cameron.Dambrosi@liminal.co

- **Specializations include market intelligence and transaction services,** full lifecycle product development, user experience and design thinking, fraud prevention, and mobile intelligence
- **Previously Engagement Manager at Deloitte Consulting,** focused on risk and compliance and digital transformation for financial institutions
- B.A., History, **Fordham University**

WILL CHARNLEY
Director
Will.Charnley@liminal.co

- **Director at Liminal** focused on transaction services and growth strategy
- Previously worked as the **Director of Systems and Growth at Learning by Giving Foundation, as well as a Director of Program Services at Big Brothers Big Sisters**
- B.A., History, **Boston College**
- MBA, **Babson University**

Liminal Principal Advisors

ERIC WOODWARD
Principal Advisor

- **25+ years experience** leading, advising, investing, and partnering **with financial technology companies** including the creation of Early Warning Services, and the launch of Zelle's real-time fraud & risk detection platform
- Current Advisory Board member at **Jumio, SentiLink, and ID Experts**
- Previously served as **President of Early Warning Services, Managing Director at Bank of America Merrill Lynch**
- B.S., Accounting & Finance, **University of Colorado**; MBA, **Haas School of Business, UC Berkeley**

FILIP VERLEY
Principal Advisor

- Group Product Manager of Identity at **Google**
- Previously led **Airbnb's Identity team, Director of Risk and Fraud at TxVia**
- B.A. Criminology, **Florida Atlantic University**; M.S., Criminal Justice, **Florida State University**

ANDREW SHIKIAR
Principal Advisor

- **Executive Director and CMO at FIDO Alliance,** a global consortium to create open standards and an interoperable ecosystem for strong user authentication
- Previously led market development for **Tizen Association, LiMo Foundation, and Liberty Alliance Project**
- Previously group manager for **Sun Microsystems'** identity management products and services
- Structured launch groups including the **Smart TV Alliance and Open Visual Communications Consortia**

DR. GILAD ROSNER
Principal Advisor

- Privacy and information policy researcher with focus areas on IoT, identity management, US & EU privacy and data protection regimes, and online trust
- **Founder of the Internet of Things Privacy Forum**
- **20+ years experience in IT,** identity management technology, digital media, automation, and telecommunications
- Member of the **UK Cabinet Office Privacy and Consumer Advisory Group**
- Visiting Scholar at the Information **School at UC Berkeley**

ANDREW KASS
Investment Banking Partner

- Managing Director and **CEO of BlackWatch Advisors**
- **20+ years of technology investment banking** experience across corporate finance and M&A
- Previously at **Deutsche Bank and Credit Suisse**
- Licensed broker-dealer registered with the **SEC and FINRA/SIPC**
- B.A., Business Economics, **Brown University**

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Sources

Appendix

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