| **#** | **Time period** | **Unit of analysis** | **Stakeholder involved** | **Extent of alignment between institutional logics** | **Incentive direction** | **Problems in governmental regulations** | **Cause** | **Effect** | **Source** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Present | System | Payers, providers, employers | Payers, providers, and employers want to keep data on business management (e.g., which parts of the business are more/less profitable) proprietary/non-transparent | Misaligned incentives |  | Much data is used for contract negotiation with providers | Lack of proper usage of the technologies, i.e., sharing of data | PY1\_DI, Pos. 53 |
| 2 | Present | System | Payers, providers, employers | Payers, providers, and employers want to keep data on business management (e.g., which parts of the business are more/less profitable) proprietary/non-transparent | Misaligned incentives |  | Much data is used for contract negotiation | Building of fire walls | PY1\_DI, Pos. 53 |
| 3 | Past | System |  | Alignment of practices: There were no standard code sets for describing diagnosis and procedures in the same way |  |  | [Part of StakeAlign and not TechPerf as standard code sets are more about unifying ways of working, i.e., practices[[1]](#footnote-1)] | Failure to achieve interoperability | CS1\_DI, Pos. 18/428-537 |
| 4 | Past | Organization | Federal agencies |  |  | Lack of government mandates that all addressed stakeholders must comply with the standardized, ubiquitous formats and standard code sets, i.e., no “must” statements, just “should” statements | “Okay, late 90s EDI, here it comes. The government gave us a format, it was the X12 4010 format. You had to use them you couldn’t change them. It was these code sets ICD-9s, CPTs, NDCs. You had to use those code sets. Payer IDs, NPIs [National Provider Identifier Standards] came later, but it was NIST. They should have done a NPIs from the beginning, but you have to use those code sets. You had the federal government mandating that at least for Medicare, half of everything you did, you had to use it. And then, if you didn’t, there was enforcement, the enforcement was, “We won’t pay your claim.” And hospital loses half the revenue. That’s a pretty good stick, okay [quote]?” | Failure to achieve interoperability | CS1\_DI, Pos. 18/428-537 |
| 5 | Present | Organization | Federal agencies |  |  | Lack of enforcement of the mandates that require all addressed stakeholders to comply with the standardized, ubiquitous formats and standard code sets | [See Ex\_SystemChar#39] | Failure to achieve interoperability | CS1\_DI, Pos. 18/428-19 |
| 6 | Past | System | Intermediaries | Alignment of goals: VRS providers felt anxiety that the maintainers of the look-up directory could be compromised |  |  | “And all it took was one of these other companies to say, ‘You know what? We’re gonna make our own lookup directory, and we’re going to sync it with [blockchain-powered network for the pharmaceutical industry]. But we’re not going to run everything through [blockchain-powered network for the pharmaceutical industry], because we don’t like that. You know it. We’re anxious about this as an [software company]-driven project.’ Because they felt like the rug could be pulled out from under them in any time [quote].”  “And again, it’s very much a protectionist model, it’s an ‘I-got-mine’ sort of model because they felt like [software company] was coming for their breakfast [quote].” | [See Ex\_FacilCon#2] | ETC1\_DI, Pos. 14; ETC1\_DI, Pos. 34 |
| 7 | Past [the cost of non-compliance being lower than of compliance is an issue because of failed past governmental mandates] | Organization |  |  |  | Stakeholders weigh up the cost of non-compliance with the cost of compliance and the cost of compliance is often larger than the cost of non-compliance | Perverse economic incentives e.g., stakeholders believe that in some data that is to be shared are business secrets  “A patient should know the price that a payer has contracted with the hospital and use that to decide which hospitals they gonna go to. Okay, well. So, the government put out a rule about that, and the industry sued. They said we can’t possibly do that. They went to court. The court said, ‘Congress has this authority because the President has his authority, dear hospitals, you have to publish it.’ So, about half the hospitals looked at what the fine was and said, ‘I’d rather pay the fine than publish the data.’ And you might think it’s as a systems person, you might think, ‘Well, they didn’t want to do all the hard work of gathering the data and normalizing and publishing.’ It wasn’t that at all. They already have that ability. It was that inside that data, where business secrets, in their case, business secrets of what doctors refer to me, what doctors do I refer to, and how much did I negotiate prices with the different payers. Those business secrets the hospitals believed were so important they’d rather be non-compliant, look bad in the newspaper, and get fined by the government than to comply with the rule [quote].” | Failure to achieve interoperability | CS1\_DI, Pos. 18/428-537 |
