

## THE GENERATIVE MECHANISMS OF DIGITAL INFRASTRUCTURE EVOLUTION

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### Appendix

#### Sample Cases

##### Contextual Conditions

Architecture: tightly coupled (0); loosely coupled (1)  
Control: centralized (0); decentralized (1)

##### Mechanisms

Adoption (A): unactualized (0); actualized (1)  
Innovation (I): unactualized (0); actualized (1)  
Scaling (S): unactualized (0); actualized (1)

**Outcome:** unsuccessful (0); successful (1)

**Comb:** combination of mechanisms

No	Case	Contextual Conditions		Mechanisms			Out-come	Comb	Reference
		Arc	Con	A	I	S			
1	<b>Health Information Systems Project HISP:</b> A successful standardization strategy in low-resource countries, based on flexible and simple solutions. Continuously from 1992-2007.	1	1	1	0	1	1	AS	Braa, J., Hanseth, O., Heywood, A., Mohammed, W., and Shaw, V. 2007. "Developing Health Information Systems in Developing Countries: The Flexible Standards Strategy," <i>MIS Quarterly</i> (31:2), pp. 381-402.
2	<b>National Hospital:</b> A case of increasing complexity of requirements, leading to paralysis.	0	0	0	0	0	0	-	Hanseth, O., Jacucci, E., Grisot, M., and Aanestad, M. 2006. "Reflexive Standardization: Side Effects and Complexity in Standard Making," <i>MIS Quarterly</i> (30:2), pp.563-581.

No	Case	Contextual Conditions		Mechanisms			Out-come	Comb	Reference
		Arc	Con	A	I	S			
3	<b>Norsk Hydro:</b> A case of an expanding corporate standard in the 1990s, leading to broad adoption, but difficult to scale	0	0	1	1	0	1	AI	Hanseth, O., and Braa, K. 2000. "Who's in Control: Designers, Managers or Technology? Infrastructures at Norsk Hydro," in <i>From Control to Drift—The Dynamics of Corporate Information Infrastructures</i> , C. U. Ciborra, K. Braa, A. Cordella, B. Dahlbom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro, and K. A. Simon (eds.), Oxford: Oxford University Press, pp. 125-147.
4	<b>IBM:</b> An innovative CRM project, with scaling problems.	0	0	1	1	0	0	AI	Ciborra, C., and Failla, A. 2000. "Infrastructure as a Process: The Case of CRM at IBM," <i>From Control to Drift—The Dynamics of Corporate Information Infrastructures</i> , C. U. Ciborra, K. Braa, A. Cordella, B. Dahlbom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro, and K. A. Simon (eds.), Oxford: Oxford University Press, pp. 105-124.
5	<b>EDI:</b> An ambitious project in health, but failing to align a complex network of actors and technology.	1	1	0	0	0	0	–	Monteiro, E., and Hanseth, O. 1995. "Social Shaping of Information Infrastructure: On Being Specific about the Technology," in <i>Information Technology and Changes in Organizational Work</i> , W. J. Orlikowski, G. Walsham, M. R. Jones, and J. I. DeGross (eds.), London: Chapman & Hall, pp. 325-343.
6	<b>Internet:</b> Describes how the dynamics of bootstrapping and adaptation explains the success of the Internet.	1	1	1	1	1	1	AIS	Hanseth, O., and Lyytinen, K. 2010. "Design Theory for Dynamic Complexity in Information Infrastructures: The Case of Building Internet," <i>Journal of Information Technology</i> (25:1), pp.1-19.
7	<b>Genome project:</b> An ambitious scientific community project, which fails to establish a sustainable solution.	0	1	0	0	0	0	–	Star, S. L., and Ruhleder, K. 1996. "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," <i>Information Systems Research</i> (71), pp.111-134.
8	<b>Statoil:</b> An innovative project of knowledge management, which fails to trigger internal dynamics.	0	0	0	0	0	0	–	Hepsø, V., Monteiro, E., and Rolland, K. 2009. "Ecologies of eInfrastructures," <i>Journal of the AIS</i> (10:5), pp.430-446.
9	<b>Legal systems:</b> An expanding legal infrastructure in Austria, growing organically from 1972.	0	0	1	0	1	1	AS	Koch, S., and Bernroider, E. 2008. "Aligning ICT and Legal Frameworks in Austria's e-Bureaucracy: From Mainframe to the Internet," in <i>ICT and Innovation in the Public Sector: European Studies in the Making of E-Government</i> , F. Contini and G. F. Lanzara (eds.), Basingstoke, UK: Palgrave Macmillan, pp. 147-173.
10	<b>Environmental Health in the French Public Health Administration:</b> Analyzes a successfully distributed network of practice, 2000 to 2005, supported by an emerging information infrastructure.	1	1	1	1	1	1	AIS	Vaast, E., and Walsham, G. 2009. "Trans-situated Learning: Supporting a Network of Practice with an Information Infrastructure," <i>Information Systems Research</i> (20:4), pp. 547-564.

