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# **CENTRAL TEXAS DIGITAL CONVERGENCE ASSETS IN A GLOBAL CONTEXT**

Digital Convergence Initiative Conference  
Texas State University  
San Marcos, Texas  
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# Overview

1. Digital Convergence Leaders
2. Regional Inventory
  - Defining digital convergence
  - Identifying Waco-Austin-San Antonio digital convergence technology assets
  - Create options for exploiting the digital convergence opportunity

# 1. Digital Convergence Leaders

## US DC Centers

- New York City
- Washington DC
- Central Florida
- San Francisco/Silicon Valley
- Los Angeles
- San Diego
- Phoenix
- Denver
- Las Vegas

## Global DC Centers

- South Korea
- Finland
- China
- Taiwan
- Sweden
- Denmark
- Germany
- UK
- Israel
- Malaysia
- Japan



# San Diego

- Well established biotech, telecom, and defense industries
- History of regional collaboration through organizations such as San Diego Association of Governments, SD Telecom Council, UCSD CONNECT

High Tech Industry	1,400 firms ; 160,000 workers
High Tech Sectors	Defense, Aerospace, Life Science, Biotech, Telecommunications, IT, Video Gaming, New Media, Educational Technology
Telecom	300 firms, \$200 billion
Bio/Medical Tech	55,600 workers, \$5.8 billion
Defense/Aero space	24 firms, 26,103 workers
Military Personnel	14 installations, 129,743 personnel
Defense Spending	\$13.6 billion (2002)

# Central Florida

- Relatively new technology clusters emerged from creative industries, NASA, and defense.
- Aggressive, dynamic cross sector relationships established through the Florida High Tech Corridor Council.

High Tech Firms	2,200
High Tech Workers	235,000
High Tech Exports	\$8 billion
High Tech Sectors	Defense, Aerospace, Homeland Security, IT, Microelectronics, Modeling, Simulation and Training, Video Games, Optics/Photonics, New Media/Film and Medical Technologies
Modeling, Training & Simulation	171 firms, 10,726 workers, \$750 mil. payroll, \$5.4 bil. sales
Photonics/Optics	145 firms, 9,600 workers, \$3.2 bil. sales
Medical Device	370 firms, 51,000 workers, \$5 bil. sales
Defense-related	Florida- 750,000 workers, \$44 bil.; Orange County- \$3.12 bil.

# Finland

- Distinguished by well-coordinated and research-intensive technology development efforts.
- Extensive R&D infrastructure for both technological and human development.

Population	5.2 million & 1.2 million, Helsinki
High Tech	200,000 workers
S&T and R&D Expenditures	US\$6.3 billion, 3.5% of GDP, 3rd highest globally
High Tech Sectors	Telecom, Biotech, Instrumentation, Microelectronics, Optics/Photonics, IT, Design, AI, Visualization, Aerospace, Health Tech and Educational Technology
Digital Media	1,100 firms
Telecom	6,000 firms, US \$6.7 billion
Bio, Pharma and R&D	Firms: 107; Workers: 8,200 (1999)



# South Korea

- One of most integrated R&D, economic development and public policy environments in the world.
- Goal to be the leading exporter of knowledge-intensive products.
- \$900 million country-wide digital convergence effort for devices, services, and content.

Population	Korea 48,598.175 & Seoul, 10,300,000
IT	1,200,000 workers ; 28,146 start-ups (2001)
ICT Exports	US \$57.2 billion (2003)
High Tech Sectors	Video Games, Telecom, IT, Semiconductors, Broadcast Equipment, Electronic Components, Software, New Media, Animation
Telecom	US \$37.6 billion (2003)
Multi-Media	US\$128.1 million (2002)
Gaming	34,000 workers (2002), Won 27.3 billion (2003)
Software	5,600 firms (2002), US 17.2 billion (2003)
Biotechnology	816 firms, 7,107 workers (2001)



# Digital Convergence Leaders: Themes

- Cross-sector collaboration: government, military/defense, private, academic
  - Joint research
  - Joint tech transfer
- Multi-university cooperation
- Cross-regional collaboration: cities, regions, states, central governments
- Cross-disciplinary research



# Identifying Digital Convergence Assets

## Waco-Austin-San Antonio

- 1500 digital convergence companies
- Key assets in digital convergence cornerstones: IT, telecom, biotech/health science, creative content, military, and defense.
- Substantial entrepreneurship support infrastructure
- State support for tech-based economic development

Population	4,035,000
High Tech Workers	150,000
Military	95,000
Federal Research	\$550 million (2003)
Major Employers	Dell, SBC, Freescale, NSA, IBM, AMD, 3M, L3
US Military	Brooks City Base, Fort Hood, Fort Sam Houston, Lackland AFB, Randolph AFB,
Research Centers	UT Austin, UT San Antonio, UT HSCSA, SWRI, Baylor



# Regional Inventory

- Define digital convergence
- Develop framework for analyzing and understanding digital convergence technologies, processes, and know how
- Map regional resources to framework
- Use map to create technology strategy options for exploiting the digital convergence opportunity

# Defining Digital Convergence

Digital convergence is the coalescence of all the functions for the acquisition, storage, distribution and utilization of all present and future human knowledge, which is characterized by:

- The **digitization** of the full range of data
- The enabling of the data to be used with **increasing ease**
- The **integration** of an increasing percentage of the **data handling systems**
- The **satisfying** of an increasing portion of **customer needs**
- The **integration** of the components of the **value network** to perform new functions
- The **global reach** of data, devices, content, communication and customers



# Digital Convergence S&T Resource Map: Framework for understanding our assets

- Excelling as satisfying customer needs is foundation of all competitive advantage
- Exploitation of technology to excel at satisfying customer needs takes place in four dimensions

Structure = Interconnections between technologies dictates **which** customer needs they satisfy

Capability = Abilities of technologies dictates **how well** techs can satisfy customer needs

Flow = Technology flows among organizations dictates how they are **developed & acquired**

Time = How structure, capability and flow **evolve** forward



digital **convergence** initiative

# Digital Convergence S&T Resource Map

- Completed to date:
  - Complete coverage in Technology Structure
    - All technology paths for digital convergence
  - Medium resolution of Central TX region in Technology Capability
    - Can, and may be expanded in resolution and coverage
- Map can be used to develop technology strategy options
  - Technology strategy options for DCI
  - Support development of technology strategy options by DCI members

