The STS Digital Framework for Cross Disciplinary Designing:

How Digital Technology and STS Principles Support Systemic Work Design

A Paper for the Global STS-D Network, San Francisco - Friday, September 9, 2016 PM

Bernard Mohr/Richard Ordowich/Ron Smith

Summary

This paper explores the "why" and "how" of the following four assumptions.

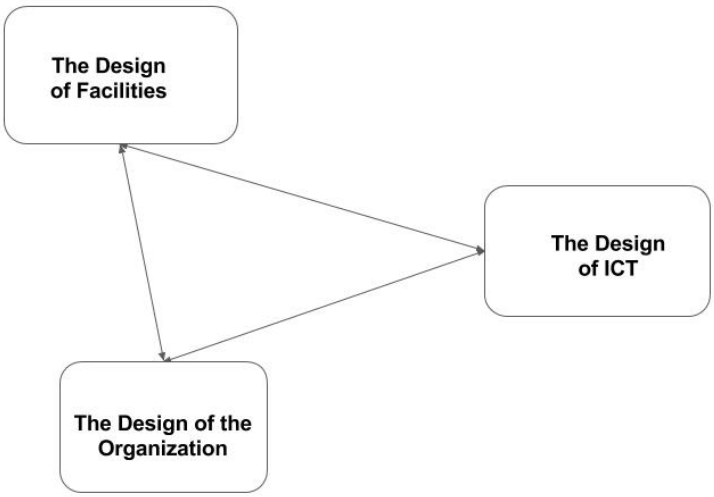
1. A powerful increase in benefits to the client organization is possible when we collaborate across disciplines (of organization design, ICT design and Facilities design) to *design at the intersection* - rather than maintaining our "silos of improvement"
2. "New" digital and social technology exists to enable such collaborations, allowing professionals with expertise in each of these three domains to use their expertise more effectively.
3. Enabling participation of "all users" in a more meaningful ways is equally important and we have "new" digital and social technology to do that as well.
4. Designing the organization structures, systems and practices AND the ICT systems AND the facilities, using concurrent and collaborative processes, requires a powerful glue. STS Principles can be the glue that holds us and this work together.

In part one of the paper we introduce the idea of "design at the intersection" of organization design, ICT design and Facilities design vs the more traditional approach of "siloes of improvement". Part two describes some of the challenges to designing at the intersection (-i.e.- systemic cross disciplinary designing). Part three proposes a revised set of STS-D principles as the glue for systemic cross disciplinary designing. Part four looks at the opportunities for cross disciplinary designing and describes other elements of the STS Digital Framework for Cross Disciplinary Design. Part five focuses on emerging practices and capabilities that are helping to bring the STS Digital Framework for Cross Disciplinary Design to life. Part six offers some brief conclusions and ideas for next steps.

PART ONE: DESIGN AT THE INTERSECTION

In our more generous moments, (whether as organization designers, facilities designers or ICT designers,) most of us would agree that "*No domain of practice exists in isolation from the other."* More importantly, we might admit that each of our respective domains, in isolation, cannot realistically supply the competence to provide a truly systemic design approach for our clients.

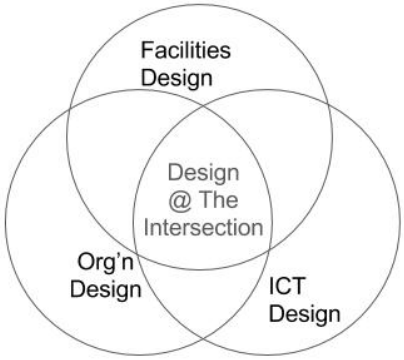
An Inconvenient Reality: Nothing Exists in Isolation



For much of our collective history as designers in these three domains, we have mostly given lip service to any sort of systemic, cross-disciplinary design process. Our work in the fields of Organization Design, ICT Design, and Facilities Design has been, and continues to create, for all practical purposes, **"siloes of betterment,"** with each seeking to design and install better "architecture" for improved organizational functioning. Each silo alternately casts out olive branches and thorn bushes to its neighbors.

We have a choice for future practice.

Or...



Fortunately, we may be at a point at which we have both the concepts and the tools to change this. What's going on in the digital world that is inviting us to "**design at the intersection"** of Organization design, ICT design, and Facilities design?

Digital Technology provides an efficient, accessible means to collaborate, permitting humans to spend more time in creative work rather than administering and sharing information. Technology creates opportunities for connectivity, organization of information, and coordination. Digital automation helps reduce the tedious tasks supporting collaboration. Can these same technologies enable a shift from "**siloes of betterment**" to a more systemic approach leading to **design at the intersection**? We think so.

