Development Paths of Interorganizational Information Systems (IOIS) – Work in progress

Stefan Klein

The problem

- Observation: Significantly different development paths and states of IOIS within and across industries, across countries
- Differences not properly explained.
- Approach: Cross-country comparison in selected industries
- First case pharmaceutical distribution
  - Strategic drivers/ business models
  - Institutional actors
  - Regulation
Research environment

- Joint DFG project (2005-2008) with the Research Group on Electronic Business (Kai Reimers)
- Collaboration with Robert Johnston, Melbourne University

Layers of analysis

- Economic, political, regulatory, social environment
- Industry segment
- Networks
- The firm/ strategic business units: IOIS Strategy and operation
- Customers
Layers of analysis

Economic, political, regulatory, social environment

Industry segment

Networks

The firm/strategic business units: IOIS Strategy and operation

Customers

IOIS research: the missing link

- Numerous studies from a firm’s perspective: initiation, adoption, strategy … while few studies address specifically industry and network level issues

Open issues are e.g.:
- The varying diffusion and maturity of IOIS across industry segments
- The failure of high profile initiatives, often driven by individual companies
- The impact of the wider environment
- The role and influence of collective actors
- The role of social capital …
**Existing studies: CRITO**

- Studies of the environment: impact of the environment on the diffusion of eCommerce, e.g. the Technology-Organization-Environment framework (Tornatzky and Fleischer 1990; Rogers 1983) used in the CRITO “Globalization and E-Commerce” project

![Conceptual Framework (Gibbs et al. 2002)](image)

**Environmental factors (CRITO study cntd.)**

<table>
<thead>
<tr>
<th>Global Environment</th>
<th>National Environment</th>
<th>National Policy</th>
<th>Adoption of E-commerce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global production networks</td>
<td>Demographics</td>
<td>Telecom liberalization</td>
<td>• Total e-commerce</td>
</tr>
<tr>
<td>MNC strategies</td>
<td>Economic and financial resources</td>
<td>E-commerce promotion</td>
<td>• Business-to-business</td>
</tr>
<tr>
<td>Trade liberalization</td>
<td>Information infrastructure</td>
<td>E-commerce legislation</td>
<td>• Business-to-consumer</td>
</tr>
<tr>
<td>Global competition</td>
<td>Industry structure and competition</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Organizational environment</td>
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<tr>
<td></td>
<td>Consumer preferences</td>
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</tbody>
</table>

Conceptual Framework (Gibbs et al. 2002)
Questions and issues

- Unit of analysis
- Layers of analysis
- Types of IOIS
- Diffusion and development paths
- Relevant variables and theories
- Research design

Diversity of IOIS
### IOIS dimensions (1/3)

<table>
<thead>
<tr>
<th>Actors and relations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiator(s)</strong></td>
<td>Single user companies (e.g. Ford, American Airlines)</td>
</tr>
<tr>
<td></td>
<td>Systems providers/ operator (e.g. IBM, GE … EDI)</td>
</tr>
<tr>
<td></td>
<td>Consortia (e.g. car manufacturers for Covisint)</td>
</tr>
<tr>
<td></td>
<td>Cooperations, cooperatives</td>
</tr>
<tr>
<td></td>
<td>Associations</td>
</tr>
<tr>
<td></td>
<td>(Standardization bodies)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scope and addressees (structure, number of participants)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral solution</td>
<td>Bilateral solution</td>
</tr>
<tr>
<td>Closed user group</td>
<td>Closed user group</td>
</tr>
<tr>
<td>Open for industry sector members</td>
<td>Open for industry sector members</td>
</tr>
<tr>
<td>Cross industry infrastructure solution</td>
<td>Cross industry infrastructure solution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systems operator</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identical with initiator</td>
<td>Identical with initiator</td>
</tr>
<tr>
<td>Operator separate from initiator</td>
<td>Operator separate from initiator</td>
</tr>
</tbody>
</table>