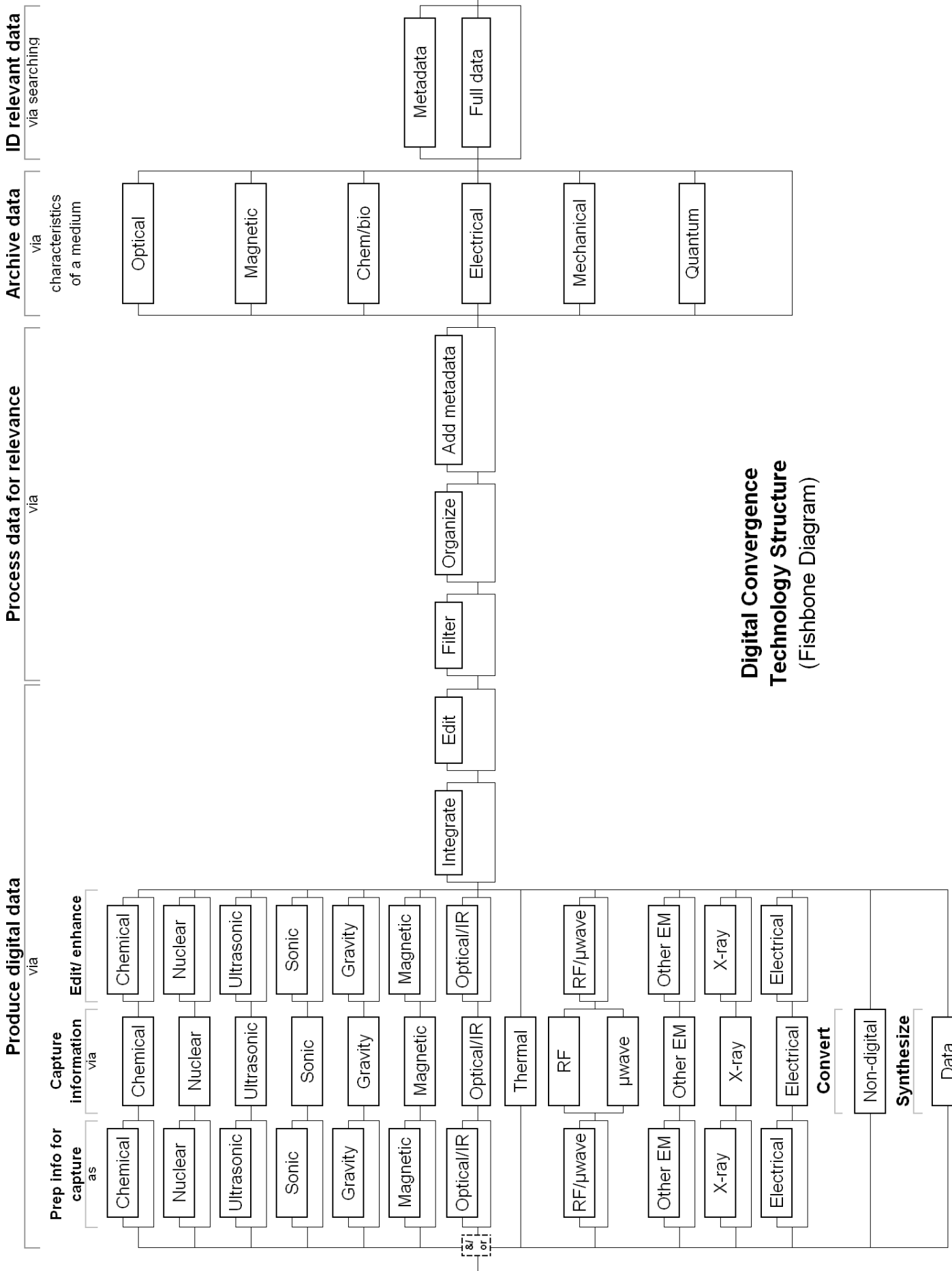


# Digital Convergence S&T Resource Map

## *Technology Structure*

- Defines outer boundaries of digital convergence
- Lays out full set of technology paths within boundaries that could be used to excel at satisfying various customer needs
  - Full range of customer needs
  - Near, mid and long term tech paths
  - Follows unbroken *thread* of data that starts with “Produce digital data” and ends with “User responds to data”
  - Technology paths in terms of function to be accomplished (genus vs. species)
- Customer needs at highest level of aggregation





# Prep data for transmission or transfer

**Compress/ decompress**  
via  
dimension

**Encrypt/ decrypt**  
via means

**Marshal**  
via protocols

**Secure transmission/transfer**  
via deception

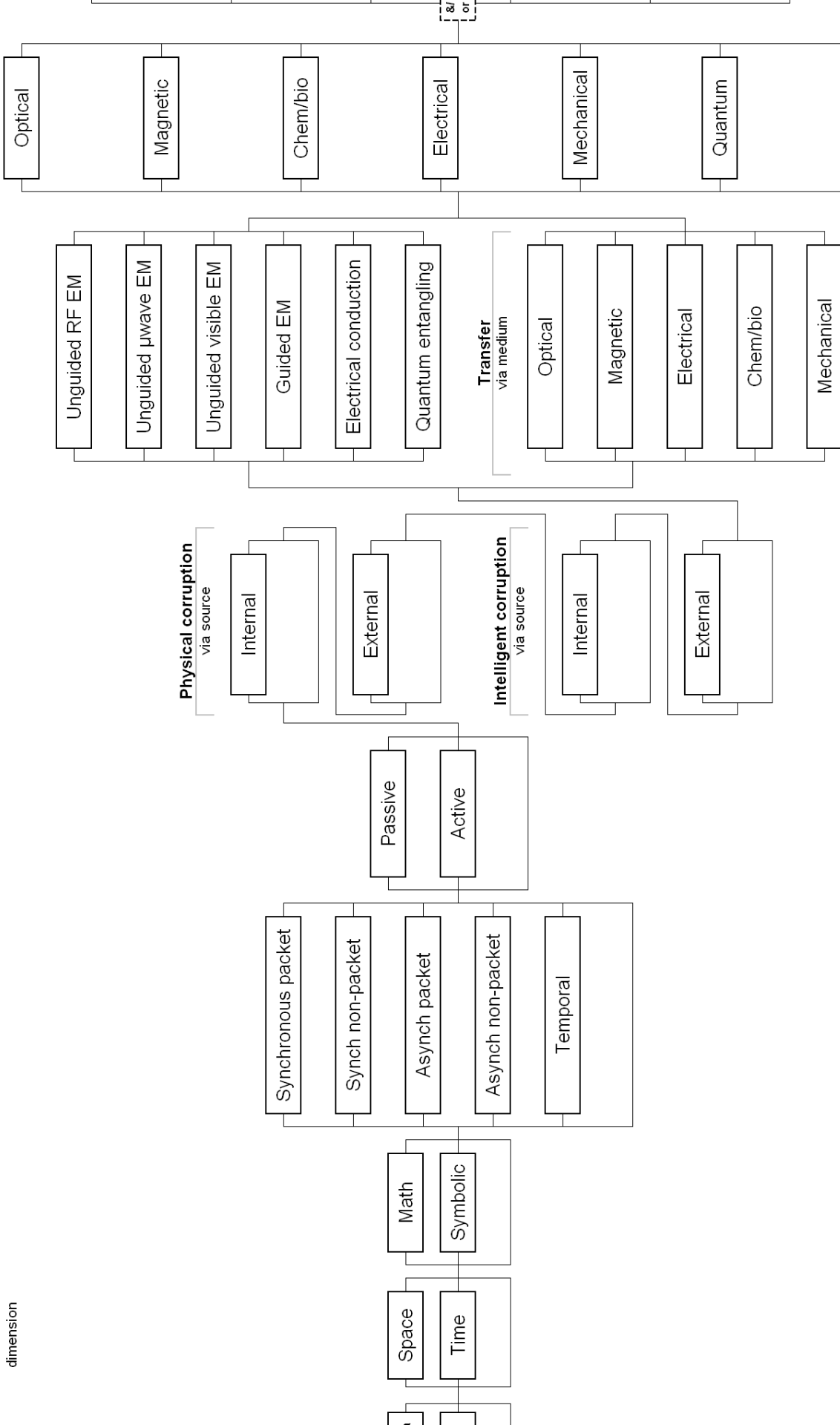
**Stop corruption during transmission/transfer**

