E-Commerce

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Aims

- **Outline issues involved**
- **Lectures:**
  - **Historic and Economic Background (JL)**
  - **Business Models and Strategy (JL)**
  - **Web Design (JL)**
  - **Implementation (JL)**
  - **The Law and E-commerce (AS)**
  - **Making E-Commerce work (JL)**
  - **Finance and future opportunities (JL)**
  - **RIP, DCMA and other legal developments (RC)**

Resources

- **Jack Lang "High Tech Entrepreneurs Handbook"**
  - FT.COM; ISBN: 0273656155

- **Ross Anderson "Security Engineering"**
  - John Wiley & Sons Inc; ISBN: 0471389226

- **Hal Varian "Intermediate Microeconomics"**
  - W.W. Norton; ISBN: 0393973700

- **+ Carl Shapiro "Information Rules" Harvard Business School Press; ISBN: 087584863X**

- **Tom Standage "The Victorian Internet"**
  - Orion Paperbacks; ISBN: 0753807033

- **John Kenneth Galbraith: A Short History of Financial Euphoria**
  - Penguin Books; ISBN: 0140238565

Online Resources

- Andrew Odlyzko's papers on e-commerce and network growth: http://www.dtc.umn.edu/~odlyzko/

- Web Design:
  - http://www.wowwebdesigns.com
  - http://www.webpagesthatsuck.com

- Draft regulations
  - http://www.dti.gov.uk/cii/ecommerce/europeanpolicy /ecommerce_directive.shtml

What is E-commerce?

- **A course thought up by the Teaching committee...**
  - Academic research on protocols, economics
- **Mail-order ('B2C')...amazon.com etc**
- **New business models...Lastminute.com, ebay.com**
- **Re-badging of Electronic Document Interchange ('EDI')**
  - 'B2B': SWIFT.CREST,BOLERO,Just-in-Time
- **Disintermediation: E*Trade.com**
- **CRM: Call-centres, credit-cards, cost-dumping, discrimination, customer aggravation, digital "haves and have nots"**
- **EU "Information Society Services"**
- **New opportunities for fraud**
  - This list is not exclusive!
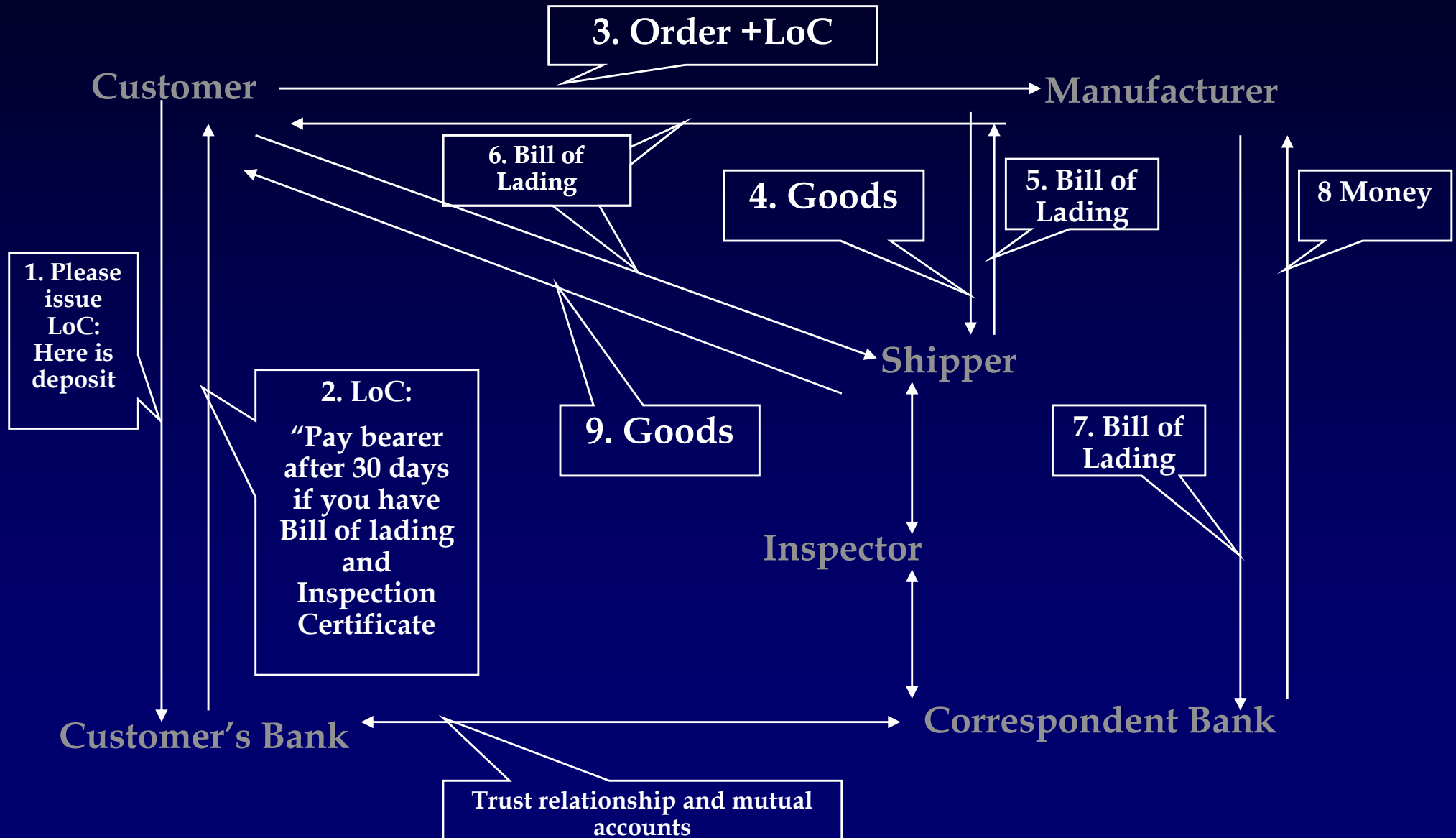
Bulla (Sumarian about 3500 BC)