### IOIS dimensions (2/3)

<table>
<thead>
<tr>
<th>Strategic positioning, business model</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional scope</strong></td>
<td>Mono-functional focus (e.g. procurement, sales/ distribution, logistics)</td>
</tr>
<tr>
<td></td>
<td>combination of different functions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business logic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Market vs. cooperation</td>
<td>Market vs. cooperation</td>
</tr>
<tr>
<td>Extending scope vs increasing efficiency</td>
<td>Extending scope vs increasing efficiency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategic relevance/ salience (potential competitive advantage) for the initiator (firm)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High, e.g. customer portal</td>
<td>High, e.g. customer portal</td>
</tr>
<tr>
<td>Medium to low: focus on increasing the operational efficiency, e.g. Just-in-time coupling</td>
<td>Medium to low: focus on increasing the operational efficiency, e.g. Just-in-time coupling</td>
</tr>
<tr>
<td>Low: Infrastructure, e.g. CRS/ GDS</td>
<td>Low: Infrastructure, e.g. CRS/ GDS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network effects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive network externalities as a result of high acceptance and distribution of standardized solutions in the industry (segment)</td>
<td>Positive network externalities as a result of high acceptance and distribution of standardized solutions in the industry (segment)</td>
</tr>
<tr>
<td>Network effects of proprietary solutions limited to focal company (e.g. Ford Net)</td>
<td>Network effects of proprietary solutions limited to focal company (e.g. Ford Net)</td>
</tr>
</tbody>
</table>
### IOIS dimensions (3/3)

<table>
<thead>
<tr>
<th>Organisational coupling, relationships of IOIS users</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationships among IOS users</td>
<td>• Asymmetric, e.g. solution driven by focal company in a value chain</td>
</tr>
<tr>
<td></td>
<td>• Symmetric, e.g. horizontal solution in an industry segment, contract networks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation, technical coupling</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of standardization</td>
<td>• High: advantages of harmonization outweigh the complexity of the negotiations and consensus building</td>
</tr>
<tr>
<td></td>
<td>• Low, local solution: Harmonization limited to participants of IOIS (for financial reasons)</td>
</tr>
<tr>
<td></td>
<td>• Hybrid solution: Standard elements (message types, product codes, company identifiers, communication protocol etc.), which are used within a proprietary solution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal integration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• IOIS interface as part of a standard sw</td>
<td></td>
</tr>
<tr>
<td>• Stand-alone IOIS solution</td>
<td></td>
</tr>
</tbody>
</table>

### IOIS typology based on scale and scope

Scale: narrow → broad

Scope: narrow → broad

- Large network with a single, standardized application (e.g. e-payment): positive network effects, operational benefits
- Focal network or portal, driven by the initiator: strategic focus, asymmetric benefits

- Large network with a suite of functions (e.g. ECR): network effects extended across a range of applications
- Focal network with a range of functions (Click2procure.com): IOIS is leveraged within existing partner relations and across one or more functional domains
IOIS – Unit and levels of analysis

Unit of analysis: Industry Segment Value System

Unit of analysis (ISVS)

Suppliers
Whole-salers
Retailers

Downstream stage

X industry in country A
Global X industry
Focal industry segment
X industry in country B
Levels of analysis illustrated by examples of social constructs

Remote environment

All social constructs that require collective action involving actors other or in addition to those included in the IV such as national law, national standards, or systems shared with other industries

Industry segment value system

Rules regarding vertical and horizontal interaction (business customs), including EDI standards, and systems facilitating transactions, including technical systems

Industry segment

Dominant designs, value propositions, product standards, rules regarding acceptable modes of competition and cooperation

Firm or division

Coordination mechanisms, corporate culture, hierarchical structure, process rules (routines)

