

Lockstep Technologies *Stepwise* executive overview

Lockstep *Stepwise*

A unique identity security solution

Stepwise uses smart chipped devices—smart phones, Secure Elements, smartcards etc.—to protect online identity data, enhance privacy, prevent ID theft, and deliver verified anonymity/pseudonymity in sensitive applications like e-health, mobile and online payments, and online voting. We were the first in the world to fully exploit the advanced cryptography built into Chip-and-PIN cards, to prevent online payments fraud. *Stepwise* protects identity assertions in motion, eliminating the collection of extraneous personal information; it can turn the tide in Internet privacy, defuse the black market in stolen identities, and radically improve customer privacy and convenience.

www.lockstep.com.au/technologies



LOCKSTEP

Safety in numbers!

Stepwise is a unique solution for digital identity security. *Stepwise* safeguards digital identity claims and assertions, eliminates extraneous personal details, decentralises and streamlines authentication, and radically enhances convenience and privacy at the same time.

Issued on: Gold Credit Card
CCN. 4000 1234 5678 9012
Issued by: Acme Bank

Issued on: Health Insurance Card
Unique Health ID 999AAA
Notarised by: Department of Health

Issued on: Health Insurance Card
Patient ID 303
Notarised by: Dr Blogs

Ordinarily, when a Digital Identity is presented online, nobody can tell if it's real, or stolen and replayed, or simply made up. *Stepwise* encapsulates discrete identity assertions—like credit card numbers, health IDs, or any customer reference number— within intelligent devices like smart phones or smartcards, and seals each assertion with a two-fold pedigree. Firstly, *Stepwise* shows who issued the assertion, to prove its bona fides. Secondly, *Stepwise* names the type of device on which it has been carried, safe from attack, to help RPs make risk-based authentication decisions.

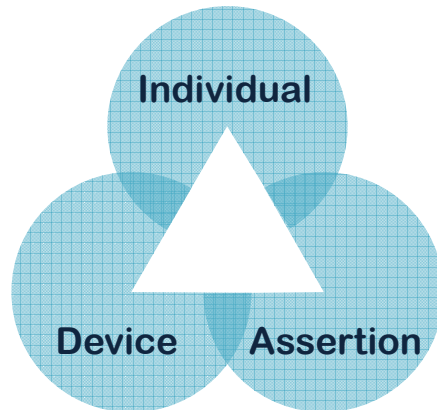
When the user needs to present an assertion in a transaction, their application selects the appropriate *Stepwise* capsule and seals the transaction data with it. Technically, the capsule is a pseudonymous digital certificate and the seal is a digital signature. Multiple capsules can be carried by the one device. For instance, a health smartcard can carry a unique national identifier, and separate local IDs or handles issued by doctors and service providers. Or, a smart phone can carry a unique CRN for each app. The unique decentralised architecture protects assertions from being linked, reduces ID theft, and streamlines processing.

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Rethinking authentication



Lockstep has fundamentally re-thought authentication and authorization. In the vast majority of transactions, we know what we need to know about someone to do business with them. Instead of reworking "identity" we need more reliable ways to confer precise claims and assertions, with less exposure of personal information.



Lockstep Technologies' *Stepwise* creates a strong virtual triangle joining a Digital Identity assertion to an Individual via an authentication Device under their control. The structure of the triangle can be proven and relied upon without revealing all the constituent personal detail, as we shall see ...