- Business-to-business communications go back into antiquity
  - believed to have driven the invention of writing and mathematics
  - Trust system

EDI ('B2B')

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

Remote transaction

3. Order +LoC

Customer → **Manufacturer**

6. Bill of Lading

4. Goods

5. Bill of Lading

8 Money

1. Please issue LoC: Here is deposit

Shipper

2. LoC:

"Pay bearer after 30 days if you have Bill of lading and Inspection Certificate

9. Goods

7. Bill of Lading

Inspector

Customer's Bank ↔ **Correspondent Bank**

Trust relationship and mutual accounts

B2B (2)

- **The invention of the telegraph led to the development of business use protocols**
  - Huge boom in telegraph construction and applications (Standage)
  - 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 exisiting 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 3- Wiring Money

- **Interbank message e.g**
  - "To: Lomarco Bank, Geneva. Please pay SFR 10,000 from our account to Herr Thilo Schmidt on presentation of his passport. Our test key is 254"
  - The 254 is a primitive MAC computed on significant data such as money, currency code, date etc.
- **SWIFT reimplement 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 similar, but more complex conditions**
  - E.g LoC needs Bill of Lading, insurance certificate and inspection certificate

B2B 4

- **"Electronic Document Interchange" (EDI)**
  - Proprietary systems built late 60's/early 70's
    - General Motors ordering car components (EDS)
    - Marks & Spencer's clothes ordering
- **Big problem not security or DoS or lost systems but standards**
  - 1980's 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

B2C Mail Order

- **Book printers in C15th**
  - Aldus Manutius of Venice 1498. His mail-order offerings included 15 texts that he had published.
- **(UK version) William Lucus, Gardener, 1667**
  - Army and Navy Stores supplied British Forces and others in India ~1871
- **(US Version) Tiffany of Fifth Ave 1845**
  - Montgomery Ward 1872
- **Sears, Roebuck made it possible to settle the West(1886)**
  - US Postal services subsidised shipping by having flat rates nationwide.
    - Still critical in some places!
- **Need guarantee to provide customer confidence**
  - Brand (e.g Sears, Amazon...)
    - Sears unique innovation: "Satisfaction guaranteed or your money back"
  - Industry (ABTA, MOPS)
  - Intermediary (VISA, Access Paypal etc)

Credit Cards

- **Consumer credit goes back to 18th Century – "The Tallyman"**
  - Some US stores offer "shopper's plate" from 1920's
- **Diners Club offered first credit card**
  - NY 1951: 27 Restaurants, 200 customers
- **Barclaycard offered as incentive to high-value Barclays customers in late 60s; Access started as rival**
- **Classic "Network effect"**
  - Need enough shops to attract customers and vice versa
- **Took off in early 1980's 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**
  - Competition starting e.g Paypal

