

E-Commerce

Jack Lang and Stewart McTavish

Guest lectures

Anna Soilleux, Olswang

Kush Puri and Tim Phillips, KPMG

Richard Clayton, CL

Aims

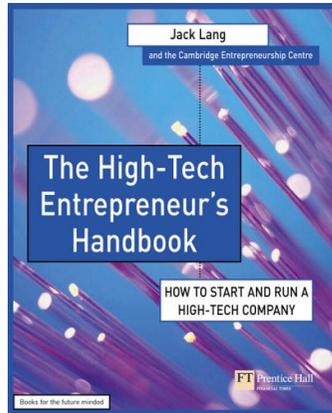
Outline

Lectures:

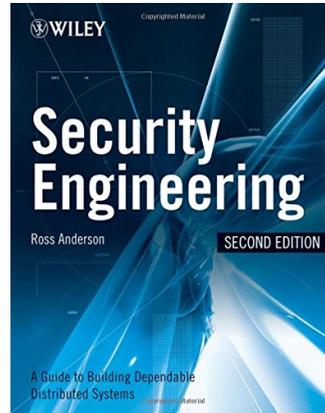
1. What is money and its traded equivalents
2. Networks, regulation and business models
3. Law and Commerce (AS)
4. Web design and implementation
5. Creating a business
6. Finance and funding (KP and TP)
7. Making it work
8. Snoopers charter, RIP, DMCA and others (RC)

Lecture notes for guest lectures (3,6,8) will be provided on the day of the lecture

Resources



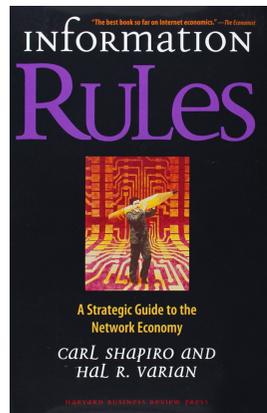
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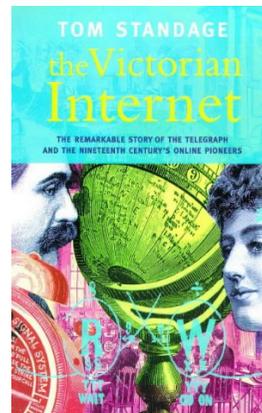
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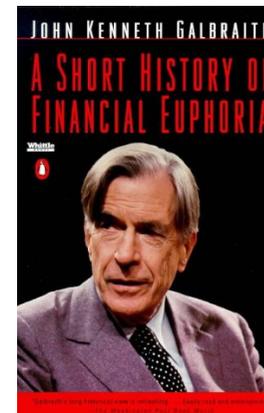
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ISBN: 087584863X



ISBN: 0753807033



ISBN: 0140238565

Online Resources

Andrew Odlyzko: Recent Papers on Technology and Financial Manias

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 - **The collapse of the Railway Mania, the development of capital markets, and the forgotten role of Robert Lucas Nash.** A. Odlyzko. *Accounting History Review* (formerly *Accounting, Business & Financial History*), vol. 21, no. 3, Nov. 2011, pp. 309-345.

Andrew Odlyzko's papers on
Technology and Financial Manias
<http://www.dtc.umn.edu/~odlyzko/doc/bubbles.html>

<http://www.webpagesthatsuck.com>
Or a web-search for other
similar lists and pages

STATUTORY INSTRUMENTS

2002 No. 2013

ELECTRONIC COMMUNICATIONS

The Electronic Commerce (EC Directive) Regulations 2002

Made - - - -	30th July 2002
Laid before Parliament	31st July 2002
Coming into force	
Regulation 16	23rd October 2002
Remainder	21st August 2002

The Secretary of State, being a Minister designated(a) for the purposes of section 2(2) of the European Communities Act 1972(b) in relation to information society services, in exercise of the powers conferred on her by that section, hereby makes the following Regulations:—

Citation and commencement

1.—(1) These Regulations may be cited as the Electronic Commerce (EC Directive) Regulations 2002 and except for regulation 16 shall come into force on 21st August 2002.
(2) Regulation 16 shall come into force on 23rd October 2002.

Interpretation

2.—(1) In these Regulations and in the Schedule—

<http://www.legislation.gov.uk/uksi/2002/2013/contents/made>

What is E-commerce?