Joining the three



Individual



1. Authentication Device issued to Individual and controlled by them

2. Recognised Authority issues a particular assertion to Individual

3. Anonymous certificate (capsule) holding the assertion bound to device by Private Key

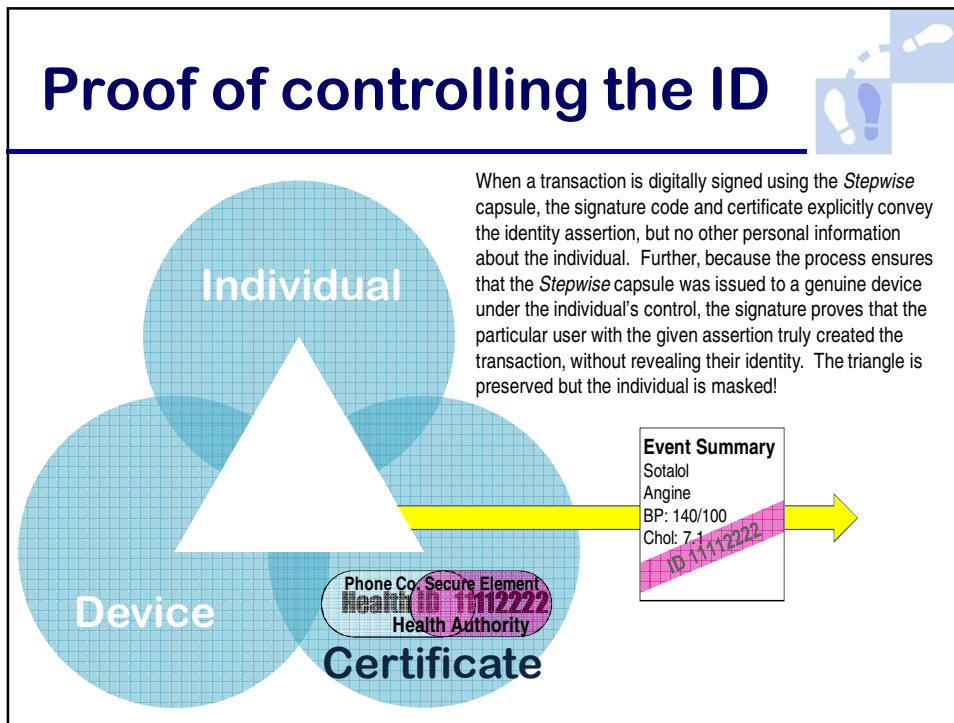


Device

Certificate

The triangle is formed by a coordinated mix of processes and technologies. *Stepwise* utilises personal authentication devices like smart phones or smartcards, capable of carrying Digital Certificates. A device is issued to an individual through some trusted process by e.g. a telco or a government agency. Separately, an authority issues some identity assertion to the same individual. For example, a health ID could be issued by a health department, or a payment card number by a bank. The final leg of the triangle is formed by issuing an anonymous certificate (*Stepwise* "capsule") to the device containing the assertion. The encapsulated assertion is uniquely bound to the device through the matching Private Key.

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Stepwise vertical markets

	Financial Services	Healthcare	Government	OSN, Gaming
Drivers	Defeat CNP fraud Customer convenience Simpler processing Improve on 3D Secure Reduce PCI burden	Confidentiality Privacy Compliance Medical ID theft Access by patients	Privacy and Trust Reduce political risk Increase utility & ROI	Fight avatar theft Age proofing Confidentiality Privacy
Uses	Phone wallets online CNP payments Debit cards online Online account origination	e-Health records Personal EHR	e-Health records Anonymous e-voting G2C e-commerce	Profile protection Avatar protection Anonymous age proofing
Form factors	Smart phones Chip-and-PIN cards	Govt health cards Private health cards Smart phones Private USB keys	Govt smart ID cards Smart driver licences Smart phones	Smart phones Private USB keys

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Benefits in govt, health



- ☞ Dramatically enhances privacy and reduces ID theft
- ☞ Eliminates the major political risks relating to privacy fears; transforms ID cards into friends of the citizen, not agents of government
- ☞ Creates a potent strategic weapon against identity crime; demonstrates government leadership
- ☞ Increases confidence in government online
- ☞ Increases smartcard utility and ROI by enabling safer secondary uses
- ☞ Transparent, de-centralised, uncomplicated security model; readily verifiable, satisfying diverse stakeholders
- ☞ Zero impact on smartcard security certification.

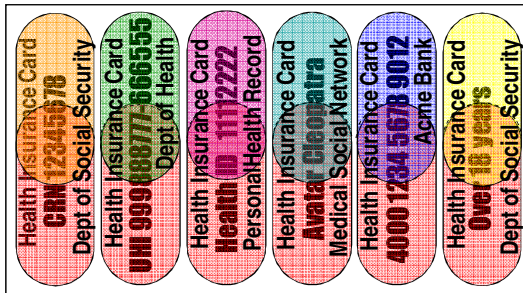
Benefits to e-commerce



- ☞ Vastly improved customer experience: *simpler, faster, ATM-like*
- ☞ Greatly reduced risk of Card Not Present fraud; increased confidence
- ☞ Radically better privacy protection, reduced disclosure of extraneous personal details; reduced incentive for identity theft
- ☞ Brings NFC smart phone wallets to online & mobile payments
- ☞ For e-merchants: better PCI-DSS compliance, lower cost, reduced exposure to organised crime
- ☞ For banks: enhanced ROI on Chip-and-PIN (EMV) cards
- ☞ Simpler, lower cost implementation; no centralised authentication servers
- ☞ Preserves Four Party payments model; zero regulatory perturbation
- ☞ Potential to streamline and accelerate *3D Secure* processing.