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11	<b>French Rail:</b> Aiming to transfer an airline booking system to a railway context. Fails because of "translation" problems.	0	0	0	0	0	0	-	Mitev, N. 2000. "Toward Social Constructionist Understandings of IS Success and Failure: Introducing a New Computerized Reservation System," in <i>Proceedings of the 21<sup>st</sup> International Conference of Information Systems</i> , Brisbane, Australia, pp. 84-93.
12	<b>Local Danish Electronic Patient Record initiative:</b> A local initiative, which surprisingly develops and scales into a national Danish Electronic Patient Record solution.	1	1	1	1	1	1	AIS	Aanestad, M., and Blegind Jensen, T. 2011. "Building Nation-Wide Information Infrastructures in Healthcare Through Modular Implementation Strategies," <i>Journal of Strategic Information Systems</i> (20:2), pp.161-176.
13	<b>Health:</b> A national Danish Electronic Patient Record standardization initiative, which never gets off the ground.	0	0	0	0	0	0	-	Aanestad, M., and Blegind Jensen, T. 2011. "Building Nation-Wide Information Infrastructures in Healthcare Through Modular Implementation Strategies," <i>Journal of Strategic Information Systems</i> (20:2), pp.161-176.
14	<b>GIS in India:</b> An attempt to introduce GIS technology into an Indian local administration. Fails because of "translation" problems.	0	1	0	0	0	0	-	Sahay, S., and Walsham, G. 1996. "Implementation of GIS in India: Organizational Issues and Implications," <i>International Journal of Geographical Information Systems</i> (10:4), pp. 385-404.
15	<b>Power systems:</b> An epic description of how the US electric grid and companies expanded as networks of power.	0	1	1	0	1	1	AS	Hughes, T. P. 1987. "The Evolution of Large Technical Systems," in <i>The Social Construction of Technological Systems</i> , W. E. Bijker, T. P. Hughes, and T. Pinch (eds.), Cambridge, MA: MIT Press, pp. 51-82.
16	<b>Health Broadband Networks:</b> A telemedicine solution at the National Hospital is successfully innovated and adopted by health personnel.	1	0	1	1	0	1	AI	Hanseth, O., and Aanestad, M. 2003. "Design as Bootstrapping. On the Evolution of ICT Networks in Health Care," <i>Methods of Information in Medicine</i> (42), pp.385-391.
17	<b>Health:</b> An EDI initiative gets mired in standardization issues, and never comes off the ground.	1	1	0	0	0	0	-	Hanseth, O., and Aanestad, M. 2003. "Design as Bootstrapping. On the Evolution of ICT Networks in Health Care," <i>Methods of Information in Medicine</i> (42), pp. 385-391.
18	<b>Telemedicine:</b> A successful case of telemedicine in ambulances, but mainly as a pilot project.	0	0	1	0	0	1	A	Hanseth, O., and Aanestad, M. 2003. "Design as Bootstrapping. On the Evolution of ICT Networks in Health Care," <i>Methods of Information in Medicine</i> (42), pp. 385-391.
19	<b>EDIFACT standard:</b> A national standardization initiative fails because of technical and organizational complexity.	1	1	0	0	0	0	-	Hanseth, O., and Monteiro, E. 1997. "Inscribing Behaviour in Information Infrastructure Standards," <i>Accounting, Management and Information Systems</i> (7:4), pp. 183-211.
20	<b>Banking:</b> A study of an innovative decision support system, with limited adoption and scaling.	0	0	0	1	0	1	I	Scott, S. V., and Walsham, G. 1998. "Shifting Boundaries and New Technologies: A Case Study in the UK Banking Sector," in <i>Proceedings of the 19<sup>th</sup> International Conference on Information Systems</i> , Helsinki, Finland, pp.177-187.
21	<b>Health IS:</b> A successful adoption and scaling of a health information system in an Indian state.	0	0	1	0	1	1	AS	Sahay, S., and Walsham, G. 2006 "Scaling of Health Information Systems in India: Challenges and Approaches," <i>Information Technology for Development</i> (12:3), pp. 165-200.