A course thought up by the Teaching committee...
research on protocols, economics

B2B

Replacement of paper with electronic documents
Re-badged Electronic Document Interchange (EDI)
Electronic Money

B2C Mail order - amazon.com

New business models
Disintermediation
CRM

New opportunities for fraud

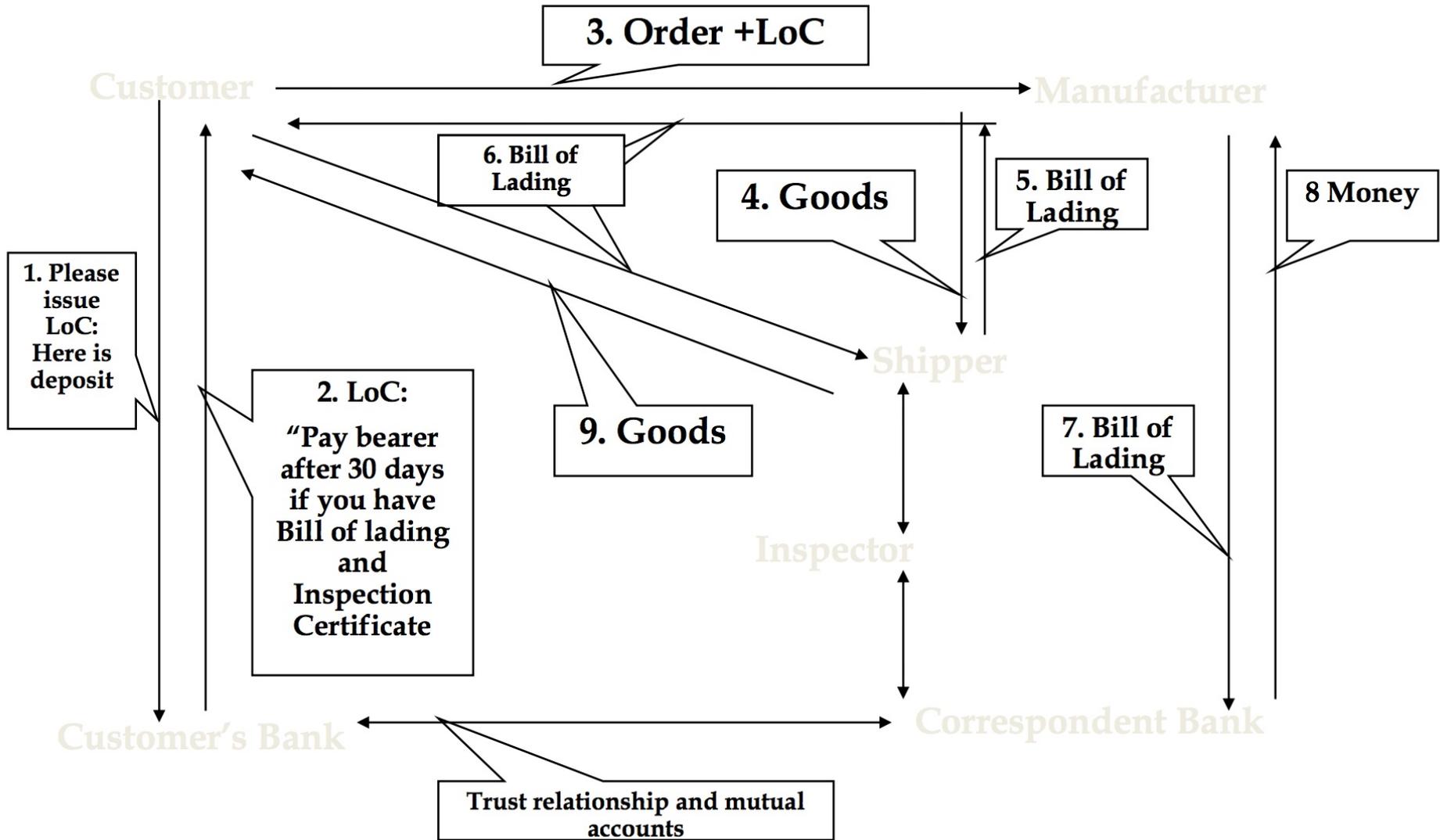
The dark web

App economies

Social media

and many more

Remote transaction



Traded Paper

Typical instruments include

Warehouse receipts

Bills of Lading - "The holder is entitled to 100 amphorae of oil from the cargo of the ship Augusta"

Purchase orders and invoices

Insurance certificates

Certificates of debt

Payment instructions - Bank-to-bank or bank-customer-bank (cheques), letters of credit

Banknotes

Bearer certificates - coupons

Share Certificates

Negotiable / guaranteed - can be used for payment, security, etc.