| 8 |  |  |  |  |  |  |  |  |  |
| 9 | Present | System |  | Interoperability is lagging [not in Ex-TechPerf as interviewee refers to lagging interoperability in terms of incentives] |  |  |  | Hampers the movement from fee-for-service to value-based care | CDE1\_A1\_D, Pos. 56 |
| 10 | Present | System | Manufacturers, retailers | Alignment of goals: For manufacturer’s it’s a compliance issue, while for the wholesaler it’s an economic issue | Weak incentives |  |  | [See Ex\_Fin#9] | ETC1\_DI, Pos. 26-28 |
| 11 | Future | System | Federal agencies |  |  | Repeated postponing of final sets of regulations coming into effect |  | Solution rollout takes time | ETC1\_DI, Pos. 50 |
| 12 | Present | System |  | Cognitive alignment: Semantic interoperability i.e., “Do the processes above or the humans above semantically see the same thing?” is one of the biggest challenges |  |  |  | Semantic interoperability requires much upfront work (right terminologies, ontology, definitions) | PYV1\_DI, Pos. 18 |
| 13 | Present | System |  | Cognitive alignment: Semantic interoperability is the primary interoperability challenge within health IT vendor systems e.g., Epic to Epic |  |  |  | This dissonance can be life impacting | PYV1\_DI, Pos. 24 |
| 14 | Present | System |  | Everybody has a different set of incentives |  |  | [See Ex\_SystemChar#15] | There is no reason to bring everyone together for a same set of standards for facilitate the sharing of clinical data | CS2\_A2\_DI, Pos. 8 |
| 15 | Past | System | Federal agencies |  |  | HITECH Act (600-pages document) was supposed to get everybody to invest and build their IT infrastructure by providing financial incentives for those who achieved certain levels but still many people complained that it was not exhaustive enough and missed important issues |  | Speaks to how complicated everything is | CS2\_A2\_DI, Pos. 8 |
| 16 | Past | System |  |  | Lack of incentive to build a central repository where all the shared clinical data is integrated |  | [See Ex\_Fin#12] |  | CS2\_A2\_DI, Pos. 18 |
| 17 | Present | System |  | Cognitive alignment: Semantic interoperability is the primary interoperability challenge across health IT vendor systems |  |  | It is hard to even in a fully standardized system to define all the contextual information that is relevant when looking at a patient’s clinical data |  | CS2\_A2\_DI, Pos. 26 |
| 18 | Present | System | Federal agencies |  |  | It takes the government years to make everyone in the industry adopt common clinical data models for the improvement of data shareability [lack of enforcement] |  |  | CS2\_A2\_DI, Pos. 32 |
| 19 | Present | System | Federal agencies |  |  | HIPAA is outdated | [See Ex\_RiskTrust#10] |  | CS2\_A2\_DI, Pos. 34-36 |
| 20 | Present | System | Health IT vendors | Health IT vendors are focused on making their systems the best [status] |  |  |  | Clinical data flows are difficult to share | CS2\_A2\_DI, Pos. 6 |
| 21 | Present | System | Health IT vendors | Alignment of goals: Health IT vendors are focused on getting everyone to use their platform [increase switching costs, have high market share] |  |  |  | The different health IT systems do not talk to each other | CS2\_A2\_DI, Pos. 6 |
| 22 | Present | Systematic |  | Alignment of goals: Hospital does not want to see whether tests have already been performed on a transferred patient | Misaligned incentives |  | [See Ex\_Fin#13] | Information is not shared easily amongst hospital systems | PV1\_DI, Pos. 2 |
| 23 |  |  |  |  |  |  |  |  |  |
| 24 | Past | System | Federal agencies |  | Misaligned incentives | The mandates they release do not address the misaligned incentives | “And so, like, for example, in terms of hospitals being transparent with the prices the government passed a law saying, ‘Hospitals need to be transparent with what your prices are.’ So, what did most hospitals do? They gave you an Excel sheet with all these numbers, and no one’s really able to interpret it. It’s very difficult to figure out what cost what, and so essentially, you know, a government passed a law, and we still don’t know what things cost at each hospital [quote].” | [See SystemChar#17] | PV1\_DI, Pos. 10-12; PV1\_DI, Pos. 28 |
| 25 | Present | System |  | Alignment of goals: There might be a good idea, but organizations have to protect their business and their data | Misaligned incentives |  |  |  | PV1\_DI, Pos. 10 |
| 26 | Present | Organization | Providers | Alignment of goals: Health system employees’ salaries are pegged to how well the health system does overall [relevant as they do not want to share data which would remove a lot of redundancy in procedures] | Misaligned incentives |  |  | Ripple effect: Physicians are incentivized to keep the hospital revenue high | PV1\_DI, Pos. 16 |