# Transmit/transfer data

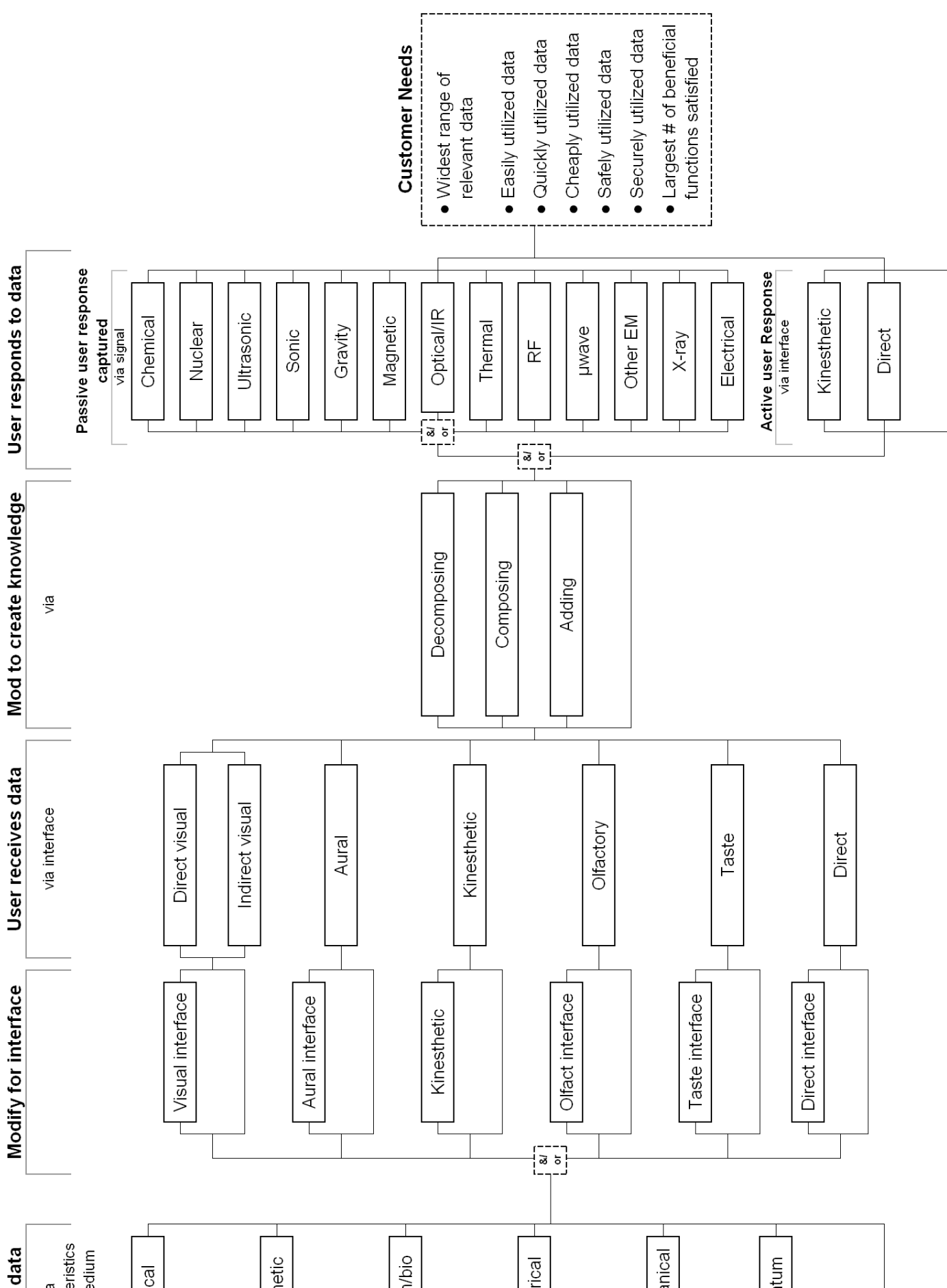
**Transmit**  
via "signal"