Credit Cards 2
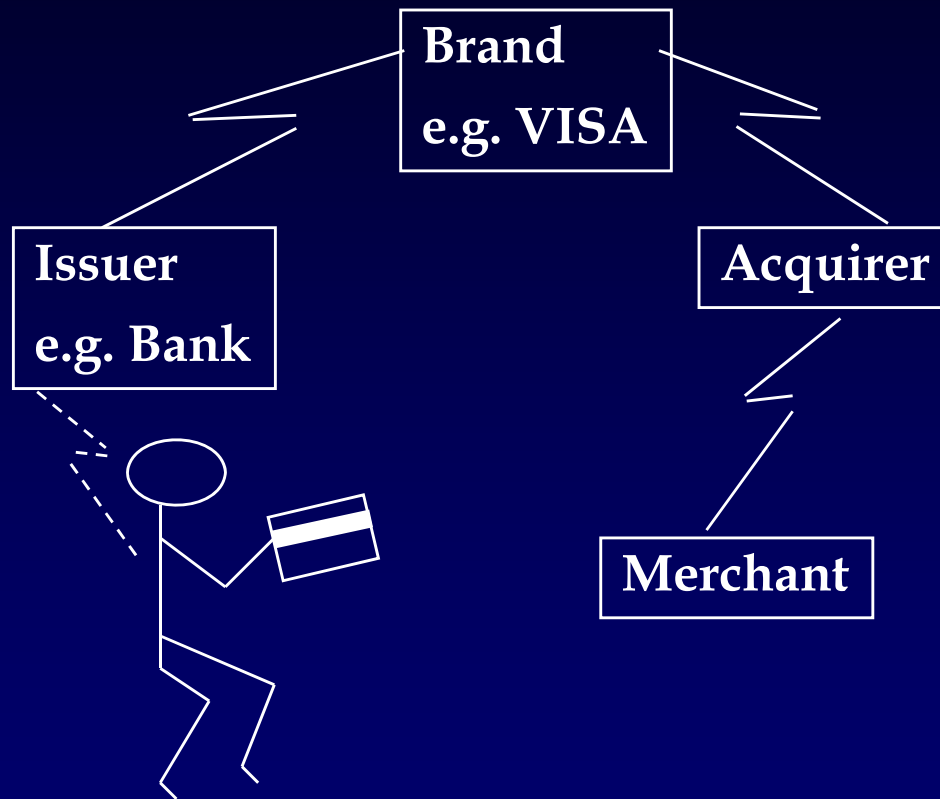
Credit Cards 3

- 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

- **Originally fraud risk borne by banks**
- **Introduction of mail order and telephone (and web) order (MOTO) risk for transactions with the cardholder not present passed to merchant.**
- **MOTO have lower floor limits, and in delivery only to cardholder address (but not possible to be checked for e-delivery or services like Worldpay)**
  - 40% fraud fro some sites
  - Paypal fraud
- **Traditional frauds:**
  - Stolen cards
  - Pre-issue
  - Identity theft

Cards 5

- **Evolution of forgery**

Attack	Countermeasure
Simple copy	Hologram
Alter embossing	Check mag strip
Emboss mag strip #	TDC
Make up strip	CVV, CVC
Skimming	Intrusion detection
Free Lunch	

Cards 6

- **Overall cost of fraud**
  - Spain 0.01%
  - UK 0.2%
  - USA 1.0%

- **Motivation – who gets the reward?**
  - Huge hyoe "Evil Hackers"
  - No case of fraud resulting from interception!
    - Getting sense from mail is hard
  - Real problem: hacked or crooked end systems

- **Overall pattern – cyclical: Best defences not always high-tech!**

Cards 7

- **Bigger problem: disputes**
  - Porn sites
  - Paypal etc
- **Incompetence, fraudulent denial by customers, outright fraud by merchants**
- **Control mechanisms poor and slow – e.g acquirer call centre can only check country, not cardholder address**
- **Technology?**
  - SET failed
  - Other formats, e.g stored value cards, cell-phones

Other ways to pay

- **Via phone wallets**
  - e.g Pingit
- **Electronic cash**
  - Chaum
  - Bitcoins
  - Game currencies
- **Issues**
  - Anonymity, exchange rate, regulation etc

Hot Topics

- **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?