B2B

The invention of the telegraph led to the development of business use protocols

Hugh boom in telegraph construction and applications

Indirect effects included creation of national markets - price differences drove rapid shipment + arbitrage

Direct uses included purchase orders and queries. Easy where there is an existing relationship, otherwise intermediaries needed

Huge expansion in banking

Banks sent about 50% of telegraph traffic

Trusted intermediaries

Others (insurers, inspection agents, shipping agents) largely harnessed via bank mechanisms

B2B - Wiring Money

Interbank message e.g.

“To: Lomarco Bank, Geneva. Please pay SFR 10,000 from out account to Herr Thilo Schmidt on presentation of his passport. Out test key is 254”

The 254 is a primitive MAC computed on significant data (money, date, currency, etc)

SWIFT reimplemented this using ‘email’ and proper MAC in mid 70’s

First big ‘open’ EDI system

Swift II added PKI to manage MAC keys in early 1990’s

Adapted to CREST (UK equity clearing)

Commercial transactions imilar, but more complex conditions

e.g LoC needs Bill of Lading, insurance certificate and inspection certificate

Electronic Document Interchange (EDI)

Proprietary systems build late 60s / early 70s

General Motors ordering car components (EDS)

Marks and Spencer's clothes ordering

Big problem not security or DoS or lost systems but standards

1980s agreeing common message formats

UN, specific country / industry e.g. NHS

Being redone as XML

e.g. BOLERO (www.bolero.net)

Many players - slow progress

What is money

Exchange of value

Store of value

Measure of value

Fiat money

Money issued by the Government, can't go bust, can always print more

- may cause inflation, exchange rate drop etc
- "cash is trash"

"Unforgable" bearer certificates

Anonymous, immediate

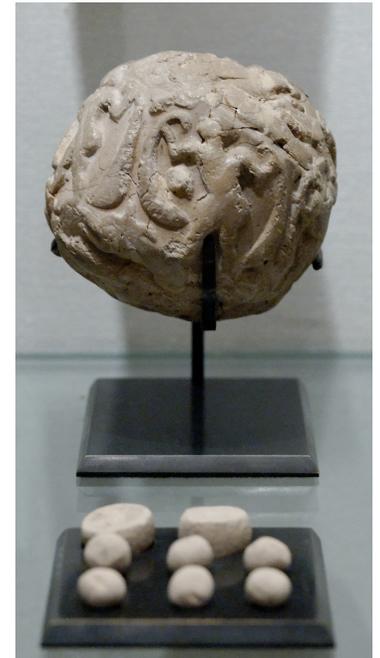
Trusted (mostly)

Business-to-business communications
go back into antiquity

Believed to have driven the invention
of writing and mathematics

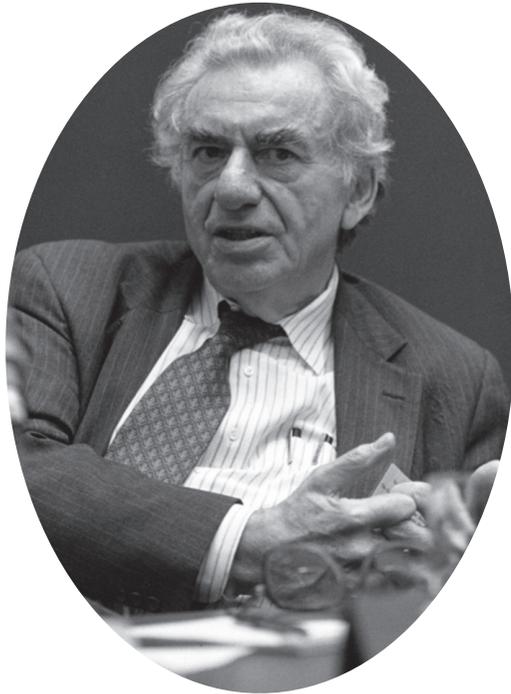
Trust system

Sumerian Bulla
Uruk Period
(4000 BC - 3100 BC)