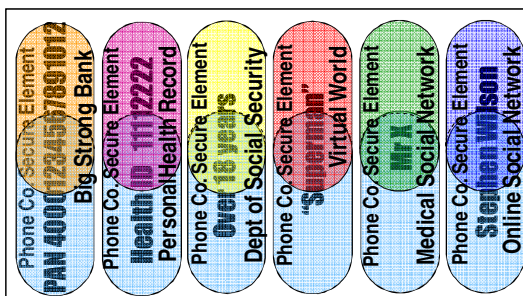
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Encapsulating multiple identifiers



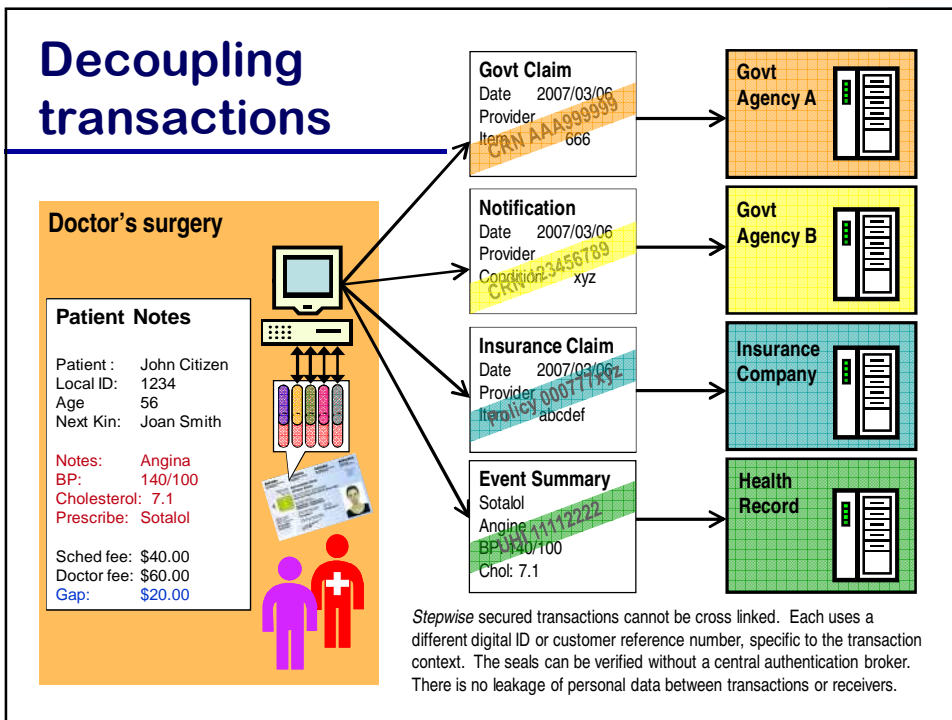
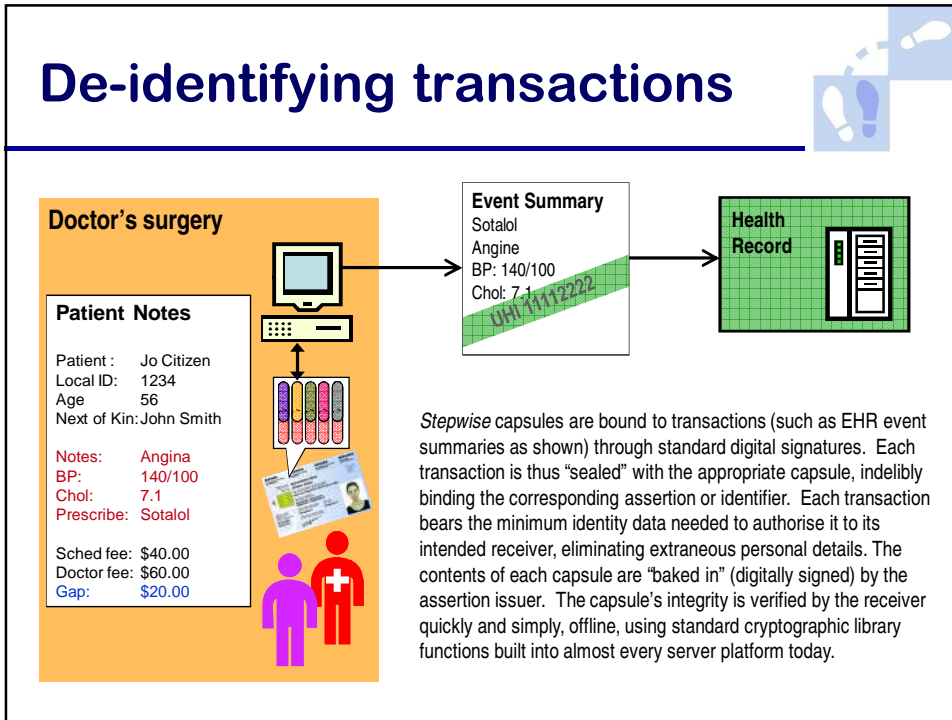
- Any assertion or personal data may be encapsulated by *Stepwise* in a PK-capable chipped device, and cannot then be copied or counterfeited.
- Each *Stepwise* capsule bears a tamper-proof pedigree, showing (a) who issued the capsule and (b) the type of chip that carries it; the chip issuer and capsule issuer can (and often will) be different.
- The legitimacy of encapsulated assertion can be verified by receivers offline, without the need for central validation services or authentication brokers.
- Additional capsules can be added at anytime, memory allowing.