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22	<b>The SWIFT Network:</b> A successful standards innovation in early 1970s, and the gradual expansion into a global financial network.	1	1	1	1	1	1	AIS	Scott, S., and Zachariadis, M. 2010. "A Historical Analysis of Core Financial Services Infrastructure: Society for Worldwide Interbank Financial Telecommunication (S.W.I.F.T.)," Working Paper Series, No 182., London School of Economics and Political Science.
23	<b>Law:</b> A Criminal Case Management system in Finland was developed and expanded gradually from 1992 into a successful legal network.	1	0	1	1	1	1	AIS	Fabri, M. 2009. "E-Justice in Finland and in Italy: Enabling Versus Constraining Models," in <i>ICT and Innovation in the Public Sector: European Studies in the Making of E-Government</i> , F. Contini and G. F. Lanzara (eds.), Basingstoke, UK: Palgrave Macmillan, pp. 115-146.
24	<b>Law:</b> The Civil Trial Online project is aimed at improving the workflow between courts and lawyers in Italy, had almost no results after 6 years, due to growing complexity.	1	0	0	0	0	0	–	Fabri, M. 2009. "E-Justice in Finland and in Italy: Enabling Versus Constraining Models," in <i>ICT and Innovation in the Public Sector: European Studies in the Making of E-Government</i> , F. Contini and G. F. Lanzara (eds.), Basingstoke, UK: Palgrave Macmillan, pp. 115-146.
25	<b>e-Customs in Europe:</b> An ambitious EU project to integrate customs had some local successes, but has problems in scaling and adoption.	0	0	1	0	0	0	A	Henningsson, S., and Henriksen, H. Z. 2011. "Inscription of Behaviour and Flexible Interpretation in Information Infrastructures: The Case of European e-Customs," <i>Journal of Strategic Information Systems</i> (20:4), pp. 355-372.
26	<b>Health:</b> The NHS summary care record project is characterized by a number of problems, and fails to establish a sustainable development.	0	0	0	0	0	0	–	Greenhalgh, T., Stramer, K., Bratan, T., Byrne, E., Mohammad, Y., Russell, J. 2008. "Introduction of Shared Electronic Records: Multi-Site Case Study Using Diffusion of Innovation Theory," <i>British Medical Journal</i> (337: a1786; doi: 10.1136/bmj.a1786).
27	<b>Pharmaceuticals:</b> The evolution of an intranet, from corporate asset to local adaptation in a loosely coupled architecture.	1	1	1	1	1	1	AIS	Ciborra, C. U. 2000. "From Alignment to Loose Coupling: From Mednet to WWW.Roche.Com," in <i>From Control to Drift—The Dynamics of Corporate Information Infrastructures</i> , C. U. Ciborra, K. Braa, A. Cordella, B. Dahlbom, A. Failla, O. Hanseth, V. Hepsø, J. Ljungberg, E. Monteiro, and K. A. Simon (eds.), Oxford: Oxford University Press, pp. 193-211.
28	<b>OSI vs. IP standards:</b> Compares the development and adoption of the OSI and IP standards, explaining the success of IP as the successful balancing between flexibility and standardization	1	1	1	0	1	1	AS	Hanseth, O., Monteiro, E., and Hatling, M. 1996. "Developing Information Infrastructure: The Tension Between Standardization and Flexibility," <i>Science, Technology, and Human Values</i> (11:4), pp. 407-426.
29	<b>Gateways vs. standards:</b> Analyzes a "standards war" in Scandinavia in the 1980s, concluding with the importance of gateways.	1	1	1	1	1	1	AIS	Hanseth, O. 2001. "Gateways—Just as Important as Standards: How the Internet Won the 'Religious War' about Standards in Scandinavia," <i>Knowledge, Technology and Policy</i> (14:3), pp. 71-89.
30	<b>Internet IPv6:</b> The case investigates the efforts in the early 90s to address the IP address shortage. Aligning the various actor-networks and protecting the installed base proved successful.	1	1	1	1	1	1	AIS	Monteiro, E. 1998. "Scaling Information Infrastructure: The Case of the Next Generation IP in Internet," <i>The Information Society</i> (14:3), pp. 229-245.