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Financial Instability Hypothesis



Hyman Minsky (1919-1996)

Accumulation of debt causes instability

Three stages

Hedge borrower - can repay interest and capital

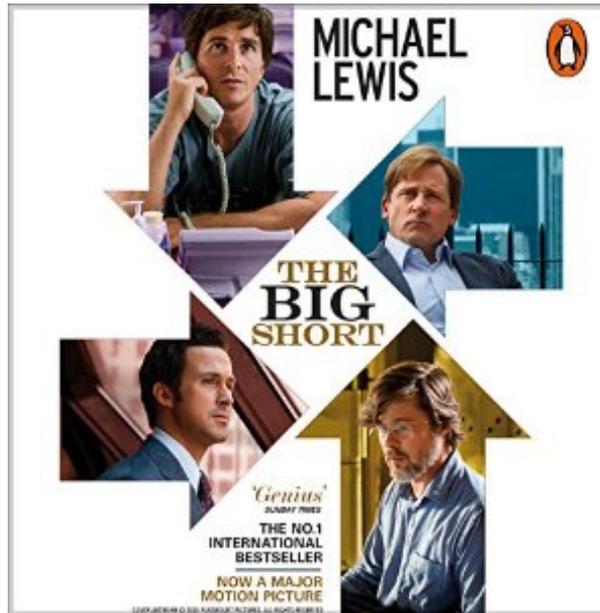
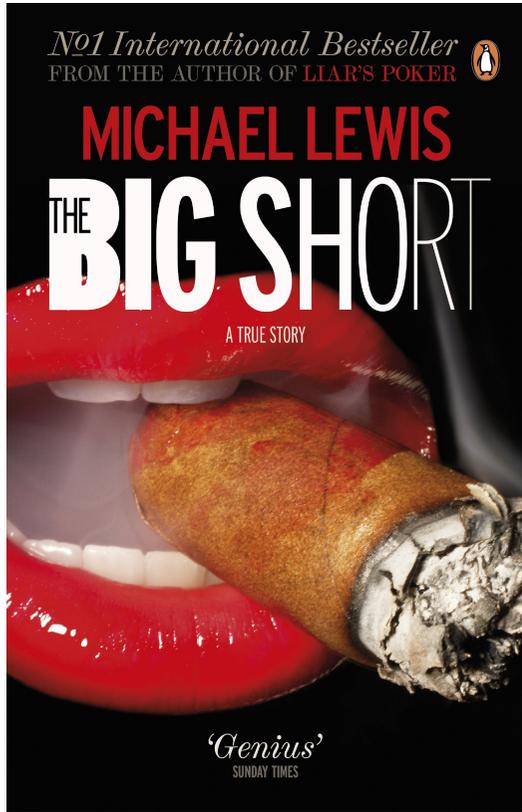
Speculative borrower - can only repay interest = hopes asset will go up

Ponzi borrower - hopes appreciation of asset will pay both interest and capital

Good times don't last

https://en.wikipedia.org/wiki/Hyman_Minsky

<https://kpfa.org/wp-content/uploads/2016/06/HymanMinsky2.png>



Macro economics: Modern Monetary Theory

Domestic Government Balance + Domestic Private Balance + Foreign Balance = 0

$$(T-G) + (S - I) - NX = 0$$

Where

G is government spending

T is taxes

S is savings

I is investment

NX is net exports

or

$$S-I = G-T + NX$$

=> Private Wealth ~ Government deficit or trade surplus

<http://neweconomicperspectives.org/modern-monetary-theory-primer.html>

Bearer certificates

Token representing value

May be anonymous (cash vr cheque)

Not easily forger (trust)

Physical handling (banks / wallets)

Coupons

Tradeable (bureau de change)

Electronic Bearer Certificates

Centralised

e.g. Paypal, Oyster card, M-Pesa

Decentralised

e.g. Bitcoin

Exchange of value ✓

Store of value ✗

Measure of value ✗

GBP to XBT Chart

4 Jan 2017 20:45 UTC - 5 Jan 2017 20:58 UTC GBP/XBT close:0.00128 low:0.00108 high:0.00137



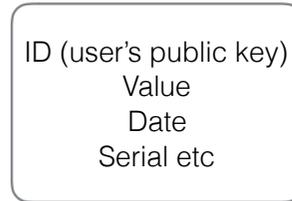
<http://www.xe.com/currencycharts/?from=GBP&to=XBT>

Hard (repudiatable) vs Soft (no recourse)

Electronic money

Unforgeable token

e.g. (value, serial number, id) signed by the issuer's private key



Problem: how to avoid double spending?