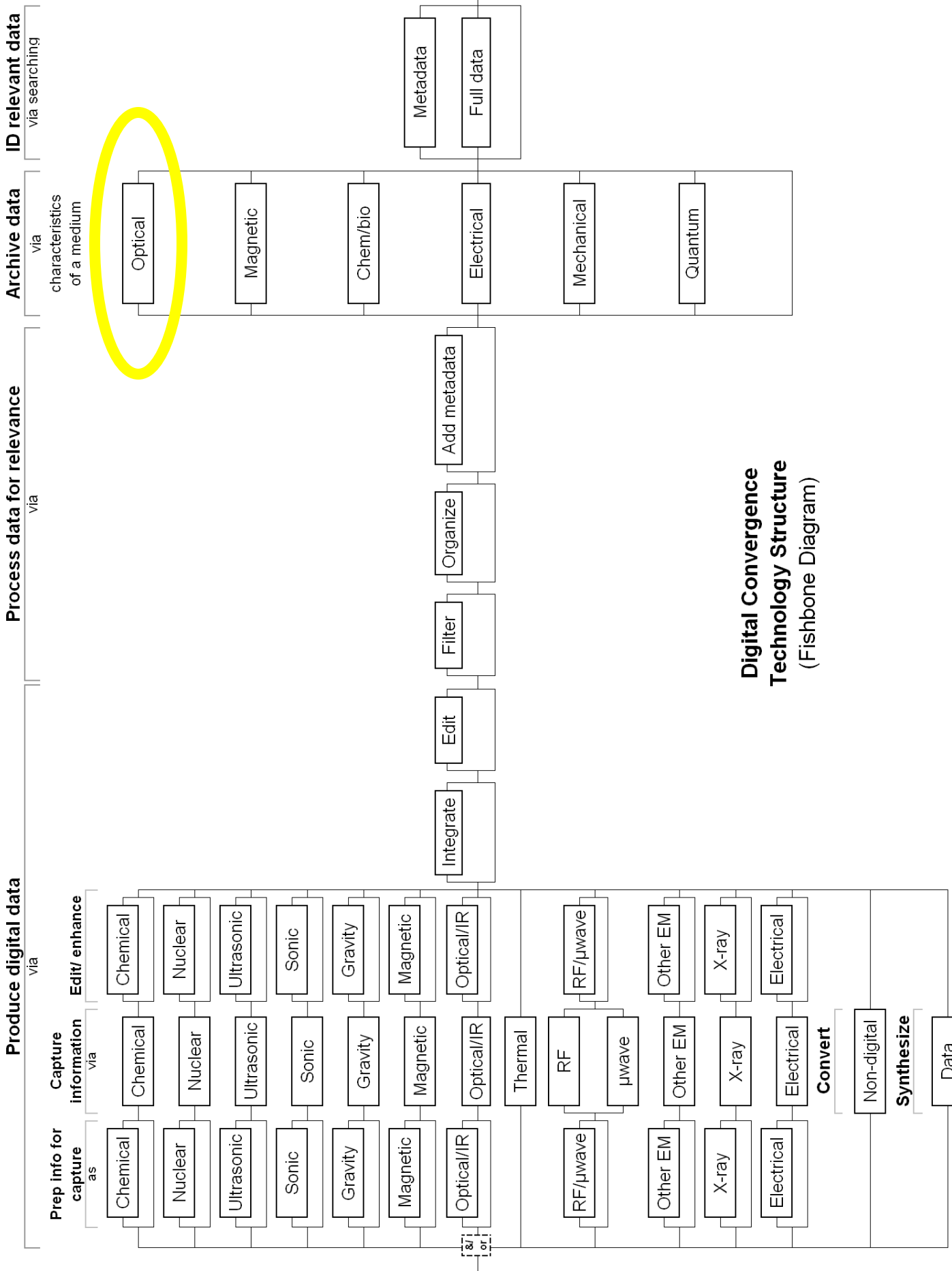
# Store data

via characteristics of a medium









# Optical

- a. **Passive digital** optical medium storage systems
  - 4-7 14,15
  - 18
  - 23
  - 45
  - 46
  - 48
  - Max data rate (I/O rate)
  - Max op temp
  - Max storage capacity/volume
  - Max storage capacity/cost
  - Min seek time/access time
  - Max MTBF
  
- b. **Passive non-digital** optical medium storage systems
  - 4-7 14,15
  - 18
  - 23
  - 45
  - 46
  - 48
  - Max data rate (I/O rate)
  - Max op temp
  - Max storage capacity/volume
  - Max storage capacity/cost
  - Min seek time/access time
  - Max MTBF
  
- c. **Active digital** optical medium storage systems
  - 4-7 14,15
  - Max data rate (I/O rate)
  - :
  - :