In the past, attempting a systemic design of work across these three design domains (organizational architecture, physical architecture, and information/communication architecture) has been difficult, requiring significant administrative manual work to capture and communicate information across the domains. This complexity added significant overhead to a project.

While each domain is indeed complex, **the evolving digital world presents unprecedented opportunities for true systemic design**. Today, we have better means of communicating information as well as the newfound ability to process data in ways that enhance collaborative design. Web-based digital tools now provide capacity for real-time language translation, sharing of conceptual models across domains of design, and communication within user populations. These tools also allow us to apply high-engagement social collaboration methods across boundaries of geography and time.

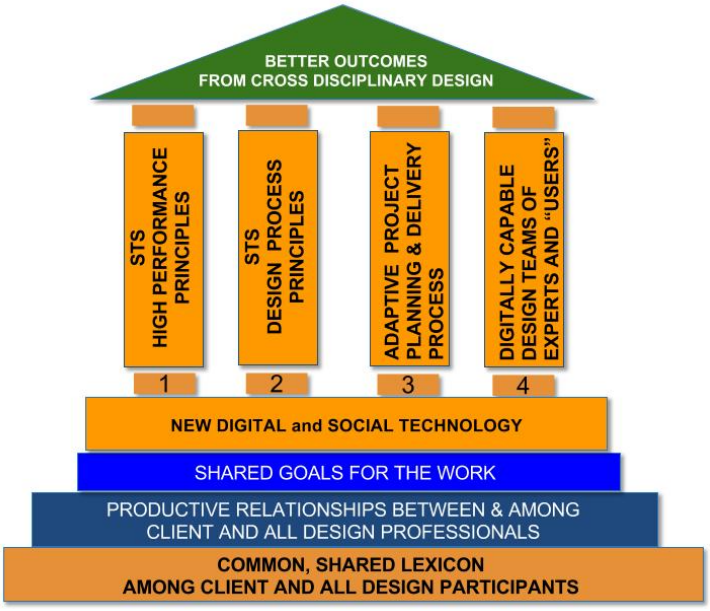
Digitized forms of data such as voice, video, and facts can now be integrated and shared. Data in its many forms has become our dominant means of communication. We have the opportunity to use data and ICT more effectively to improve collaboration and harmonization in systemic design. Of course, the technology by itself is insufficient. We need more.

We need a set of guidelines within a comprehensive framework that can quickly create conceptual common ground, allowing the disciplines and design participants:

- To *listen* to each other's worldviews,
- To *discover* their own and each other's underlying assumptions,
- To *align* emergent opportunities for design innovations with humanistic values, and
- To *work together* to transform siloed professional worlds of practice into a coherent design whole – physical, organizational and digital.

The framework we propose is The STS Digital Framework for Cross-Disciplinary Designing . STS-D principles are the core of this framework, but other critical elements exist as well; we believe these principles and the other elements offer unprecedented opportunities for true "**design at the intersection.**"

Before elaborating on this framework, a description of challenges to the practice of systemic cross disciplinary designing (or as we call it "designing at the intersection) is helpful.



STS DIGITAL FRAMEWORK For CROSS DISCIPLINARY DESIGN

PART TWO: CHALLENGES

The challenges in the quest for productive cross-disciplinary designing are numerous and significant, and are embedded in both client systems and our professional practices. These constraints create interlinked roadblocks across all Organization Design, ICT Design, and Facilities Design. Among these are a lack of a common language upon which to build common conceptual ground (even more vexing is that the disciplines frequently use the same words which hold different meanings within each group); a lack of explicit common, human-centered values to guide the design; client concerns about increased costs and loss of control of the project; and resistance to the complexity of involving multiple disciplines in a project. Professionals within each domain may fear that the value of their own expertise will be diminished in a cross disciplinary approach, and often find it difficult to suspend their entrenched design paradigms in order to effectively collaborate on co-designing in real time; clients may feel compelled to follow a highly-prescribed internal design process which has worked in the past. Consider the following:

Client-Based Challenges:

Constraints within Organization Design:

The "owners" of the organization design domain tend to be senior line and human resources executives. Their design goals are typically focused only on increased performance, both in the short term and longer term. And their design choices may be significantly influenced by political considerations rather than any systemic design principles.