Mobile devices



- *Stepwise* leverages the in-built digital signature capability of many intelligent chip platforms (the "capsules" are actually tailored but standard digital certificates).
- *Stepwise* capsules can be deployed on a smart phone SIM or NFC Secure Element.
- The capsule confers indelible evidence that the assertion has been secured in an approved mobile device.

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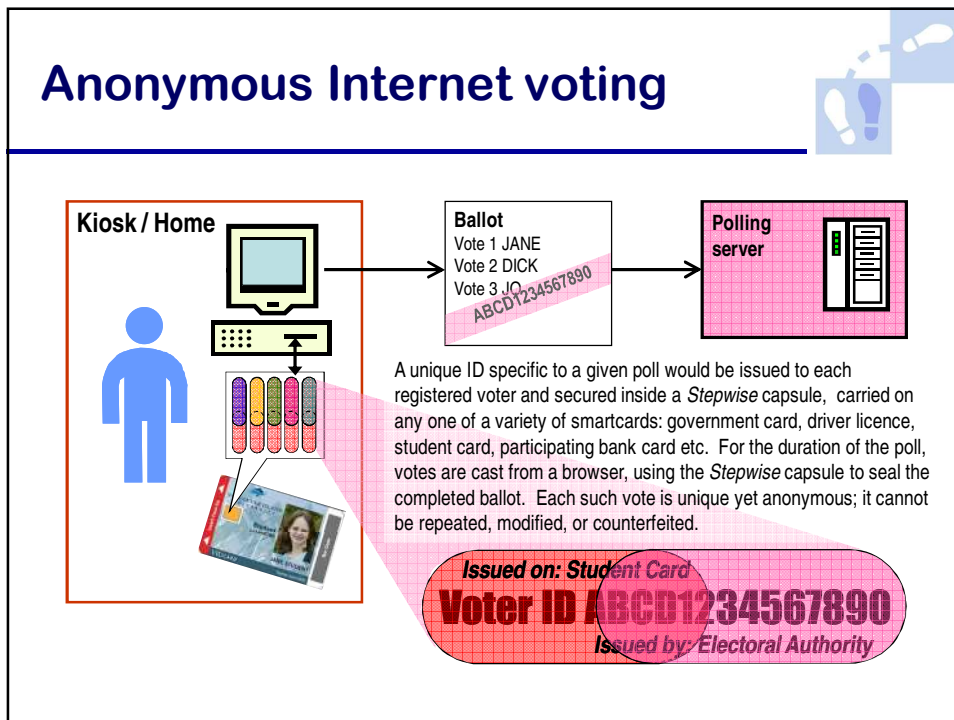
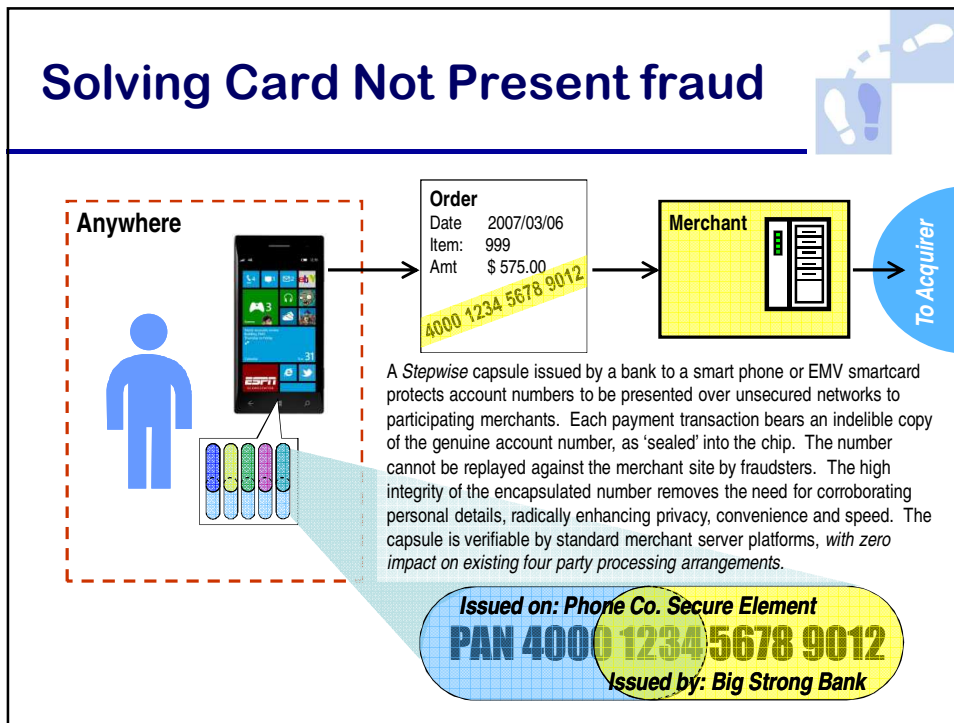
Govt Agency A