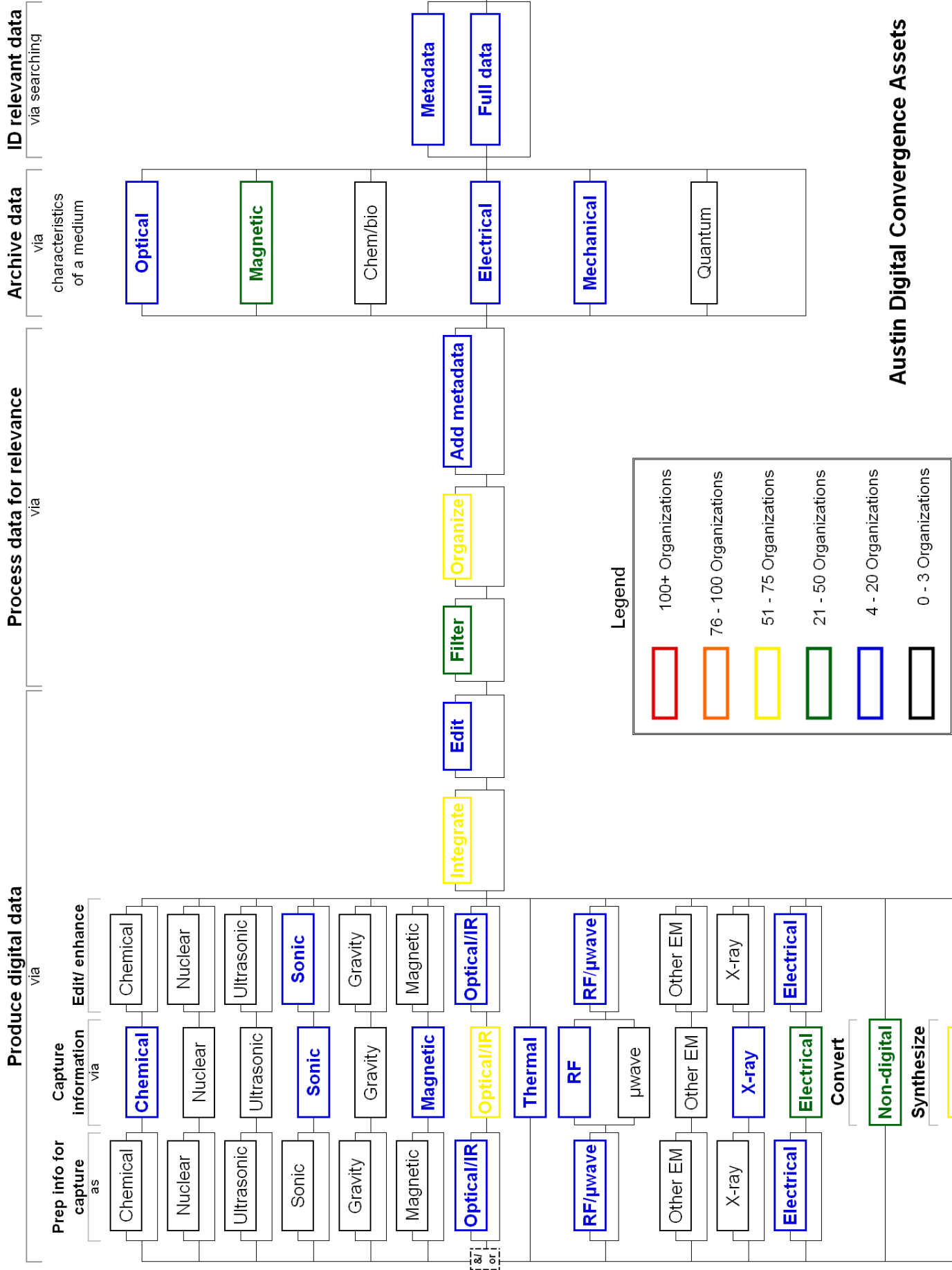


# Digital Convergence S&T Resource Map

## *Technology Capability*

- Medium resolution: identifies regional capabilities
  - By Organization: companies, gov agencies, universities, research centers, non-profits,...
  - By level of development: development, production or utilization
  - By location: Austin, San Antonio, Waco, ...
  - Does not identify external resources or threats





# Austin Digital Convergence Assets

## Prep data for transmission or transfer

**Compress/decompress**  
via dimension

**Encrypt/decrypt**  
via means

**Marshal**  
via protocols

**Secure transmission/transfer**  
via deception

**Stop corruption during transmission/transfer**

## Transmit/transfer data

**Transmit**  
via "signal"

## Store data

via characteristics of a medium

**Space**

**Time**

**Math**

**Symbolic**

**Synchronous packet**

**Synch non-packet**

**Asynch packet**

**Asynch non-packet**

**Temporal**

**Passive**

**Active**

**Physical corruption**  
via source

**Internal**

**External**

**Intelligent corruption**  
via source

**Internal**

**External**

**Unguided RF EM**

**Unguided  $\mu$ wave EM**

**Unguided visible EM**

**Guided EM**

**Electrical conduction**

**Quantum entangling**

**Transfer**  
via medium

**Optical**

**Magnetic**

**Electrical**

**Chem/bio**

**Mechanical**

**Optical**

**Magnetic**

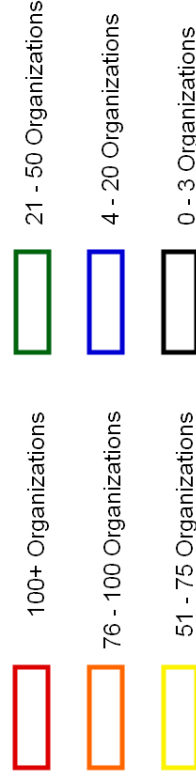
**Chem/bio**

**Electrical**

**Mechanical**

**Quantum**

### Legend

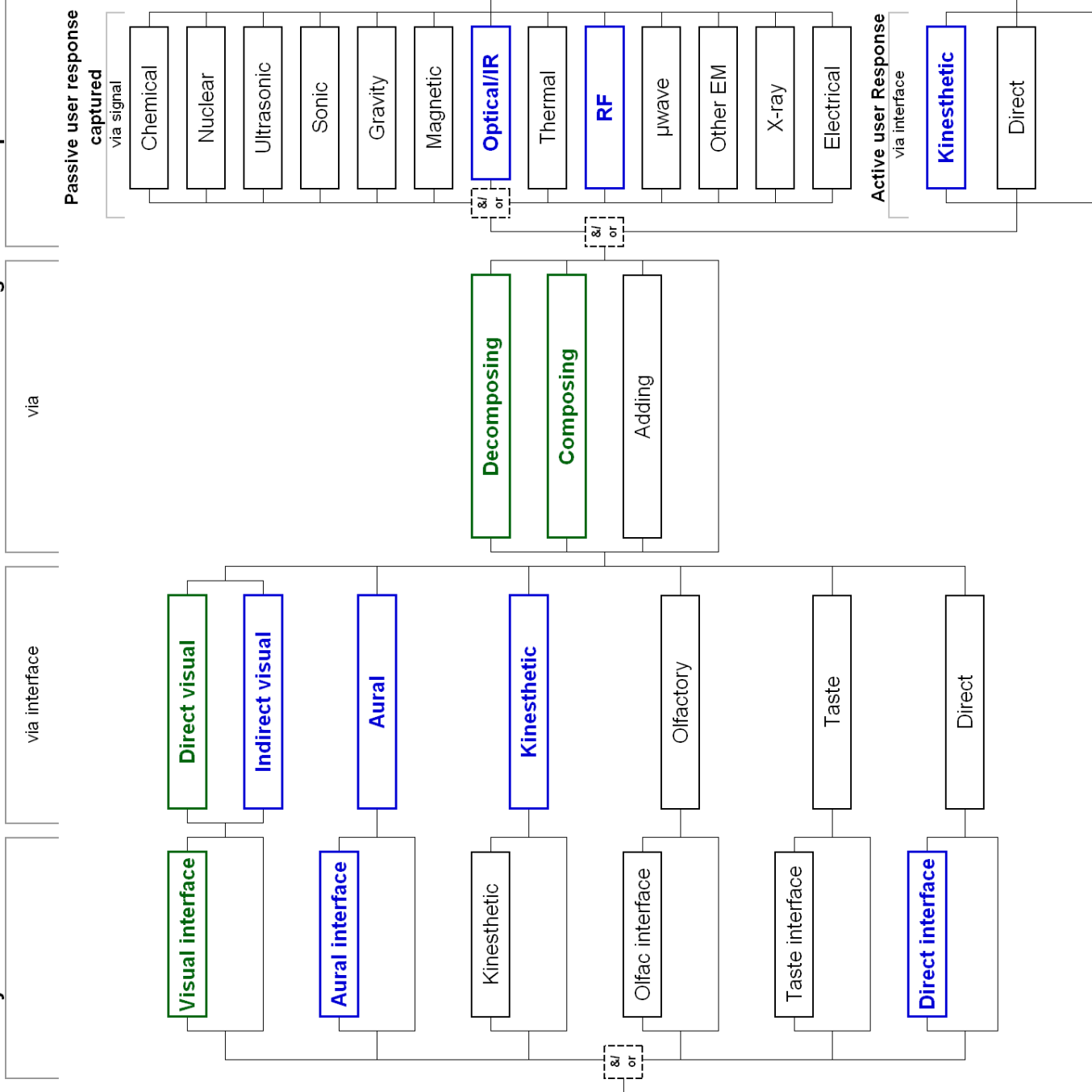


**Modify for interface**

**User receives data**

**Mods to create knowledge**

**User responds to data**



**Legend**

- 100+ Organizations
- 76 - 100 Organizations
- 51 - 75 Organizations
- 21 - 50 Organizations
- 4 - 20 Organizations
- 0 - 3 Organizations