Even when the organization design process is based on STS-D principles, seeking ways to meet the needs of customers, employees, shareholders and the community, through rethinking both strategic and operational groupings of tasks and systems, results may not be as significant as they could be without a cross disciplinary design process involving professionals from the other two domains. Often the

organization design process includes very little, if any, optimization of design choices from within the facilities and ICT domains. This deficit may be due to the following:

- The senior executives responsible for a particular re-design target typically find the complexity of redesigning any facet of the design (architecture of the organization **or** the ICT systems **or** the facilities) to be a big meal to digest. Entertaining multiple viewpoints among competing designers with multiple languages, and the idea of "changing everything all at once" can seem hopelessly overwhelming personally, politically, and economically.
- The Chief Human Resources Officer typically has neither the working relationships nor the language capabilities to partner with Chief ICT Officer or Chief Facilities Officer in broadening their thinking to include data concepts and spatial concepts.
- Clients often have difficulty appreciating how IT and Facilities relate to their concept of Organization Design. When Organization Design clients hear 'IT' and 'Facilities,' they tend to jump to preconceptions - preconceptions which limit their thinking about how those other two domains might elevate the organization design process.

Constraints within ICT Design:

Expediency is the most common reason given for limiting the time and resources to complete an information systems design in ICT projects. Agile methods (a popular approach to ICT design) reinforce the goal of expediency by limiting participation of the user community in the design process to one or two actors, hampering the essential ingredient of multiple perspectives in cross-disciplinary design. This constraint provides expediency of process but with very limited viewpoints. Lack of inclusion of all the various viewpoints results in silo solutions, frequently resulting in duplicated and incompatible data. This disconnect requires additional software to integrate data from silo systems. Other constraints include the following:

- "The business doesn't know what it wants" is a common refrain in the ICT world. Unfortunately ICT professionals typically don't have the training to help the business with this lack of clarity. This lack of training in collaborative facilitation also bleeds into difficulties that ICT professionals have in working across disciplinary borders.
- The ICT language itself, and the limited knowledge of that knowledge by non-ICT stakeholders, makes it difficult to have useful dialogue between ICT professionals, their clients, and professionals from other domains.
- Software is typically designed to minimize and exclude human interventions. Efficiency rather than effectiveness is the dominant design goal. Human-oriented design is not commonly practiced; and ICT designers do not typically seek to appreciate how the software affects workflow and communications within an organization, since such dynamics are seen as distractions to the more "pure" world of programming.

Constraints within Facilities Design:

Facilities architects, planners, and interior designers are trained to consider task relationships, flow, and work communications in the design process. However, their access to knowledge of these for any given

project is generally limited to observation and interviews with their client about their current work practices, but not necessarily about the design ideas behind those work practices or consideration of desired future work organization. Other important constraints include the following:

- Design criteria for facilities projects are established by the client and often limited to "bricks and mortar" goals in a financial pro-forma for space and cost. These criteria generally use industry standards for space allocation, not taking into account the dynamic nature of the organization and its creative potential to inform the design. Criteria for human relationships, human experience at work and effective work outcomes are typically not articulated explicitly.
- A strict standard checklist-based definition of the facility designer's role and an expectation of the expertise the designer will bring, including liability for the health, safety and welfare of the facility's occupants and the delivery of signed and stamped drawings which are legal documents, is reinforced through contracts and fee limits.
- A facilities design project is usually defined by a program of functions and spaces based on the way the organization currently works, and draws from the experience of the programmer from past similar projects. This process can influence the subsequent design process to replicate past models and can inhibit the exploration of facilities configurations based on emerging Organization and ICT design.

Practitioner-Based Challenges:

Are we our own worst enemies or best partners? If we simply lay all the blame for a lack of more systemic, cross disciplinary approach at the feet of our clients, we are missing the chance to initiate positive change in the area over which we have the most control - our own practices. These self-examinations are complex; as design practitioners in different domains, we have all been taught different "truths" in a different "languages." We vary, for example, in our beliefs about the value of seeking perfection for a first time design vs. planned evolution of a design. As organization designers, we assume the world to be too complex to ever "get it right" the first time, so we emphasize building in the capacity for ongoing redesign. As ICT designers we have been taught that "getting it right the first time" is essential.

Our practices vary on the degree to which our "services/products" are regulated. For example, the drawings produced by a facilities designer must be stamped with the architect's registration number in a process regulated by law. ICT designers and organization designers, while they can be held responsible for the quality of their work by clients, have no such professional regulatory body governing their actions.

Typically, professional designers in all three domains value the *concept* of systemic/cross disciplinary design, but feel that their small efforts at client engagement aimed at bringing useful information about the other domains to the table is already sufficient. For example, all socio-technical design models show

facilities and ICT as key design elements, implying that organization designers have the capability to deal with these elements in an integrated fashion.

Within all three disciplines, many of us have been taught that our discipline is the core and most significant discipline, and therefore it should serve as the umbrella for the other two disciplines. As with most professions, we have little insight into our own siloes in which we practice. Like the fish who has little insight into the water in which he swims, accepting it as "just the way things are" we have difficulty imagining not living in the water of our disciplines. It's the only thing most of us have known.

