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|  |  | **Barrier relevance to technology innovation deployment process** | | | | | | | |
|  |  | Initiation (pre-adoption) | | | | Implementation (post-adoption) | | | |
|  |  | Barrier | Cause | Effect | Source | Barrier | Cause | Effect | Source |
| **Owner of deployment barrier** | Individual |  |  |  |  | Indirect costs:   * A physician gets paid for patient care but not for sharing data with other stakeholders (CS2\_A2\_DI, Pos. 18) | * [Value-based care eliminates this issue, in particular the formation of payviders as they are just getting one data [contradiction with PYV1\_DI]] (CS2\_A2\_DI, Pos. 18) | Sharing data with other stakeholders is added work for physicians (CS2\_A2\_DI, Pos. 18) [see Pr\_ExEff] | CS2\_A2\_DI, Pos. 18 |
| Organization | Financial requirements:   * High ROI required for a business case (PY1\_A3\_DI, Pos. 53) * Many EHRs are not ROI positive and do not lead to better care for patients (CDE1\_A1\_DI, Pos. 30-32) * Any innovation that wants to get to the top of the list to get adopted/implemented needs a business case that out-beats those of alternative innovations (CS1\_DI, Pos. 22)  “… it’s not that, you know, a hospital’s looking and saying, ‘Well, we could do this interoperability thing, but you know, we think it’d be better not to.’ That’s not it at all; they’re choosing which of their children to feed and which ones they gonna let starve to death. And you know, I’m sorry to come up with such a brutal, you know, description, but that’s how they feel I’ve been in those meetings. And it’s just not possible to do all the things you should do, or you didn’t want to do. It has to be you pick the one that’s got the biggest business case impact. My goal is to improve profitability, my goal is to improve market share, my goal is to improve top-line revenue. You pick the one thing that has the biggest contribution to that. So, any innovation that wants to make it to the top of the list and actually get implemented has to beat out all the others on that business case, or it has to be mandated [quote].” * Hospitals adopt the innovation if it is provided for free (PV1\_DI, Pos. 28) * *Innovation needs to demonstrate on day one that it makes money (PV1\_DI, Pos. 28)* * Many innovations lose out in prioritization process (PY2\_DI, Pos. 26) * For-profit companies have a fiduciary duty to their shareholders for shareholder value maximization (PY2\_DI, Pos. 50) * For-profit companies have something at stake (M2\_DI, Pos. 42) * People tend to only look at costs and not the value proposition/benefits (PV2\_CDE3\_DI, Pos. 18-26) | * Large provider groups require a business case before IT adoption (PY1\_A3\_DI, Pos. 53) * A consulting industry has been built around this, trying to help businesses unlock value from their EHRs (CDE1\_A1\_DI, Pos. 30-32) * *Healthcare is a lucrative field but has very thin operating margins (PV1\_DI, Pos. 28)* * The impact/benefit of many innovations is hard to quantify (PY2\_DI, Pos. 26; PV2\_CDE3\_DI, Pos. 18-26) | * High thresholds to meet for IT (PY1\_A3\_DI, Pos. 53) * If the innovation’s business case out beats that of others the stakeholder choses in favor of that one; if the innovation’s business case does not out beat that of others it needs to be mandated to be adopted (CS1\_DI, Pos. 22) * Fiduciary duty towards shareholders does not always align with decentralized technology use cases (PY2\_DI, Pos. 50) * Profits drive the advancement of innovations (M2\_DI, Pos. 42) | PY1\_A3\_DI, Pos. 53  CS1\_DI, Pos. 22  CDE1\_A1\_DI, Pos. 30-32  PV1\_DI, Pos. 28  PY2\_DI, Pos. 26  PY2\_DI, Pos. 50  M2\_DI, Pos. 42  PV2\_CDE3\_DI, Pos. 18-26 | Financial requirements:   * *Innovation needs to demonstrate on day one that it makes money (PV1\_DI, Pos. 28)* | *Healthcare is a lucrative field but has very thin operating margins (PV1\_DI, Pos. 28)* |  | PV1\_DI, Pos. 28 |