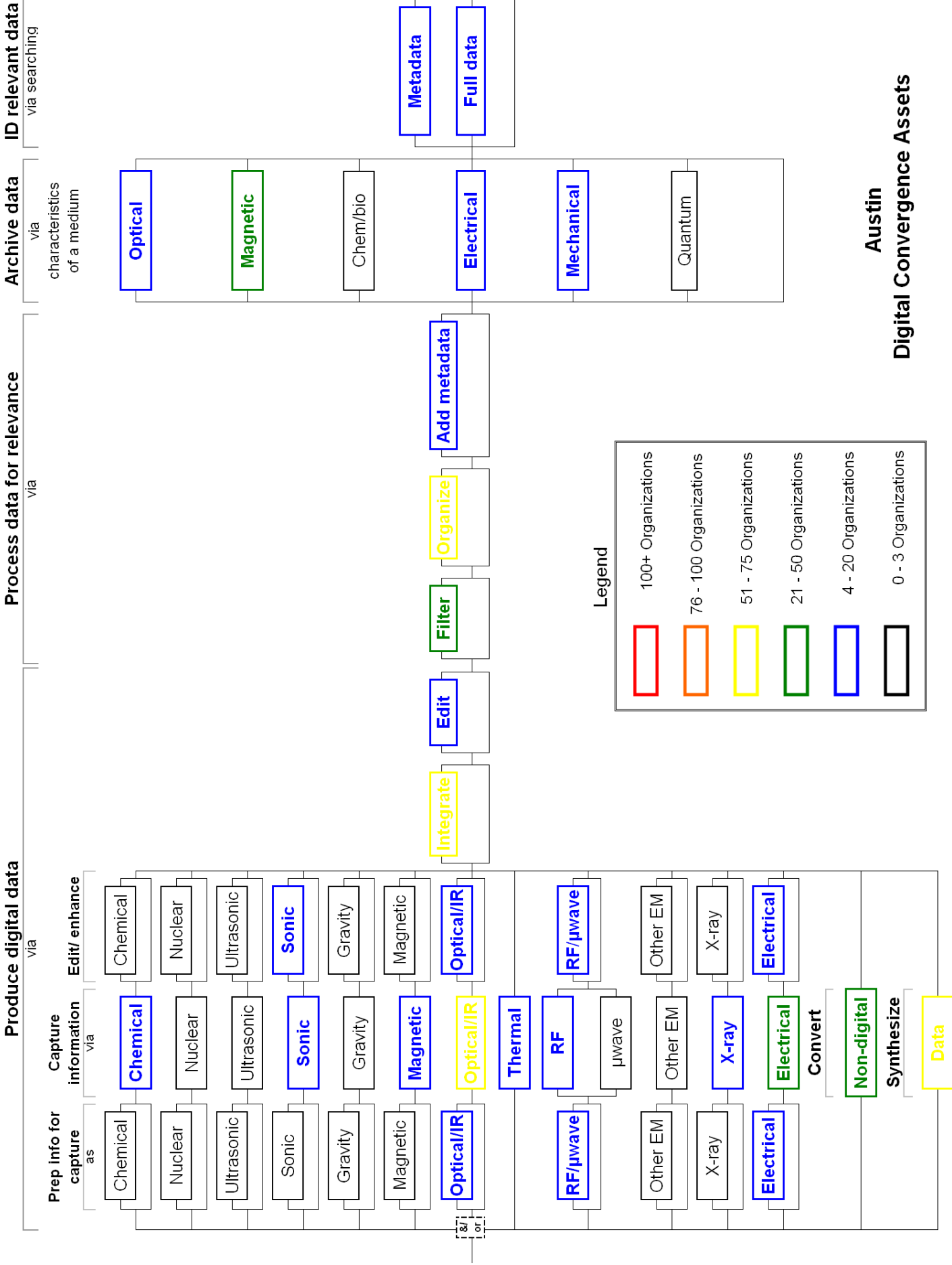
# Digital Convergence S&T Resource Map

## *Technology Capability (cont)*

- No one city in the corridor has the technology assets that the combined corridor has
  - For example, regions has more than twice number of orgs in numerous areas than Austin area alone
  - Austin lacks some technologies altogether
- Corridor capabilities basis for effective tech strategies
  - High level of capability in key areas -- Provides strong core
  - Widely dispersed capabilities -- Provides flexibility







**Produce digital data**

**Archive data**

**Process data for relevance**

**ID relevant data**

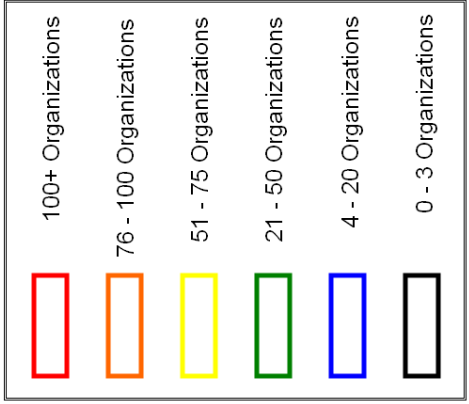
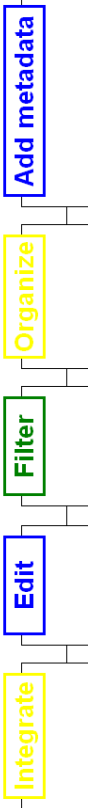
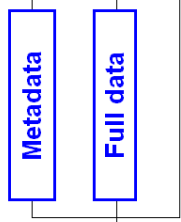
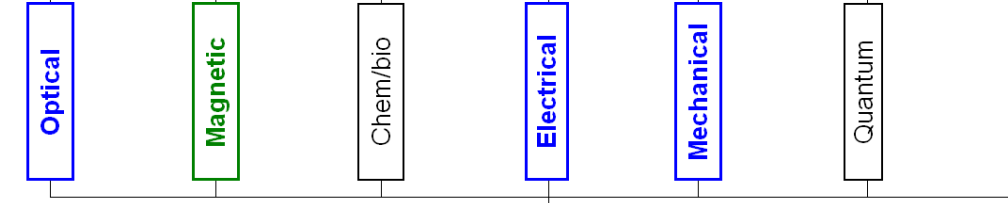
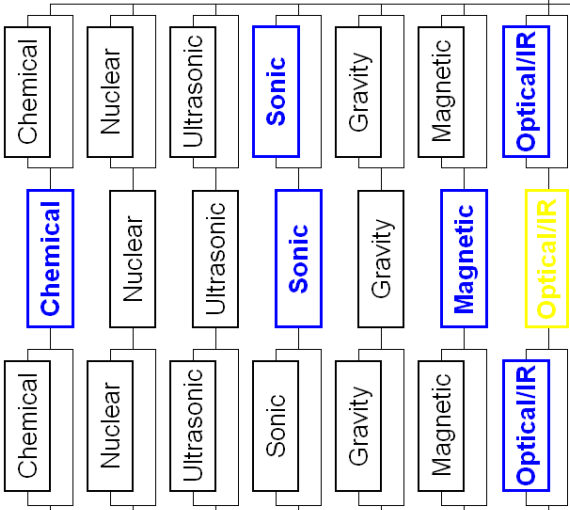
Prep info for capture as