Key: \(\downarrow\) constrains … \(\uparrow\) is a precondition for …

Theoretical approaches

<table>
<thead>
<tr>
<th>Theoretical approach</th>
<th>Remote environment</th>
<th>ISVS</th>
<th>Industry segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structuration theory (Giddens, 1984)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network theory (Hakansson, 1987; Hakansson and Johanson, 1993; Johanson and Mattson, 1987; Nassimbeni, 1998)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Industry clusters, market power (Porter, 1990; Porter and Rivkin, 2000)</td>
<td>(\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
</tr>
<tr>
<td>Institutional theory (Powell, 1991, DiMaggio and Powell, 1983)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
</tr>
<tr>
<td>Organisational environments, &quot;matrix organisations&quot;, &quot;organisational federations&quot; (Emery and Trist, 1965; Trist, 1963; D’Aunno and Zuckerman, 1987)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
</tr>
<tr>
<td>Resource dependency theory (Pfeffer and Salancik, 1978)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
</tr>
<tr>
<td>Negotiated order theory (Strauss, 1978)</td>
<td>(\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td></td>
</tr>
<tr>
<td>Transaction cost theory (Williamson, 2000 and 1987)</td>
<td>X (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
</tr>
<tr>
<td>Contingency theory (Giaglis et al., 2002)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
</tr>
<tr>
<td>Industry life cycle theory (Klepperer and Graddy, 1990; Agarwal and Gort, 1996)</td>
<td>X (\leftrightarrow)</td>
<td>X (\leftrightarrow)</td>
<td>(\leftrightarrow)</td>
</tr>
<tr>
<td>Social capital theory (Kumar et al., 1998)</td>
<td>X (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
<td>(\leftrightarrow) (\leftrightarrow)</td>
</tr>
</tbody>
</table>
Organizational characteristics of ISVS

- **Network structure** (fragmentation/concentration on each value stage; modes of vertical and horizontal collaboration on each stage; existence and number of groups (Gomes-Casseres, 1994))
- Degree of **standardization** of transaction processes (Kumar and van Dissel, 1996)
- Degree of **business process alignment** between market participants (Hempel and Kwong, 2001)
- Types and frequencies of **transaction processes** (Holland et al., 1992)
- Degree of **trust/social capital** along transaction relationships (Allen et al., 2000; Gallivan and Depledge, 2003; Putnam, 1993)
- **Coordination mechanisms** (push/pull system etc.) (Fisher, 1997)
- Variability of the **degree of IT sophistication** of value chain members (Johnston and Mak, 2000)
- Existence and type of **business intermediaries** (Johnston and Mak, 2000; Holland et al., 1992; Hempel and Kwong, 2001)
- No. of **adjacent industries** involved in the value system (Kubicek, 1992)
- **Geographical extent** (local, regional, global) (Riemer et al., 2001)
- Existence of **regional clusters** (Porter, 1998)
The Irish case: 1984

In 1984 United Drug, one of the large pharmaceutical wholesalers in the Republic of Ireland (R.I.) explored the solution of US companies to establish electronic linkages for ordering. American Hospital Supply was one of the early movers in this field, providing proprietary order terminals for hospitals to increase the efficiency of ordering. The idea at the time was to establish tighter links with pharmacies through the use of innovative IT solutions (IOIS), specifically to provide electronic ordering systems to the pharmacies.

Background: the company AHS

American Hospital Supply Corp.

American Hospital Supply Corp. descended from a hospital supply distribution company and was incorporated in 1925 in Illinois by Foster G. McGaw. It came to dominate its industry in the 1950s and 1960s by changing the way hospitals purchased equipment. Essentially, distributing its own supplies and those of other companies to 19 of 20 hospitals in America, the company manufactured a range of products from intravenous solutions to uniforms. Its sales grew from $60 million in 1956 to nearly $1.2 billion by 1965, at which time it was based in Evanston and had 4,000 employees nationwide. By the early 1970s, the company employed 6,000 workers locally.

American Hospital Supply's sales revenue grew from $2 billion in 1979 to more than $3.4 billion in 1981. The next year, competitor Baxter Travenol Laboratories, a firm that was distributing American Hospital equipment, acquired the company. In 1996, Baxter spun off its low-tech hospital supply division as an independent company, called Allegiance Corp. Allegiance was subsequently purchased by Cardinal Health Inc. of Ohio in 1999. See also Baxter Travenol Laboratories Inc.