| 27 | Past |  |  |  |  | Government mandates come as an afterthought and are just added to the already established system |  | [Makes it difficult for government mandates to be effective] | PV3\_ETC2\_DI, Pos. 12 |
| 28 |  |  |  |  |  |  |  |  |  |
| 29 | Present | System |  | Alignment of goals: Deciding on the governance of decentralized technologies is difficult |  |  | Need to balance decentralization with making every stakeholder happy |  | PY2\_DI, Pos. 30 |
| 30 | Present | System |  | Cognitive alignment: Building an incentive model that ensures that it is sustainable and equitable for the stakeholders involved, i.e., identifying who is creating and consuming value from the network/paying in |  |  |  |  | PY2\_DI, Pos. 30 |
| 31 | Present | System |  | Cognitive alignment: Some organizations sharing information while others are merely consuming |  |  |  | Altruistic solutions do not work on the long term | PY2\_DI, Pos. 34 |
| 32 |  |  |  |  |  |  |  |  |  |
| 33 | Present | System |  | Alignment of goals: Everyone is controlling or wants to control their own data flows |  |  | “One of the other big pharma companies’ chief data officers said, data is more valuable than oil. And we just don’t know what yet, and we don’t know how to value it [quote].” | A patient’s health records are not easily accessible for any physician | M1\_DI, Pos. 12 |
| 34 | Present | System |  | [Success factor[Need to follow the dollar and really understand where you are taking value from/whom you are taking it from, and what backend incentive you are providing] |  |  |  |  | M1\_DI, Pos. 26 |
| 35 | Present | System |  | Cognitive alignment: Semantic interoperability is difficult across systems |  |  |  |  | M2\_DI, Pos. 12 |
| 36 | Present | System |  | Alignment of goals: Everyone wants to design their own system |  |  | Money opportunity if systems are different and not the same |  | M2\_DI, Pos. 38 |
| 37 | Present | System |  |  |  | The government is always trying to catch up, i.e., it is not up to speed on technologies and science | It is not-for-profit, i.e., has no money at stake | Nobody trusts the government to do something proactively | M2\_DI, Pos. 32-42 |
| 38 | Present | System |  | It is difficult to align incentives |  |  | People are incented by profits/money making opportunity and status |  | M2\_DI, Pos. 49 |
| 39 | Present | System | Health IT vendors | Alignment of goals: Health IT vendors are information blockers |  |  | There is some benefit of being the data holder or the master of all kind of things (it is a business policy thing) | They do not want to share data | CDE2\_FA2\_DI, Pos. 16 |
| 40 | Past | System |  |  |  | Everything is so heavily regulated down to the protocol, i.e., “Thou must do.” |  | [See Ex\_Fin#21] | CDE2\_FA2\_DI, Pos. 16 |
| 41 | Present | System |  |  |  | Certified health IT prescribes specific standards |  | Innovation does not occur at the core of the certified health IT highly regulated data elements | CDE2\_FA2\_DI, Pos. 53 |
| 42 | Present | System |  |  |  | Certified health IT prescribes specific standards |  | The question arises as to how to get innovations that come along accepted and used | CDE2\_FA2\_DI, Pos. 53 |
| 43 | Present | System |  | Cognitive alignment: People believe in the world that they do |  |  |  |  | CDE2\_FA2\_DI, Pos. 58 |
| 44 |  |  |  |  |  | Special interest groups see their way as the one and only solution and promote it |  | Try to have an upper arm, particularly when it comes to regulation | CDE2\_FA2\_DI, Pos. 58 |
| 45 | Present | Individual | Providers | Alignment of goals: Physicians, be it the chief medical officer or grassroot level doctors push back furiously if control is wrested away from them by adoption of e.g., some technology | Misaligned incentives |  | Chief medical officers and grassroot level doctors are extremely powerful within the system in terms of the people they interact with directly and in screaming, shouting, and adopting change |  | HITV1\_DI, Pos. 14 |
| 46 | Present | Individual | Providers | Physicians do not want to adopt any technology that gets in the way of them making money |  |  |  |  | HITV1\_DI, Pos. 22-24 |
| 47 | Present | Individual | Providers | Physicians do not want to adopt any technology that gets in the way of them making money |  |  |  | [See\_TechPerf#44] | HITV1\_DI, Pos. 22-24 |
| 48 | Present | Individual | Providers | Alignment of practices: Some providers want to do it their own way and do not care about adjusting and changing workflows |  |  | “’What do I care, you know, it’s like I’m focused on this X-ray, this bone this hammer, you know, don’t tell me that they’re allergic to the antibiotic I want to give them someone else will pick that up along the way’ [quote].” | [See Ex\_FacilCon#8] | PV2\_CDE3\_DI, Pos. 28 |