Govt Agency B

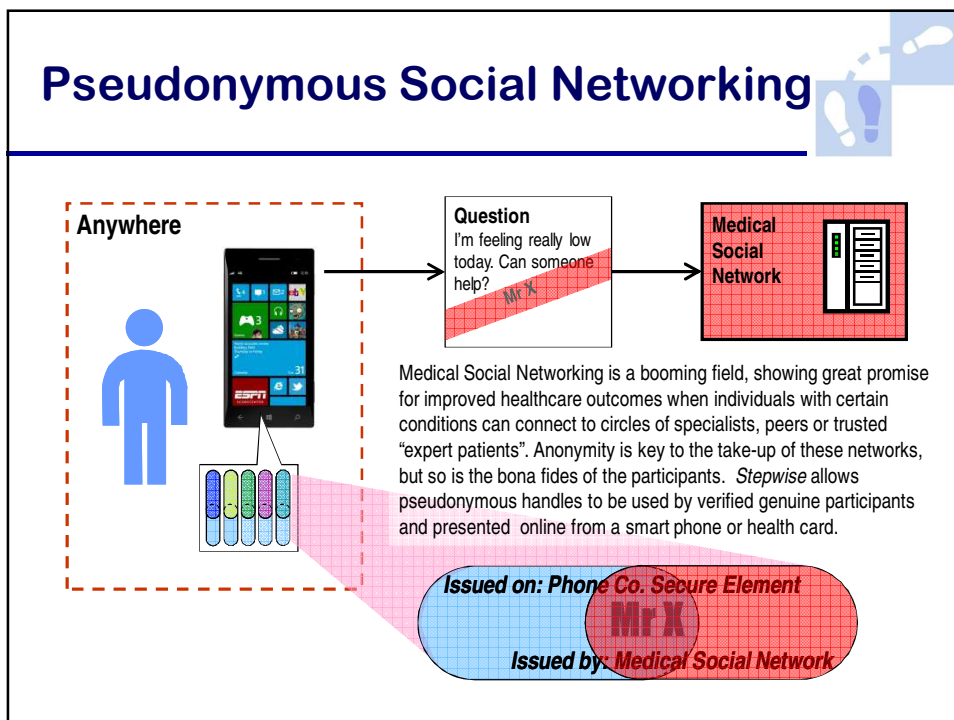
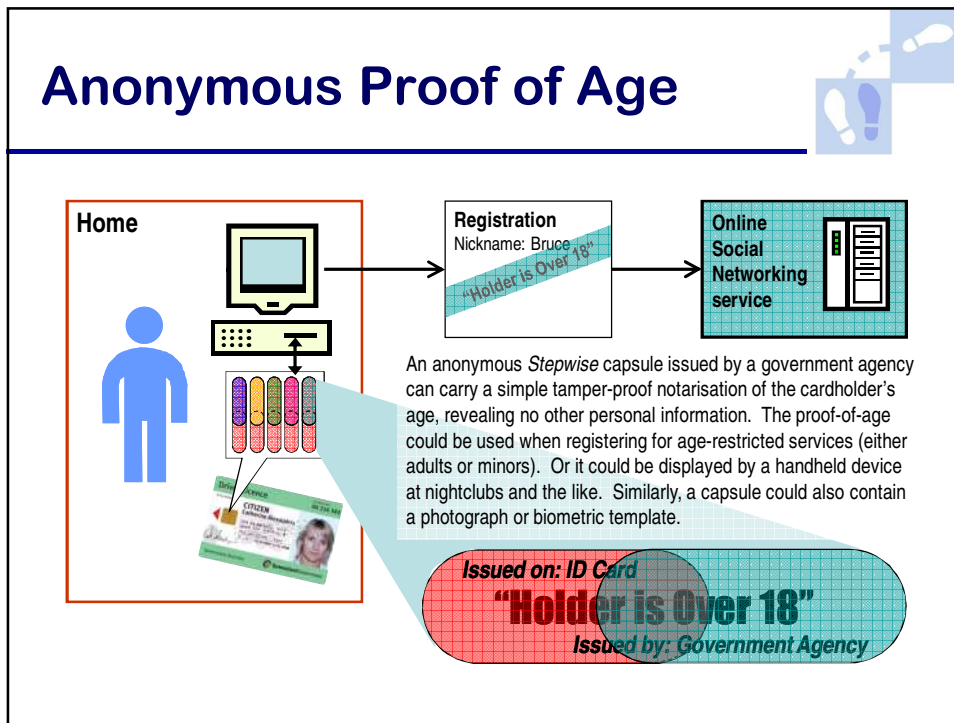
Insurance Company

Health Record