This entry is part of the Encyclopedia's Dictionary of Leading Chicago Businesses (1820-2000) that was prepared by Mark R. Wilson, with additional contributions from Steven K. Porter and Janice L. Reiff.

http://www.encyclopedia.chicagohistory.org/pages/2542.html
Background: The AHS – Baxter case

"This posits that electronic interconnection can render some of the traditional sources of business competencies irrelevant. ... Our overall point is that different phases of electronic interconnection will create new sources of business competencies, enhances some existing ones, destroy others. This requires managers to go beyond assessing operational efficiency and/or effectiveness and identify new sources of competitive advantage."


Today in the R.I.

- United Drug is the largest of three pharmaceutical wholesalers in R.I.
- A standardized solution for electronic ordering by the pharmacies has been established consisting of
  - The Irish Pharmaceutical Union (IPU) product file based on GS1 standards, covering products sold by pharmacists (prescription drugs, OTC, cosmetics, toiletries, sundries) (semantics)
  - A format for order and order confirmation messages (syntax)
  - A communication protocol (communication)
  - Established tele-ordering routines by which
Pharmaceutical distribution in Ireland

In contrast in Australia (and the UK …)

- Not a single product file exists for pharmacies
- Each of the wholesalers uses their own product identification codes (PIP)
What had happened in between

- Tele-ordering was seen by the Irish Pharmaceutical Union (IPU) as an option to increase operational efficiency
- Few pharmaceutical companies had introduced EAN codes
- Virtually no pharmacy used computers at the time

Development of standard solution

- The IPU had invited the then five wholesalers for talks on a common standard for tele-ordering
- Software companies had attended the meetings as observers, realizing that they would have to put the standard into pharmacy software
- The IPU had successfully applied for a EAN manufacturers license in order to be able to issue product numbers
The role of the IPU

- Initiating directs talks between the wholesalers
- Developing and maintaining the product file
- Maintaining the communication protocol

### Product File Record Layout

<table>
<thead>
<tr>
<th>FLD</th>
<th>NAME</th>
<th>WIDTH</th>
<th>TECHNICAL DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>CAT</td>
<td>N</td>
<td>IPU CATEGORY e.g. Ethicals=1, OTC=2, VET=3</td>
</tr>
<tr>
<td>002</td>
<td>ANAOCID</td>
<td>C</td>
<td>IPU EAN Code</td>
</tr>
<tr>
<td>003</td>
<td>BARCODE</td>
<td>C</td>
<td>Manufacturers' Bar-code</td>
</tr>
<tr>
<td>004</td>
<td>GMSNO</td>
<td>C</td>
<td>GMS Number</td>
</tr>
<tr>
<td>005</td>
<td>TRADENAME</td>
<td>C</td>
<td>Trade name</td>
</tr>
<tr>
<td>006</td>
<td>PS</td>
<td>C</td>
<td>Pack Size</td>
</tr>
<tr>
<td>007</td>
<td>PSNO</td>
<td>N</td>
<td>Pack Size Number</td>
</tr>
<tr>
<td>008</td>
<td>PHOTO</td>
<td>C</td>
<td>Photo</td>
</tr>
<tr>
<td>009</td>
<td>MANU</td>
<td>C</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>010</td>
<td>AGENT</td>
<td>C</td>
<td>Agent</td>
</tr>
<tr>
<td>011</td>
<td>ICP</td>
<td>N</td>
<td>Ingredient Cost Price IR£</td>
</tr>
<tr>
<td>012</td>
<td>MRP</td>
<td>N</td>
<td>Manuf recommended retail price</td>
</tr>
<tr>
<td>013</td>
<td>VAT</td>
<td>C</td>
<td>0=0%, VAT 1 = 21%, VAT 2 = 12.5%</td>
</tr>
<tr>
<td>014</td>
<td>UP</td>
<td>C</td>
<td>V=VAT Change, D=Deletion, A=Addition, U=Increase, L=Decrease</td>
</tr>
</tbody>
</table>

The distribution of product file involves the following steps:

1. Manufacturer requests product key.
2. Distributor assigns product key.
3. IPU distributes product file.
5. Pharmacy provides software.
6. GMS Board distributes product file.
7. 90% of all Irish pharmacists.
Questions and explanations

- How can we explain the standardization process in R.I.?
- Why did not a similar solution emerge in UK or Australia?
- How can we explain the persistence or resilience of the solution?
- What are likely scenarios for the future?