PART THREE:
STS-D PRINCIPLES as the "Glue" For Systemic, Cross-Disciplinary Design

Fortunately, STS-D (Socio-Technical System Design) principles are a powerful "glue" that can guide, support and integrate collaboration of diverse professionals. These Socio-Technical System Design principles have been developed to serve all three disciplines. These principles represent a major opportunity for moving away from traditional **"siloes of betterment"** into true **"design at the intersection."**

However, when organization designers, facilities designers ICT designers, and their clients explore whether they want to "take these principles on board", they soon realize that this involves more than cosmetics. The application of these principles and processes leads to a paradigm shift in the way we design, collaborate, and bring about meaningful change. With this challenge in mind we have updated and divided the principles two categories, STS High Performance Principles, and STS Design Process Principles - to make their application as easy as possible. We describe these 2 sets of principles below with a caveat… they can be reworded by each "design at the intersection" team in their own language - as long as the core intent is retained!

STS High Performance Principles

STS High Performance Principles serve to guide the choices made by a design team (or perhaps a larger design community) in the design of all structures systems and practices - be they organizational, physical or digital in nature. When designers follow these principles, the organization as a whole is more likely to move toward a state of higher performance. These principles are not "new" to many readers because they are based on Albert Chern's good work, but they bear repeating; this list also contains a few additional ideas in italics which we have found to be highly relevant.

STS High Performance Principles: All design choices should...

- *Ensure informed adherence to all regulatory standards*

- Specify only minimal critical performance requirements
- Optimize social system, technical system *and external stakeholder requirements*
- Ensure that work is Controlled and Coordinated at the level where work is performed through:
    - Boundary Location enabling Self-regulation
    - Authority and Resources that match Whole-task Accountability
    - Multi-functionality built into workgroups
    - ICT that supports the Primary Task/User first
    - Congruent HR and Strategic Management support systems
- Support individual Quality of Working Life for all: ie- elbow room, variety, learning, mutual support and respect, meaningfulness, desirable future
- *Leverage Strengths - organizational and individual*
- *Support process Optimization while also supporting Innovation & Agility*

For example, in the design of the organization's strategic planning system, one option is to leave the work of strategic planning to a few senior executives; another option is to include many more viewpoints in the process. These principles help a design team make the choice for a more inclusive design process, since only one of the options would support the principle that *"work is controlled and coordinated at the level where work is performed."* People cannot "self regulate" without understanding the strategic context within which they are operating, and that understanding comes best from having contributed in some way to the development of the organization's strategic plan.

STS Design Process Principles

The second set of principles is called the **STS Design Process Principles**. Our choices regarding the process of designing (who is involved, how, and to what extent) are just as important as our choices regarding design. STS-D philosophy particularly focuses on the involvement of those who will inherit the new design, and ensures that these end users are engaged in the design process.

STS Design Process Principles: The activities of designing should….

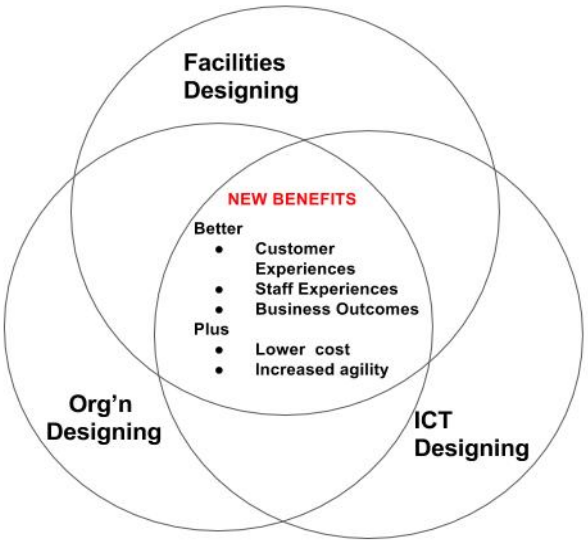
- Start with shared understanding and purpose of the design process
- Invite into meaningful contribution
    - As many of of the people who actually do the work that is being designed as possible
    - Other relevant professionals who bring design content and process expertise (ICT designers, facilities designers and Organization designers)
    - Other key stakeholders with special knowledge
- Enable Conscious Choice among Multiple Options
- Generate implementation "pull" vs top down push

- Ensure Compatibility of Designing, Implementing & End-state
- Utilize positive in-process evaluation & adjustment
- Assume the need for and build capability for Ongoing Redesign

For example, in planning the design process we can choose to form small design teams of "professionals" and representative users/stakeholders, or we can plan to have these small teams themselves design the engagement of much larger groups into what we call communities of design -or anything in between. The options are endless given the new social and digital technologies we have at our disposal.