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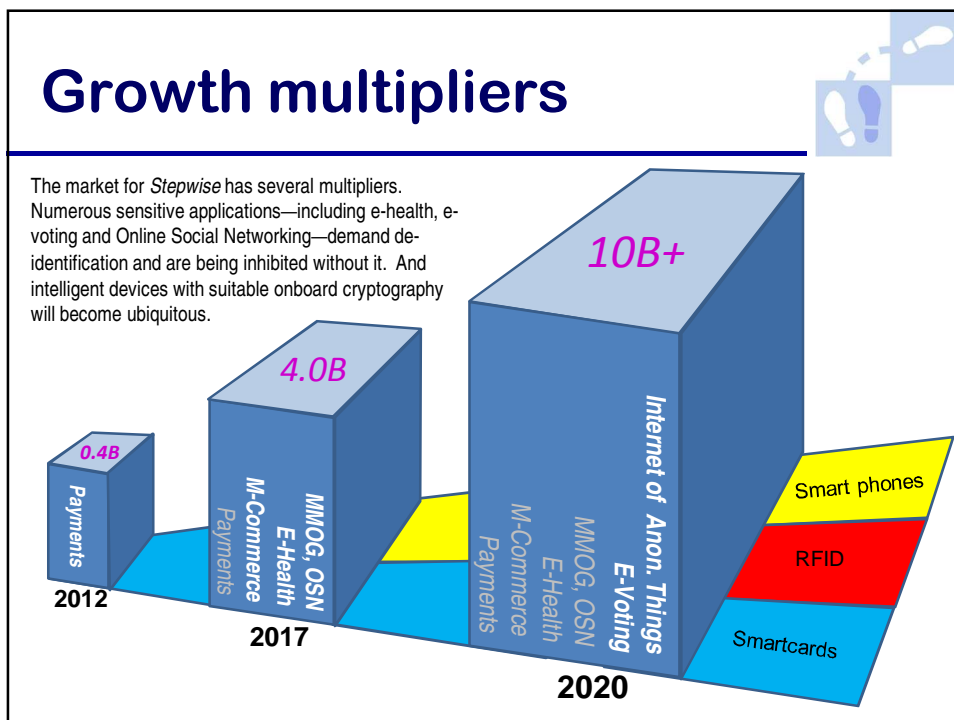
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Stepwise market segments