| Non-financial requirements:   * Innovation must create meaningful value no matter what technology is used to make it work (PY2\_DI, Pos. 30) |  |  | PY2\_DI, Pos. 30 |  |  |  |  |
| Direct costs:   * High implementation costs (PY1\_A3\_DI, Pos. 53) * *Maintenance: Blockchain networks are expensive to maintain (ETC1\_DI, Pos. 14)* |  | * Smaller providers and employers cannot afford such investments (PY1\_A3\_DI, Pos. 53) * *Involved parties (VRS providers) fell back on the old-school relational model, with everyone building their own look-up directory and keeping it in synch via APIs [they wanted to go with the tried and tested] (ETC1\_DI, Pos. 14) [see Pr\_FacilCon]* | PY1\_A3\_DI, Pos. 53  ETC1\_DI, Pos. 14 | Direct costs:  *Maintenance: Blockchain networks are expensive to maintain (ETC1\_DI, Pos. 14)* |  | *Involved parties (VRS providers) fell back on the old-school relational model, with everyone building their own look-up directory and keeping it in synch via APIs [they wanted to go with the tried and tested] (ETC1\_DI, Pos. 14) [see Pr\_FacilCon]* | ETC1\_DI, Pos. 14 |
| Indirect costs:   * Opportunity cost to changing a system (CS1\_DI, Pos. 22) * Indirect cost: Implementation of new innovation shuts the organization down / keeps everything on hold apart from the innovation implementation for four years (CS1\_DI, Pos. 24-26)  “You’re doing a brain transplant. When you do this, or the way I often say when we’re talking about the payer side*,* the core claim systems when you change those out, it’s like doing a simultaneous heart, brain, and lung transplant. But let’s say it’s just one; you’re just doing a brain transplant. In the middle of the brain transplant, would it be a good idea to do another surgery that, say, implement some kind of robotics device that required the brain to do a bunch of things? None of that. You’re going to hold the brain function as still as possible [quote].” * Many companies do not want to give mission-critical functions up by outsourcing it (CDE1\_A1\_DI, Pos. 42) * High switching costs switching from one EHR system to another (PV1\_DI, Pos. 34) * *People are worried about being compliant with regulations (CDE2\_FA2\_DI, Pos. 16)* | * There is a tremendous pressure on margin for many organization (CS1\_DI, Pos. 22) * Opportunity cost (CS1\_DI, Pos. 24-26) * Fight for executive mindshare around innovations (CS1\_DI, Pos. 22) [see Pr\_OrgInnov] * Many technologies provided by third parties provide core functions to their clients’ business model/part of their intellectual property (in particular interoperability companies providing services to other (CDE1\_A1\_DI, Pos. 42) | * Any innovation that wants to get to the top of the list to get adopted/implemented needs a business case that out-beats those of alternative innovations (CS1\_DI, Pos. 22) * Many companies rather build the technology themselves than purchase it externally (CDE1\_A1\_DI, Pos. 42) * *Heavy regulation stunts the ability to innovate [contradiction to CS1\_DI] (CDE2\_FA2\_DI, Pos. 16)* | CS1\_DI, Pos. 22  CS1\_DI, Pos. 24-26  CDE1\_A1\_DI, Pos. 42  CDE2\_FA2\_DI, Pos. 16 | Indirect costs:   * Loss in revenue (PV1\_DI, Pos. 2) * *People are worried about being compliant with regulations (CDE2\_FA2\_DI, Pos. 16)* * Providers loose the competitive advantage of how things are done when engaging in share sharing (CS2\_A2\_DI, Pos. 8) | * Hospital does not want to see whether tests have already been performed on a transferred patient (PV1\_DI, Pos. 2) * Providers (large health systems) strongly believe that have built knowledge internally that gives them a competitive advantage (CS2\_A2\_DI, Pos. 8) [see Pr\_RiskTrust] | * *Heavy regulation stunts the ability to innovate [contradiction to CS1\_DI] (CDE2\_FA2\_DI, Pos. 16)* * Large providers have the financial incentive to not share clinical data even though they should for the patient and the good of human mankind (CS2\_A2\_DI, Pos. 8) | PV1\_DI, Pos. 2  CDE2\_FA2\_DI, Pos. 16  CS2\_A2\_DI, Pos. 8 |