In choosing among process options, these principles clarify the need to involve not only the traditional suspects such as ICT designers, facilities designers and organization designers, but also the end users as well as other key stakeholders such as finance officers and regulators. All team members, particularly those which might be perceived as adversarial in isolation, will offer valuable perspectives, and the ultimate design solution will be more effective due to their ownership in the process.

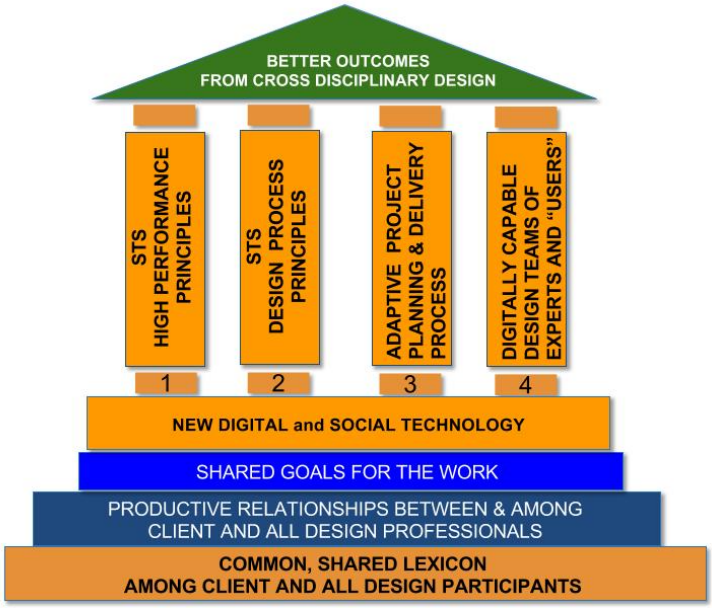
PART FOUR: OPPORTUNITIES



Given that organization redesign is often the purview of Human Resources, and facilities redesign often the responsibility of the corporate planning group and ICT the domain of the Information Systems department, the possibility of cross disciplinary collaboration has been difficult.

Fortunately, clients continue to seek increasingly more comprehensive outcomes from their investments in "designed improvement" -i.e.- better customer experiences, better staff experiences, and better business outcomes. For many, the need to lower costs and create increased agility in responding to unforeseen challenges is also driving a receptivity to new ideas, including systemic, cross-disciplinary design. Both clients and practitioners are beginning to capitalize on the opportunities inherent in ***"designing at the intersection"*** of ICT, Facilities, and Organization design. The possibility of real and specific benefits comes into view. (see diagram below).

In order to reap these benefits, we must begin to envision a framework for cross-disciplinary design that is built on a common foundation and supported by core principles and processes. The image to the right shows our current conception of such a framework. Below we describe in more detail some of the elements.



STS DIGITAL FRAMEWORK For CROSS DISCIPLINARY DESIGN

Building upon a Solid Foundation

Without a strong foundation, the STS-D Digital Framework falters. The vital components of this foundation include a common language, productive relationships, shared goals, and new tools for digital and social technology.

***Common Shared Lexicon**:* At the very most foundational level of this framework is the need to have one set of shared words with shared meaning across ALL team members. Developing this lexicon for a team is an iterative process; however, through regular dialogue, goodwill, a spirit of real curiosity, and a good sense of humor and modesty, it is possible for a shared lexicon to emerge through "doing the work" together.

Productive Relationships and Shared Goals: Both productive relationships and shared goals require a shared lexicon, but they can also be significantly enabled by use of Organization Development practices such as as team building and role/mission/goal clarification activities.

New digital and social technology: The possibility of achieving better outcomes from investments in "designed improvement" is becoming more real as the traditionally separate practices of facilities design, ICT design, and organization design gain access to both digital and social technology that might enable cross-discipline collaboration in new and hopeful ways.

New digital technology that facilitates collaborative design includes:

- Social Media: Social media applications such as Google Docs, FaceBook, Twitter and even e-mail enhance the means to collaborate in a domain neutral environment. Non technical intuitive applications/programs ensure a low barrier to entry while automating the organization, distribution and manipulation of content.
- Algorithms: Project management algorithms enable team collaboration through automation of the complexity of task management, dependency management and collaborative communications. Tools such as these enable simultaneous independent and integrated project management.
- Ubiquitous Computing (mobile cloud): Mobile devices and cloud computing provide the infrastructure to collaborate anywhere and anytime. Access to digital content, (including text, image, voice and video) through cloud based computing and storage enable new levels of collaboration in real time and facilitate knowledge sharing asynchronously.
- Internet of Everything: Sensor data, intelligent devices and wearable technology provide data that enables collaboration without action on the part of the participants. Data from these devices enables enhanced communications.