Store all spent tokens - can retire blocks of used tokens

Store all unspent tokens

Central store

Distributed store - bitcoin block chain



Electronic money - 2

Trusted

Value?

Volatility?

Anonymous or pseudo-anonymous or open?

Currency?

Fiat, or other asset backed

Magic of banking

Not everyone will want to withdraw at the same time
Confidence

Banks need only fund difference between deposits and loans

Reserve ratios vary over time, between countries and size of deposit taking institution

Country ↕	1968 ↕	1978 ↕	1988 ↕	1998 ↕
United Kingdom	20.5	15.9	5.0	3.1
Turkey	58.3	62.7	30.8	18.0
Germany	19.0	19.3	17.2	11.9
United States	12.3	10.1	8.5	10.3
India ^[34]	3	6	10	10-11

https://en.wikipedia.org/wiki/Reserve_requirement, 5/1/2027

Game money

Monetisation for F2P apps

Multiple currencies gives easier control

Hard/soft currencies

“Buy this sword for £9.99 or 10,000 gems”

Multiple traceable game objects

Wood, good, gems, credits, etc

Internal market

External market



<http://www.pocketgamer.biz/the-iap-inspector/64609/how-does-dawn-of-titans-monetise/>

Game money - 2

Fungible or purchase / winnable only?

+ prevention of “Mudflation”, 3rd party exchanges

- money laundering regulation, VAT, gambling etc

Economic Stability

Sources and sinks

Central banker(s)

Other financial products

Pseudo anonymous?

Business

Second Life Closes Banks

After months of financial scandals and fraud allegations, virtual banks got an eviction notice from Linden Lab.

by David Talbot January 10, 2008

<https://www.technologyreview.com/s/409373/second-life-closes-banks/>

B2C Mail Order

Book printers in C15th

Aldus Manutius of Venice 1498. His mail-order offerings included 15 texts he had published

(UK) William Lucas, Gardener, 1667

Amy and Navy Stores supplied British Forces and other in India ~1871

(US) Tiffany of Fifth Ave 1845

Montgomery Ward 1872

Sears, Roebuck made it possible to settle the West 1886

US Postal services subsidised shipping by halving flat rates nationwide

Need guarantees to provide customer confidence

Brand (e.g Sears, Amazon)

Sears unique innovation: "Satisfaction guaranteed or your money back"

Zappos: free shipping on returns

Industry (ABTA, MOPS)

Intermediary (VISA, Access Paypal, etc)

Credit Cards

Consumer credit goes back to C18th - “The Tallyman”

Some US stores offer “shopper’s plate” from 1920s

Diners Club offered first credit card

NY 1951: 27 Restaurants, 200 customers

Barclaycard offered as incentive to high-value Barclay customers in late 60s;
Access started as rival

Classic “Network effect”

Need enough shops to attract customers and vice versa

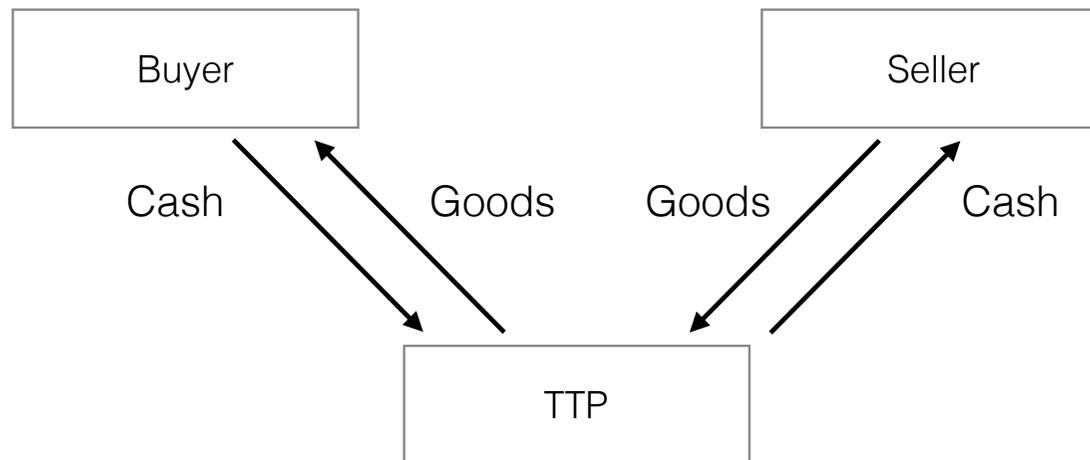
Took off in early 1980s suddenly turning from loss leader to main profit centre.