| 49 | Present | System |  |  | Lack of incentive alignment |  |  | Policy changes and policy alignment are key | PV2\_CDE3\_DI, Pos. 32 |
| 50 | Present | Individual |  |  | Lack of personal incentive alignment |  |  | [Success factor[Need to understand in what way everyone is incentivized]] | PV2\_CDE3\_DI, Pos. 32 |
| 51 | Past | System |  |  |  | They do not set forth one uniform standard of data exchange | There are centralized data exchanges (also called query-based document exchange), which are the established form of data exchange in the industry, such as HIEs, HIOs, health data utility and federated data exchanges which is enabled by FHIR efforts | It is inefficient to have two different architectures competing | PV2\_CDE3\_DI, Pos. 4 |
| 52 | Present | System |  |  |  | They do not set forth one uniform standard of data exchange | The first iteration of TEFCA does not involve FHIR | All the ideas and efforts need to converge | PV2\_CDE3\_DI, Pos. 48-51 |
| 53 | Present | System |  |  |  | Too much burden achieving a particular policy objective has shifted to one stakeholder group, i.e., the primary beneficiaries of the data or the data flows are not the ones that are involved in the upfront collection |  | Imbalanced benefits create the situation where not everyone is enthusiastic about pushing the use case forward / they feel disenfranchised about doing work where they see no added value for themselves and do not get paid for that appropriately | FA1\_DI, Pos. 10 |
| 54 | Present | System |  |  |  | Changing the balance of the system without compensating the imbalance, e.g., in a fee-for-service world before some change a physician could simply order a test or scan charging the patient for that, even though the patient might have done the test / scan recently, with perfect interoperability the provider cannot do such a test / scan for 30 days and loses revenue, even though this outcome is much better for the HC system overall | It is difficult to predict the proportion of free market capitalism, i.e., how the different market actors are going to engage in the market and finding the most efficient way to make money | Policymakers need to come up with a corresponding incentive for them to feel that they are doing the right thing for healthcare | FA1\_DI, Pos. 18-20 |
| 55 | Present | System |  |  |  | One-sided or more lopsided financial investment required from one stakeholder |  | Creates roadblocks | FA1\_DI, Pos. 22 |
| 56 | Present | System |  | Cognitive alignment: Everyone loves testing technology infrastructure, but no one is willing to pay for that individually |  |  | Testing is a community benefit type thing by figuring out what is working and what is not to improve on it to then deploy and scale it in the industry |  | FA1\_DI, Pos. 22 |
| 57 | Present | System |  |  |  | The policy dilemma of directly regulating certain issues and requiring involved actors to meet respective milestones and engaging with the industry early on before any regulation to move them down a certain path | It is hard to get people motivated to do something (e.g., testing) before it is regulated / mandated but when it is regulated without having engaged with the industry first federal agencies face a huge outcry of those parties stating that no one has tested it out yet |  | FA1\_DI, Pos. 24 |
| 58 | Present | System |  |  |  | Difficulty to align the industry’s business interest with the policy interest | Only if the government issues a mandate the industry shuffles around the priority list | Need to work with the industry in advance providing a longer-term timeline of planned mandates | FA1\_DI, Pos. 26 |
| 59 | Past | System |  |  |  | Trying to accommodate the needs of all stakeholders on the table |  | [See\_Ex\_StakeAlign#60] | CS1\_DI, Pos. 36, 802-817 |
| 60 | Past | System |  |  |  | Development and adoption of different standards | No creation of a prescriptive, fixed standard that everyone must use by federal agencies but many different variations | Two developers with different views are not able to connect | CS1\_DI, Pos. 36, 802-817 |
| 61 | Past | System |  |  |  | Lack of enforcement of mandates |  | FHIR is not getting used | CS1\_DI, Pos. 61-63 |
| 62 | Present | System |  |  |  | They want to be evolutionary not revolutionary |  | No enforcement of mandates such as requiring TEFCA-TEFCA exchanges happen. Using FHIR | CS1\_DI, Pos. 63 |
| 63 | Present | Individual |  | People running hospitals and payers, and physicians tend to be rugged individuals and pursue fierce levels of independence and individual authority, i.e., the do not want to be subordinate to anyone (neither within nor across the stakeholder group) |  |  |  | It is very difficult to make these people work together without a government mandate and enforcement | CS1\_DI, Pos. 77 |

1. Hansen and Baroody (2020), p. 60 [↑](#footnote-ref-1)