New social technology for engaging large groups as collaborative members of a design community includes:

- Free or low cost collaboration technology such as Google Docs, Survey Monkey, Zoom, Dropbox
- More sophisticated and costly collaboration technology such as IBM's "Jazz"
- Search Conferencing
- World Cafe
- Open Space Technology
- Appreciative Inquiry Innovation Summits, Innovation Studios and forms of engagement

Two excellent resources with in-depth analyses of when, where and how to use these social technologies are *The Change Handbook: Group Methods for Shaping the Future* - edited by Peggy Holman and Tom devane, published by Berrett Koehler; and *The Handbook of Large Group Methods: Creating Systemic Change in Organizations and Communities* - Barbara Benedict Bunker & Billie T Alban, published by Jossey-Bass.

Reaching Higher - The Pillars of the Digital Framework

With a solid foundation for collaboration in place, the four critical pillars of the STS Digital Framework enable designers to move from the realm of ideas into the world of practice.

The first pillar, **STS High Performance Principles**, serves to guide groups through choices regarding the design of structures, systems, and practices be they organizational, digital or physical. The second pillar, **STS Design Process Principles**, focuses on guiding our choices with respect to input from a wide variety of perspectives, and empowering people to design their total workplace – organizational, physical and digital - in ways that are meaningful and effective for them. These two pillars were described in more detail in section three of this paper.

The third pillar, the **Adaptive Project Planning and Delivery Process,** must offer strategies for navigating project complexities, difficulties, and differences of opinion. Sometimes project challenges lead to unforeseen opportunities and greatly benefit the design; sometimes project challenges engender negativity. In either case, these challenges require an early sensing capability and mechanisms to help the many actors involved achieve win-win solutions.

An Adaptive Project Planning and Delivery Process must ideally allow the three disciplines easy views of their interdependencies and accountabilities, and provide a common lexicon for easily interchangeable, interoperable data across disciplines. The process must also be both reflective and responsive; emergent and adaptive. The process of planning, design and delivery must be nimble enough to respond when the world around the project shifts.

Such a process would draw heavily from the practices of:

- The Learning Organization - a model which shows us how organizations as a whole can learn not just individual people
- Appreciative Inquiry - which helps with conducting progress reviews which energize cross disciplinary adaptation rather than resistance to change
- Complexity Science - which gives us concepts and models to better understand the "new normal" best described as iVUCA (interconnected, volatile, uncertain and ambiguous)
- Design Thinking - which is so terribly helpful in emphasizing the value of and tools for "learning fast and learning cheaply)

The fourth pillar, **Digitally Capable Design Teams of "Experts" and "Users,"** encourages better digital capability on the part of design team members to support better involvement in designing organizations, facilities. "Users" (a category which includes everyone who is a member of any part of the organization) , require basic computer literacy skills, both for their everyday work and for their contribution to the design process. Such digital capability includes the ability to use laptops or tablets at a basic level, and tools such as email, MS Office, and common collaboration tools such as Zoom, Skype, Dropbox, search engines, and Google Docs.

These skills are easily learned with a few hours of practice; digital capability must, however, also include data literacy. Being literate in the consumption and production of data is key. This is a leading edge for many "users". But why is data literacy important?

Our future will be the ubiquitous datafication of everything. This is the new way of constructing our social reality – not through technology, but through DATA! Knowledge work, which is dependent on data, is a core activity in most organizations today, and data has become the language of business. Even routine work in traditional manufacturing and service delivery is increasingly automated and algorithmically controlled. Improving knowledge exchange is key to improving outcomes for the people and business, and thus must be factored into systems design. ICT systems design itself is increasingly data centric, and requires the adoption of techniques from linguistics and human communications and concepts such as ontology, taxonomy and pragmatics. The key lies in the evolution of data standards, techniques for integrating data, and the development of common data models for knowledge creation and sharing. These are already available. Two examples of the successful use of data:

- The National Cancer Institute has created and implemented research data standards for worldwide collaboration.
- The Federal Government's National Information Exchange Model (NIEM) helps government and private companies share data to improve performance and services.

PART FIVE: THE STS-D DIGITAL FRAMEWORK SOLUTION

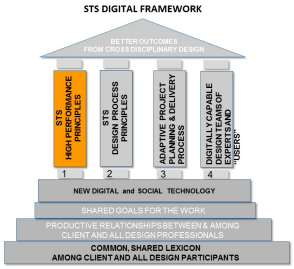
The **STS Digital Framework for Cross-Disciplinary Design** allows all three professional disciplines to work independently, focusing on their specific design domains but aligned around STS design principles. Digital planning and coordination mechanisms enable each professional to work with others on different stages while making mutual adjustments in real-time to ensure overall collaboration.