Multiple explanations possible …

- Strategy
- Power & resource dependency
- Regulation
- Institutional structure (IPU)
- Country size
- National culture
- Established practices, tradition, business models
- Standardization patterns
- Diffusion of standards
**Candidate 1: Strategy**

Proprietary solution vs. standard as classical problem in IOIS:

- trying to achieve **competitive advantage** (first mover advantage, customer lock-in)
- vs. promoting **standard solution** (systemic benefit, faster diffusion and adoption).

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**Strategy: Reasons given for standard solution**

- Wholesalers strategic assessment of standards’ benefits
  - Market size and related cost to maintain proprietary solution
  - Pharmacies would not have accepted lock-in (low adoption of proprietary solution)
- Pharmacies used to order splitting (established practice) wanted to avoid lock-in
- IPU saw an opportunity to act on behalf of their constituency (pharmacies’ representative, facilitator of collective action) and reinforce their own role (“guardian” of the product file),
Strategy: Control of SW as option?

- United Drug had McLernon to develop a pharmacy software.
- Strategic intention similar to AHS, albeit based on open standard.
- Response from pharmacies was to link SW performance (and problems) with purchasing behaviour.
- Attempt was discontinued by United Drug.

Conceptual voids

- Conditions (contingencies) of strategic choice not fully understood
- Strategic intent in itself does not explain the development of standard
- Collective action needed for standard development and diffusion
Candidate 2: Transaction cost economics

- Electronic ordering as transaction cost efficient solution.
- Transaction parameters (high frequency of transactions, low uncertainty, low asset specificity [after standardization]) suggest market governance.

Conceptual voids

- Williamson has design TCE for dyads.
- Explains stability ex post.
- However: Role of IPU not explained.
- No conceptual tools to address emerging changes.
- Limited additional explanation once institutional and regulatory constraints are elaborated.
### Candidate 3: Standardization (Reimers 2005)

<table>
<thead>
<tr>
<th>Phases</th>
<th>Explanation</th>
<th>Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Initiation</td>
<td>Initiation of standards initiative takes effort. Early mover may be viewed critically (hidden intentions).</td>
<td>IPU claims to have taken the initiative on behalf of their constituency</td>
</tr>
<tr>
<td>II. Development of standard candidate</td>
<td>Result of standardization initiative is at best a standard candidate. Diffusion uncertain ...</td>
<td>Structure of product file, message type and communication protocol were developed jointly. IPU claims ownership.</td>
</tr>
<tr>
<td>III. Diffusion</td>
<td>Success of standardization depends on diffusion and adoption.</td>
<td>Broad consensus and support facilitated diffusion. Wholesalers initially provided financial incentives for tele-ordering. IPU supports diffusion and maintains product file for the time being.</td>
</tr>
</tbody>
</table>

### Conceptual voids

- Strategic intent not explained
- Role of IPU not explained
- Persistence of solution not explained
In search for a broader theoretical framework

Criteria for choice of a theory

1. support identification of and distinction between essential properties of IOIS;
2. explain why (properties of) IOIS persist in the face of environmental change, i.e. the resilience of IOIS;
3. offer a way of describing IOIS on the organisational as well as on the collective level, i.e. the level of various types of collectives of organisations such as networks, associations or industries;
4. explain variance of IOIS (properties) on both these levels, i.e. it has to reflect on the way these levels are linked.

Giddens’ Structuration Theory as Meta theory

Giddens: Structuration Theory

- Middle ground between structural determinism and voluntarism
- Duality of structure: enabling and constraining
- Human agency
- Contingency
- Hidden causes of action and unintended effects of action
A practice theoretical perspective

The notion of practice incorporates
- action and interaction (processual) embedded in routinized behaviour,
- constellations of actors and specifically relations among the actors (individual as well as collective)
- competencies in particular knowledge, reasoning, sense making and goal directed acting.