Some countries (e.g. Germany, Japan) only just taking off

Earnings from online trades starting to be significant

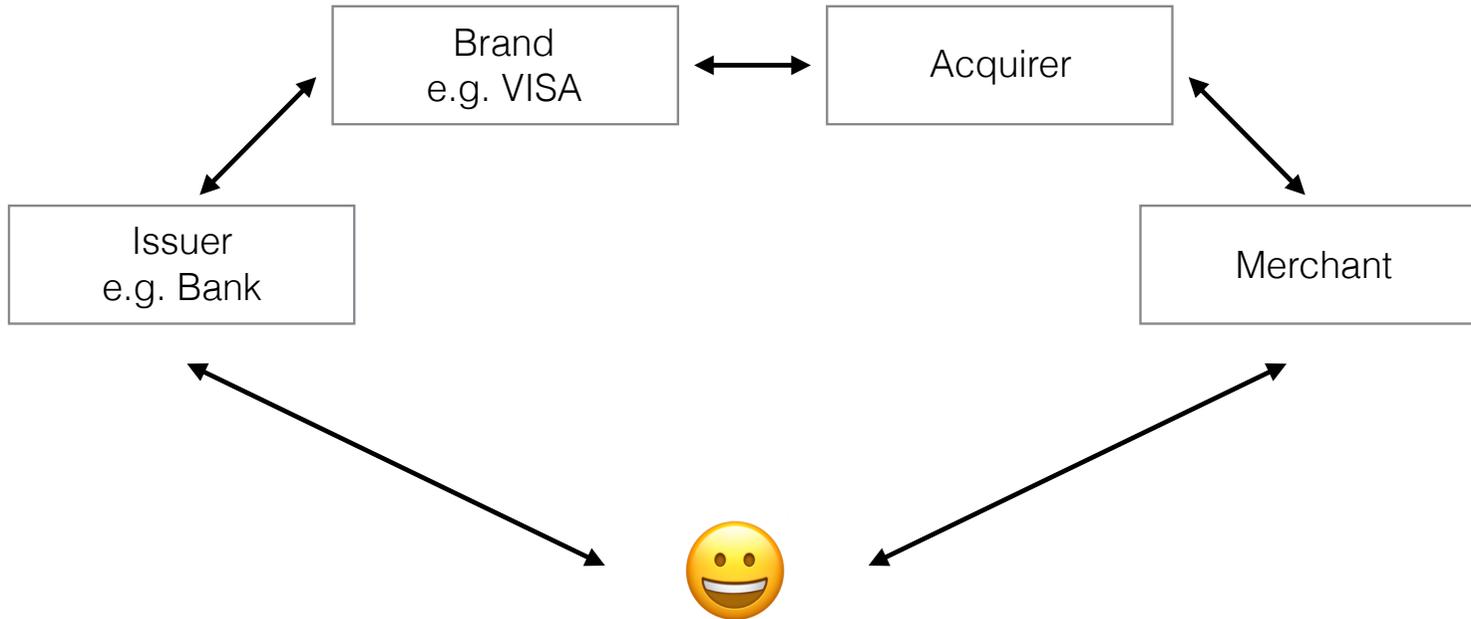
PayPal, Apple Pay

Trusted Third Party



Lawyers e.g. property
Brokers e.g. shares
Credit cards B2C
Auction houses

Credit Cards - 2



Credit Cards - 3

Merchant is paid for goods by acquiring bank
less merchant discount (typically 2%-10%, often 4%-5%)

Transactions over floor limit checked with acquirer
hot card list or credit check with issuer

Brand takes a cut;
acquirer makes money from merchant discount;
issuer from selling revolving credit - expensive money, often over 20% APR