The framework could enable design teams and their clients to achieve new levels of outcomes, but given the challenges to true cross-disciplinary design (*as experienced directly by the authors in our work together!*) **how is this to be accomplished?**

Anyone can be a CATALYST. Ultimate responsibility for assembling the cross-disciplinary team lies with the client, but the idea and suggestion can come from anyone. Active leadership of the work is typically within the consultant team. Many facilities designers and organization designers are skilled facilitators who are experienced in bringing together diverse groups of stakeholders of all sizes. These design professionals know how to engage both the team and the client to determine shared goals for the work and establish criteria for success. Ideally leadership of this process comes from within the team. Leading a cross-disciplinary team towards the ideal STS digital framework while giving all shareholders an equal voice calls for a commitment to an Adaptive Project Planning and Delivery Process as described above.

Emerging Practices

A number of practices and capabilities emerging within each of the four pillars present a hopeful sign for bringing the STS Digital Framework for Cross Disciplinary Collaboration to life. These are described below for each pillar and for each domain:



First Pillar: STS High Performance Principles (principles guiding design choices vs. guiding the process of designing)

ICT Design:

New tools to create a common language, and elicit/explore alignment and diversity:

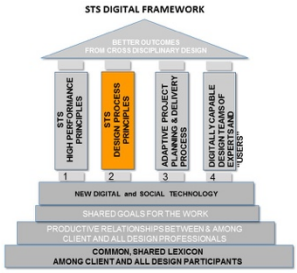
- **Protégé:** tool for development common language and data
- **Zachman Framework:** represents the intersection between two historical classifications that have been in use for literally thousands of years. The first is the fundamentals of communication found in the primitive interrogatives: What, How, When, Who, Where, and Why. It is the integration of answers to these questions that enables the comprehensive, composite description of complex ideas.
- **Archimate:** a modeling language for ICT enterprise architecture which enables enterprise architects to describe, analyze, and visualize the construction and operation of business processes, organizational structures, information flows, IT systems and technical infrastructure.
- **Business Motivation Model:** an ICT enterprise architecture tool that helps to develop and manage business plans. BMM enables the identification of core motivating factors,provides a graphical representation of business plans, and shows how the factors are integrated.

Organization Design:

- **Design Process vs Design Content:** We are beginning to better understand the difference between principles that guide the process of designing (who should be involved, how, and when) from principles that guide the design choices (such as reward systems that incentivize team working vs. individual performance).
- **Integrating the best of other fields of practice:** We are beginning to integrate into our design principles evidence from other fields such as positive psychology (making sure we design work systems that leverage strengths).
- **Explicit acknowledgment of the need for flexibility and adaptability as design requirements.** We now have design principles that speak to the iVUCA (interconnected,volatile, uncertain, complex, and adaptive nature of our world).

Facilities Design:

- **Patient Centered Medical Home**: With recent and on-going healthcare reform in the US and Canada, a new typology has emerged for primary care clinics where the spaces are designed to "facilitate partnerships between individual patients, clinicians, and family." The Center for Health Design provides insights into this emerging design practice, and the ways that the facility design can support "individualized care (that is) is designed around patient needs to increase care coordination and communication between providers and patients, and enhance overall quality."



Second Pillar: STS Design Process Principles (principles guiding the process of designing vs. guiding design choices)

ICT Design:

Methods to Integrate Stakeholder Viewpoints

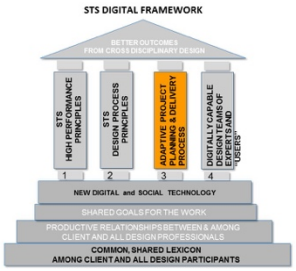
- Utilize Value-Sensitive Design (VSD**)**: VSD provides a "theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process"
- Let enterprise architects and stakeholders view different parts of an ICT enterprise architecture according to their responsibilities and interests, by categorizing models with ArchiMate Viewpoints.
- Utilize social media for quick sharing of viewpoints & transparency of action.

Organization Design:

- **Digital Social Technology:** We are becoming more comfortable and competent with the use of digitally-based tools for facilitating engagement of diverse stakeholders in the design process across borders of time and geography. Examples of these tools include specific free or low-cost tools such Zoom, Google Docs, Survey Monkey, chat rooms, social media, and intranets. New software such as IBM's Jazz lets people brainstorm and then evaluate each other's ideas, remotely.