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31	<b>Maritime Classification Company:</b> Balancing local contexts and corporate standards, adoption was successful, but scaling problematic.	1	1	0	1	0	1	I	Rolland, K., and Monteiro, E. 2002. "Balancing the Local and the Global in Infrastructural Information Systems," <i>The Information Society</i> (18:2), pp. 87-100.
32	<b>Telecom:</b> The case explores the balance between central control and local autonomy. Relinquishing control led to innovative and successful infrastructure.	1	1	1	1	1	1	AIS	Nielsen, P., and Aanestad, M. 2006. "Control Devolution as Information Infrastructure Design Strategy: A Case Study of a Content Service Platform for Mobile Phones in Norway," <i>Journal of Information Technology</i> (21), pp. 185-194.
33	<b>Broadband Mobile Services in South Korea:</b> The case explains the rapid diffusion of broadband mobile services in Korea.	1	1	1	1	1	1	AIS	Yoo, Y., Lyytinen, K., and Yang, H. 2005. "The Role of Standards in Innovation and Diffusion of Broadband Mobile Services: The Case of South Korea," <i>Journal of Strategic Information Systems</i> (14), pp. 323-353.
34	<b>University software:</b> SAP module/Uni module: The successful generification and adaptation of two university software packages.	0	1	1	0	1	1	AS	Pollock, N., Williams, R., and D'Adderio, L. 2007. "Global Software and its Provenance: Generification Work in the Production of Organizational Software Packages," <i>Social Studies of Science</i> (37:2), pp. 254-280.
35	<b>Health:</b> A case on an innovative regional health network in Greece, with adoption and scaling problems, because failing to take part in a power network.	0	1	0	1	0	0	I	Constantinides, P., and Barrett, M. 2006. "Large-Scale ICT Innovation, Power, and Organizational Change: The Case of a Regional Health Information Network," <i>Journal of Applied Behavioral Science</i> (41:1), pp. 76-90.
36	<b>eGovernment:</b> A project aimed at improving workflow between a state and federal level, with sustainable growth.	0	0	1	0	1	1	AS	Pipek, V., and Wulf, V. 2009. "Infrastructuring: Toward an Integrated Perspective on the Design and Use of Information Technology," <i>Journal of Association for Information Systems</i> (10:5), pp. 447-473.
37	<b>Health:</b> A large NHS project in the UK fails because of too technical focus and no clear adoption strategies.	0	0	0	1	0	0	I	Greenhalgh, T. 2010. "Adoption, Non-Adoption, and Abandonment of a Personal Electronic Health Record: Case Study of HealthSpace," <i>British Medical Journal</i> (341: c5814; doi: 10.1136/bmj.c5814)
38	<b>US petroleum company</b> CostCo: Infrastructure project with limited effect because of strong focus on cost reduction.	0	0	0	0	1	0	S	Broadbent, M., Weill, P., and St.Clair, D. 1999. "The Implications of Information Technology Infrastructure for Business Process Redesign," <i>MIS Quarterly</i> (23:2), pp. 159-182.
39	<b>US petroleum company:</b> Innovative infrastructure project with redesigned business processes and sustaining growth.	0	0	1	1	1	1	AIS	Broadbent, M., Weill, P., and St. Clair, D. 1999. "The Implications of Information Technology Infrastructure for Business Process Redesign," <i>MIS Quarterly</i> (23:2), pp. 159-182.
40	<b>US retail company:</b> Innovative project with adoption and scaling problems.	0	0	1	0	0	0	A	Broadbent, M., Weill, P., and St. Clair, D. 1999. "The Implications of Information Technology Infrastructure for Business Process Redesign," <i>MIS Quarterly</i> (23:2), pp. 159-182.
41	<b>US retail company:</b> Opportunity oriented project with redesigned processes and successful adoption and scaling.	0	0	1	1	1	1	AIS	Broadbent, M., Weill, P., and St. Clair, D. 1999. "The Implications of Information Technology Infrastructure for Business Process Redesign," <i>MIS Quarterly</i> (23:2), pp. 159-182.