Credit Cards - 4

Overall cost of fraud varies

1 – Comparative Overview in 2013

	EU	France	Netherlands	UK	Canada	USA
Population (m)	508.1	65.7	16.8	64.1	35.1	313.9
Number of cards (m)	759.7	85.5	30.4	157.3	105.0	827.4
Card payments value (€bn)	2,204.4	438.4	100.3	653.6	417.2	3,438.4
ATM withdrawals value (€bn)	1,418.3	135.6	51.5	242.5	na	534.7
EMV Implementation	cards: 81.6%	complete	complete	complete	debit cards: 95%	—
Total of card fraud losses (€m)	1,330.0	405.8	41.9	530.3	361.5	4,148.5
Card fraud loss ratio	0.038%	0.071%	0.028%	0.059%	0.087%	0.104%

Sources: EU: ECB; France: ECB, OSCP; Netherlands: ECB, Betaal Vereniging; UK: ECB, FFA UK; Canada: BIS, CBA, Interac; USA: BIS, Federal Reserve

Notes: 1. Number of cards covers both debit and credit and e-purses. Card fraud losses cover both domestic and international transactions. 2. EU card fraud figures and all USA figures are from 2012. Canadian and USA card fraud ratios are calculated in order to comply with European figures. 3. France: Statistics cover 68.4 million 'CB' bank cards and Moneo e-purses and 17.1 million French 'private' cards issued by third parties. 4. Netherlands: Number of cards comprises 24.5 million debit cards and 5.9 million credit/delayed debit cards. 5. UK: Number of cards includes 0.19 million ATM only, 95.7 million debit cards and 57.6 million credit/delayed debit cards. 6. Canada: Number of cards includes 23.9 million debit cards and 81.1 million credit/delayed debit cards. 7. USA: Number of cards includes 290.8 million debit cards and 905.6 million credit/delayed debit cards.

Sources: European Central Bank (ECB), Bank of International Settlement (BIS); for other sources see above.

Motivation - who gets the reward?

- huge hype of hacking the system
- no case of fraud from interception
- real problem is old fashioned card theft

7 – Card Fraud Losses by Method of Compromise – France vs UK vs Canada

	France		UK			Canada (credit cards only)		
	(€m)	%	(£m)	(€m)	%	(CADm)	(€m)	%
Card lost or stolen	81.7	34.2%	58.9	69.4	13.1%	25.2	18.4	5.4%
Card not received	0.9	0.4%	10.4	12.2	2.3%	5.0	3.6	1.1%
Card altered / counterfeit	0.5	0.2%	43.4	51.1	9.6%	111.5	81.5	24.0%
Theft of Card Details	154.0	64.5%	301.1	354.5	66.9%	299.4	218.8	64.4%
– of which e-commerce	125.0	52.4%	163.2	192.2	36.2%	na	na	na
Account takeover, others	1.5	0.6%	36.7	43.2	8.1%	24.0	17.6	5.2%
Total (€m)	238.6	100.0%	450.4	530.3	100.0%	465.1	339.9	100.0%

Notes: 1. Figures cover both domestic and international transactions on French and UK-issued cards respectively. 2. France: Data covers both interbank ('CB') cards and private cards. 'Other' covers, particularly for three-party cards, fraud resulting from the fraudulent opening of accounts with a false identity. 3. UK: 'Others' covers third party application fraud. 4. Canada: Data covers Canadian credit cards only. Additionally, card fraud losses on debit cards were CAD 29.5 million.

Sources: Observatoire de la sécurité des cartes de paiement, Financial Fraud Action UK, Canadian Bankers Association.

Overall pattern - cyclical : best defences not always high-tech

http://www.paymentscardsandmobile.com/wp-content/uploads/2015/03/PCM_Alaric_Fraud-Report_2015.pdf

Fair Market

Willing buyer and seller

“Fair price”

Not under compulsion

Price discovery

Equality of information

“Reasonable knowledge of relevant facts”

Anonymity

Pre transaction e.g. Stock market

Pseudo anonymity e.g. Ebay (reputation)

Post transaction

Settlement

Other ways to pay

Via phone wallets

e.g. Pingit

Electronic cash

Chaum

Bitcoins

Game currencies

Issues

Anonymity

Exchange rate

Regulation

etc

Hot Topics

Who controls your identity?

Government, Bank, or Apple / Google

Identity cards, MS. Net

Lots of issues?

liability

control

civil liberties

protocol attacks

etc

Privacy

who owns your information?

what is it worth?