US Govt PIV employee cards (HSPD-12)	20,000,000
National ID (Hong Kong, Malaysia, Belgium, Mid East, Thailand ...)	100,000,000
Health cards (Austria, France, Germany, Taiwan, Slovenia ...)	200,000,000
Chip & PIN Phase 2 rollouts (DDA chips)	100,000,000
Virtual Worlds, MMORPG	10,000,000
Total (c. 2013)	430,000,000
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Future national ID cards (India+)	2,000,000,000
Smart driver licences	100,000,000
Health cards	300,000,000
Chip & PIN Phase 2 completion (DDA chips)	1,000,000,000
M-commerce (smart phone NFC wallets)	500,000,000
OSN, Virtual Worlds, MMORPG	100,000,000
Total (c. 2018)	4,000,000,000



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Alternate form factors

The diagram illustrates alternate form factors for digital identity, showing three columns of data points linked to physical objects:

- Column 1 (Credit Cards):**
 - Acme EMV Card: CCN 4000 1234 5678 9012, Acme Bank
 - Acme EMV Card: A/C No. 123456, Acme Bank
 - Acme EMV Card: Shareholder ID ABC123, PublicCo Pty Ltd
- Column 2 (Health Cards):**
 - Health Card: CRN 43590865784, Agency 1
 - Health Card: CRN 3456787345, Agency 2
 - Health Card: Allergy = Penicillin, Dr Smith
 - Health Card: Drug Trial ID = xyz, Acme Drug Inc.
- Column 3 (Smart Phones/USB Drives):**
 - Smart phone: Profile = 76349578635, OSN 1
 - Smart Phone: Age over 18, Notary
 - Smart Phone: CCN 4000 1234 5678 9012, Acme Bank
 - Privacy Scheme: Profile = Superman, OSN 2

Physical objects shown include a credit card, a health card, a smartphone, and a USB drive.

Patents

System and method for anonymously indexing electronic record systems

- US Patent 8,347,101
- AU Patent 2005220988
- Pending EU Patent App. EP05714237
- Pending HK Patent App. 7106215.9

Authenticating electronic financial transactions

- US Patent 8,286,865
- NZ Patent No. 589160
- Pending EU Patent App. EP09732423
- Pending AU Patent App. 2009238204 (PCT/AU2009/000456)

Authenticating electronic financial transactions

- Pending US Patent App. 13/646,142 (continuation of 12/937,700 now US 8,286,865)

Verifying a Personal Characteristic of Users of Online Resources

- Allowed AU Patent App. 2008301230

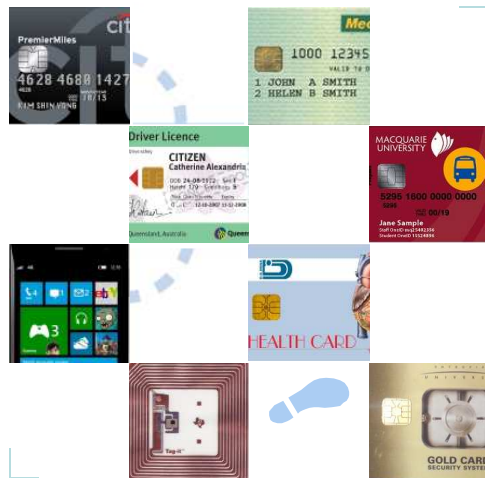
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Awards & Recognition

- Asian SESAMES Awards finalist, 2010
- Tech23, 2009
- Anthill *Smart 100 Awards* (voted No. 25), 2009
- Finextra (UK) Innovation Showcase, 2009
- ABC TV *The New Inventors* program, 19 Nov 2008
- Global Security Competition, Asian Top Five semi-finalist, 2008
- Australian Technology Showcase, 2008
- AusIndustry COMET R&D grant, 2007
- Anthill Cool Companies Award (Innovation) Top Three, 2007
- Secrets of Australian ICT Innovation (Security) 3rd place, 2006.



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