Facilities Design:

- **"Design Thinking"**: This approach to product design has had an influence on designers of facilities - especially large complex facilities like hospitals - starting with empathy for the context of a problem (from the point of view of those who will use the product) and engaging users in the design process. For example, the design practice of **HKS Architects**, as expressed by their CEO Dan Noble.



Third Pillar: Adaptive project planning & delivery process

ICT Design:

- Project management technology facilitates team collaboration and coordination of interdependencies, reducing overhead and time needed for coordination of tasks and deliverables. Examples include Microsoft Project.
- Digital voting mechanisms allow participants to view value consensus for quick decision making . Examples include Direct Polling.

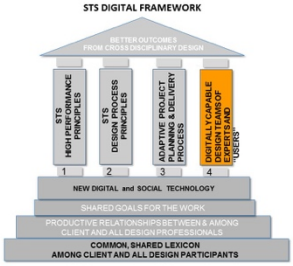
Organization Design:

- **Dynamic Appreciative Evaluation** combines the power of stories and the rationality of numbers with design thinking and the lessons from positive psychology, ensuring that complex multi-stakeholder projects are not just "meeting schedules" but are actually able to sense and adapt to shifts in the business and organizational environments within which the project is taking place.

Facilities Design:

- **Integrated Project Delivery Example:** IPD is a step toward collaboration, but only a partial solution. IPD integrates the team for the design and construction phases, but the team is still fragmented in the financial and organizational planning before design, and in the activation and operation that follows construction. The AIA conducted an extensive case study in 2010.
- **Multidisciplinary Design Team example**: An emerging solution can be found in the Center for Health Design's "Safety Risk Assessment Toolkit" that defines the roles for collaborative engagement of a multidisciplinary team through the entire project.

- **Target Value Design example:** A hospital design & construction project used Lean/IPD methodology to support a Target Value Design approach. Research conducted by CADRE and Texas A&M noted that the biggest advantages for Lean IPD are:
    - *Collaboration, team engagement and working towards common goals*
    - *Building relationships*
    - *User engagement and user buy-in*
    - *Learning & Education (of both the design teams and the larger community)"*



Fourth Pillar: Digitally-capable integrated design teams experts and users.

ICT Design:

Teams can work concurrently on design using ICT modeling tools such as the Universal Modeling Language (UML). These tools facilitate the integration of:

- Concurrent integrated design - teams working independently on data designs that are subsequently integrated into a common data model
- Multi-stakeholder teams in data and software design

Organization Design:

- **Digital Collaboration Technology:** Organization designers are becoming more comfortable with and competent in, combining their traditional facilitation competencies with the use of digitally based tools for facilitating engagement of diverse stakeholders in the design process - across borders of time and geography. Examples of these tools include specific free or low cost tools such Zoom, Google Docs, Survey Monkey, as well as Chat Rooms, various forms of social media, intranets, software that lets people brainstorm and then evaluate each other's ideas, remotely… such as IBM's Jazz etc.

Facilities Design:

- **Integrated Collaborative Teams Example:** Design teams that use tools like "GoogleDocs", "Base Camp", "MindJet", are able to share information in real time; design teams who use BIM software like "Revit" are more likely to succeed when they are connected in real time with digital communications instant messaging tools like "Spark."

PART SIX: CONCLUSIONS

This paper comes out of our own experience of the past year in learning to communicate and collaborate across our domains of design. Regular dialogue, goodwill, a spirit of real curiosity, and a good sense of humor and modesty are important in our shared experience. We also found, through creating a shared understanding of the STS principles, that we shared values and a vision of better practice. This vision was to better serve our clients and end users through giving up some degree of autonomy, thereby gaining a greater benefit for all.

When we "design at the intersection," we realize powerful benefits to the client organization and the people within it. People with diverse areas of expertise are more effective when they can collaborate easily; digital technology now exists to enable such collaboration. Enabling participation of "end users" in a more meaningful way is equally important, and we now have social technology to do that. However, designing based on STS Principles is at the core of this work, and as such, these principles are the glue that holds us, and this work, together.

To move forward with this idea of systemic cross disciplinary design (aka "designing at the intersection") we need more pioneers - both clients and design practitioners who are willing to work together to overcome the challenges and to seize the opportunities that lie ahead. We also need to develop and test the common lexicon which we see as so important

Lastly, we need feedback, from readers of this paper and from applications of these ideas in the field. Please contact us with your ideas and experiences

Thank you.

Bernard Mohr, Organization Design. Email <bjmohr@Innovationpartners.com>
Richard Ordowich, ICT Design. Email <richord@comcast.net>
Ron Smith, Facilities Design. Email < RonSmith@LS3P.com>