Moreover we include
- material or physical structures as well as
- institutional or normative structures (based on Child (2000)).
The structural setting/ environment

Structural setting/ environment

- Physical structures/ infrastructure
- Institutions/ normative structures
- "Leitidee" (guiding principle)
- Embodiment of ideas
- Coherence?
- Legitimization

Conceptual rationale

- Broad conceptual framework
- Linkage of multiple perspectives
- Network of practices
- Multi layer explanations (first and second level practices)
Relationship building as practice

Structural setting/ environment

Total number and ratio of pharmacies: wholesalers, fixed margins

Regulation and Institutions (IPU, IPHA, IMB ...)

“Leitidee”:
• Model of pharma distrib.
• Business models
• Model of collaboration

Building relationships

t = 1

constrain and enable

produce

Building relationships

t = 2

Reflect, (re-)produce, institutionalize

Creating switching cost by providing electronic linkages, loans etc..

Stabilizing linkages, joint initiatives

Collective sense making, collaboration

Behavioural patterns

Ordering

Structural setting/ environment

Assortment of products/ product catalog/ communication infrastructure

Contractual relations among business partners/ conventions/ communication protocol

“Leitidee”:
• Two stage supply chain
• Inventory management
• Interests of stakeholders

Ordering

Modes of ordering:
• electronic
• phone
• suppliers’ sales reps.

Pragmatics:
• wishlist
• splitting orders

Collective sense making, articulation of stakeholder interests e.g. by IPU

Behavioural patterns
Standard as boundary object

- Standards are the link between the ordering practices of retailers and the responses (order confirmation) of wholesalers.

Delivery

Structural setting/environment

- Logistics infrastructure, density of pharmacies
- Warehousing layout/equipment
- Universal service provision
- Contractual delivery frequency (twice daily)
- "Leitidee": Pharmaceutical distrib.
  - Division of labour
  - Value propositions

Behavioural patterns

- Equipment in action (streams of blue boxes)
- Social aspects:
  - delivery swapping
  - splitting orders
- Negotiation/collective sense making

Delivering

- Constrain and enable
- Produce
- Reflect, (re-)produce, institutionalize
Explaning persistence: path dependence

- Path dependence theory was developed to explain processes of technology adoption and industry evolution.
- Current research done at the FU Berlin
  http://www.fu-berlin.de/wiwiss/forschung/pfadkolleg/
Emergence and discontinuation of paths

I. Period of choice
II. Phase of positive feedback
III. Path dependency
IV. Discontinuation of path

Scope of variation
Scope of action

"Historical" practices
Gradual/revolutionary transformation of practices
Stabilizing practices
Softening or breaking of practices

Path dependence in the Irish case

- Phone ordering
- Order splitting
- Development of standard for tele-ordering
- Development of pharmacy s/w
- Changing industry structure
- End of technology life cycle

- Standard embedded in pharmacy s/w
- Order and delivery practice stabilizes wholesaler – pharmacy division of labour

Source: Schreyögg, Sydow, Koch (2003)
Challenges for the future

- Emergence of (larger) pharmacy groups, which might opt for an elaborate inventory management solution across the group (Boots, UK).
- Emergence of national chains of drugstores (like CVS or Walgreen in the US) and professional retail management.
- Take-over or merger between pharmacy chains and wholesalers (example Cahill May Roberts - Unicare pharmacy, the largest pharmacy group in R.I.).
- European consolidation (example Celesio).
- Direct delivery by pharmacy companies (e.g. Pfizer UK - http://www.pfizer.co.uk/template2.asp?pageid=367)
- Online pharmacies, operating with a fundamentally different distribution model.
- GS1 could maintain the data pool.

Background: Data pool

E.g. GXS data pool manager:
- GS1 certified data pool
- Link/ access to GS1 GDSN™ (Global Data Synchronisation Network)

http://www.gxs.com/de/products/synchronization/products_dataPoolManager.htm
Conclusions

- ... in search of a rich conceptual framework to explain differences and emergence of IOIS.
- ... encountered a broad range of basic questions (e.g. unit and level of analysis, notion of causality).
- ... adapted framework (structuration/ practice theory), open for further additions or focused discussion (e.g. path dependency).
- ... core element of explanation: cycles of reproduction of structures through action.