Capture information via

Edit/ enhance

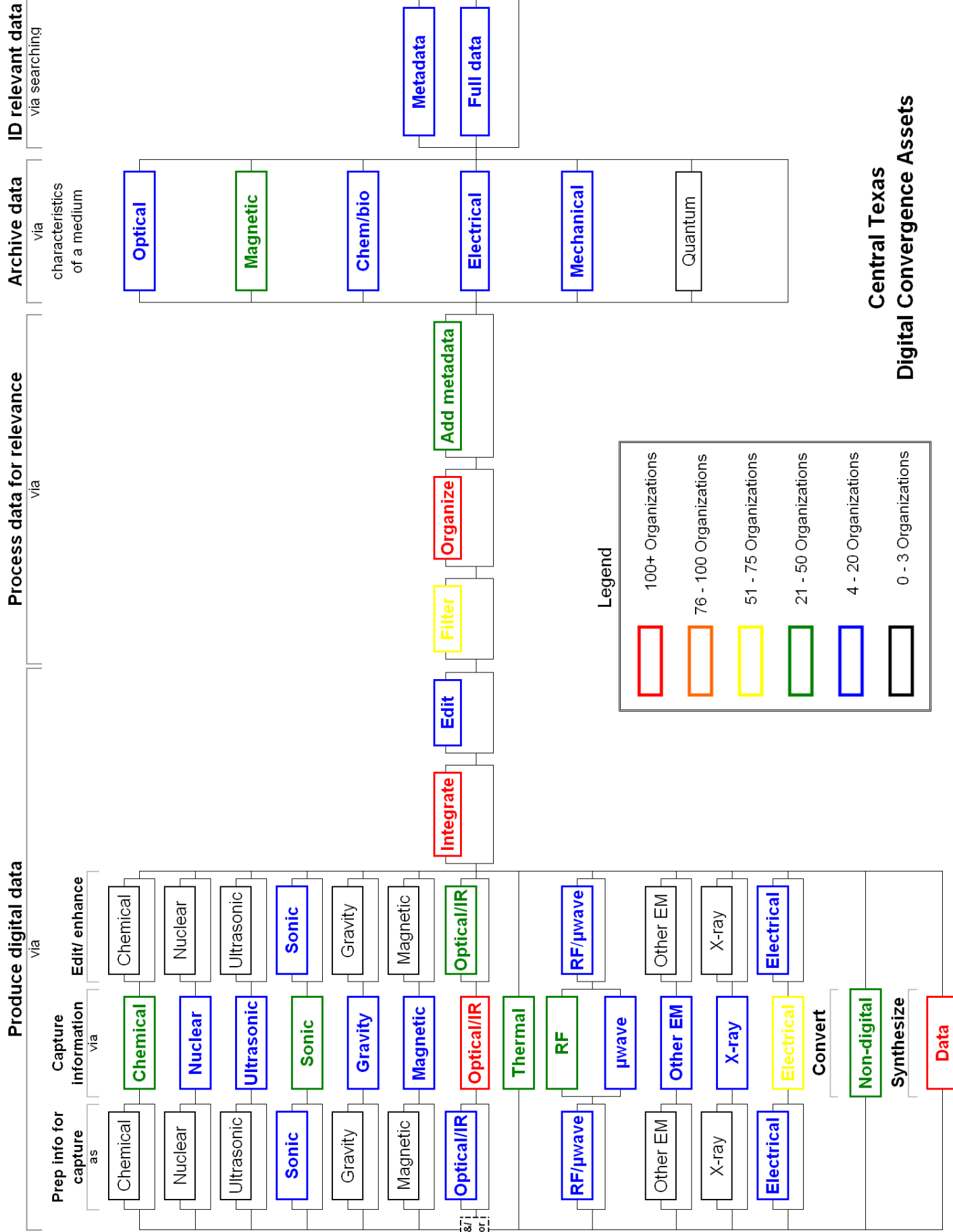
via characteristics of a medium

via searching



**Austin Digital Convergence Assets**

&/ or



**Central Texas  
Digital Convergence Assets**

## Prep data for transmission or transfer

**Compress/ decompress**  
via dimension

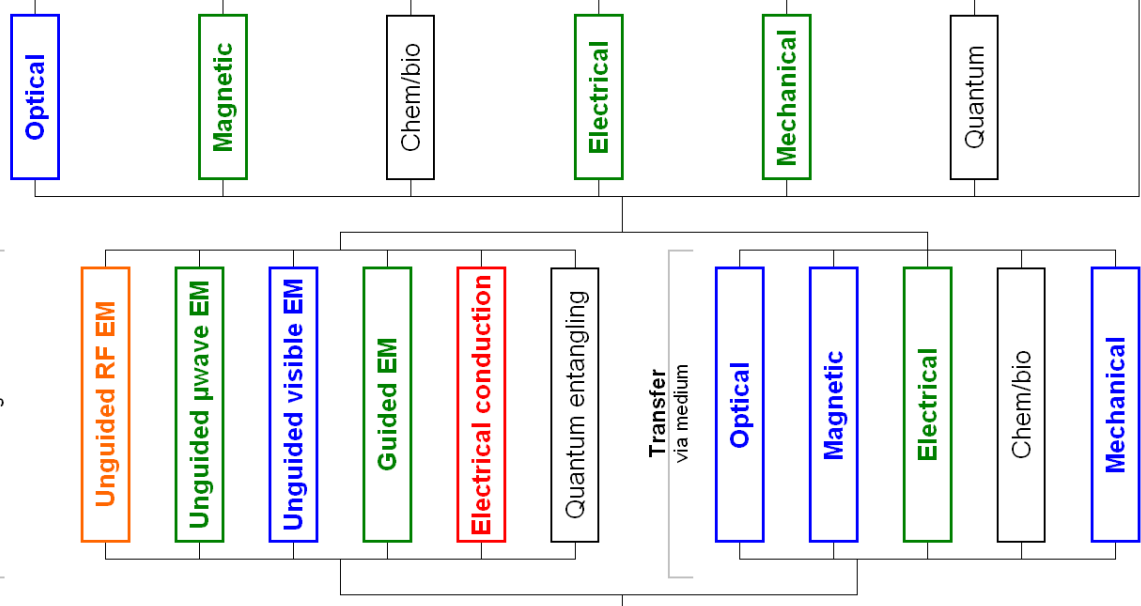
**Encrypt/ decrypt**  
via means

**Secure transmission/transfer**  
via deception

**Stop corruption during transmission/transfer**

**Transmit**  
via "signal"

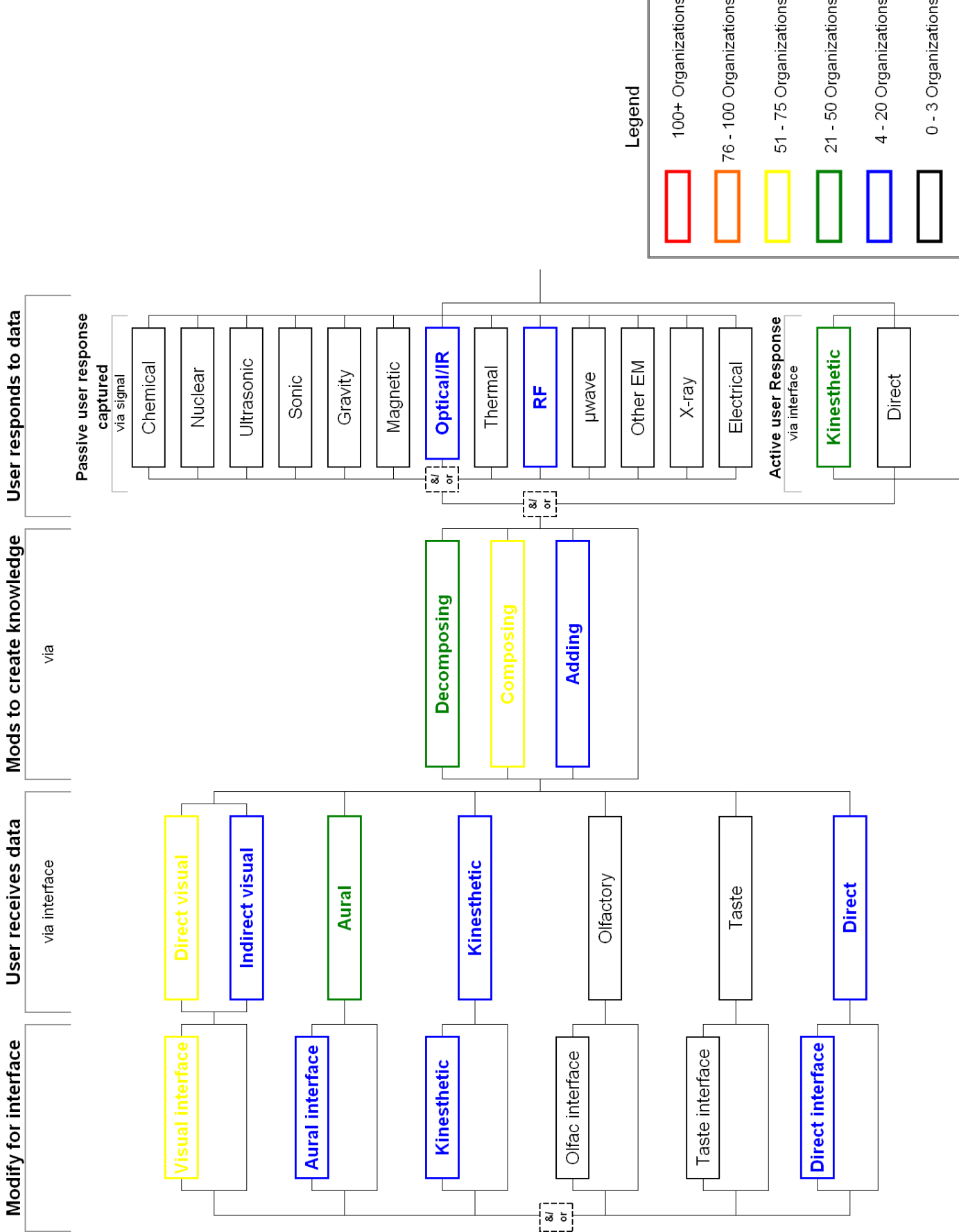
**Store data**  
via characteristics of a medium



## Legend

- 100+ Organizations
- 76 - 100 Organizations
- 51 - 75 Organizations
- 21 - 50 Organizations
- 4 - 20 Organizations
- 0 - 3 Organizations

## Central Texas Digital Convergence Assets



# Using DC S&T Resource Map to Create Strategy Options

- Essence of strategy is to use your strengths against competitors' weaknesses
  - Not a matter of attempting to match competitors' strengths
- Must know our strengths; dictated by two factors:
  - Precisely what tech capabilities are in Corridor (& external)
  - Ways tech capabilities could be fit together to produce what products that will excel at satisfying what customer needs
    - Early stage: Co-research, co-development, consortiums,....
    - Later stage: Suppliers, licensing agreements,.....
- To some degree know competitors' weaknesses
  - What tech capabilities don't they have – Capability “holes”
  - How do these “holes” fit together to prevent them from excelling at satisfying what customer needs



# Example Technology Strategy Option

## *Creating the Data Push for Digital Convergence*

- Potential Tech Strategy thrust for DCI capitalizes on Corridor's strengths:
  - *Data Integration* technologies, and
  - *Data Capture* technologies for entire data spectrum
- Executes **holistic** data generation to create and control data availability push that drives digital convergence
- Capitalizes on competitors' weakness; their focus on:
  - *Data Transmission* technologies, and
  - *User Receives Data* technologies



# Example Technology Strategy Option

## *Creating the Data Push for Digital Convergence*

- Tech strategy executed in three phases

- 1st phase:

- Coordinate capabilities in areas of strengths in *Data Capture* technologies

- Align *Data Capture* techs with *Data Integration* techs

- 2nd phase:

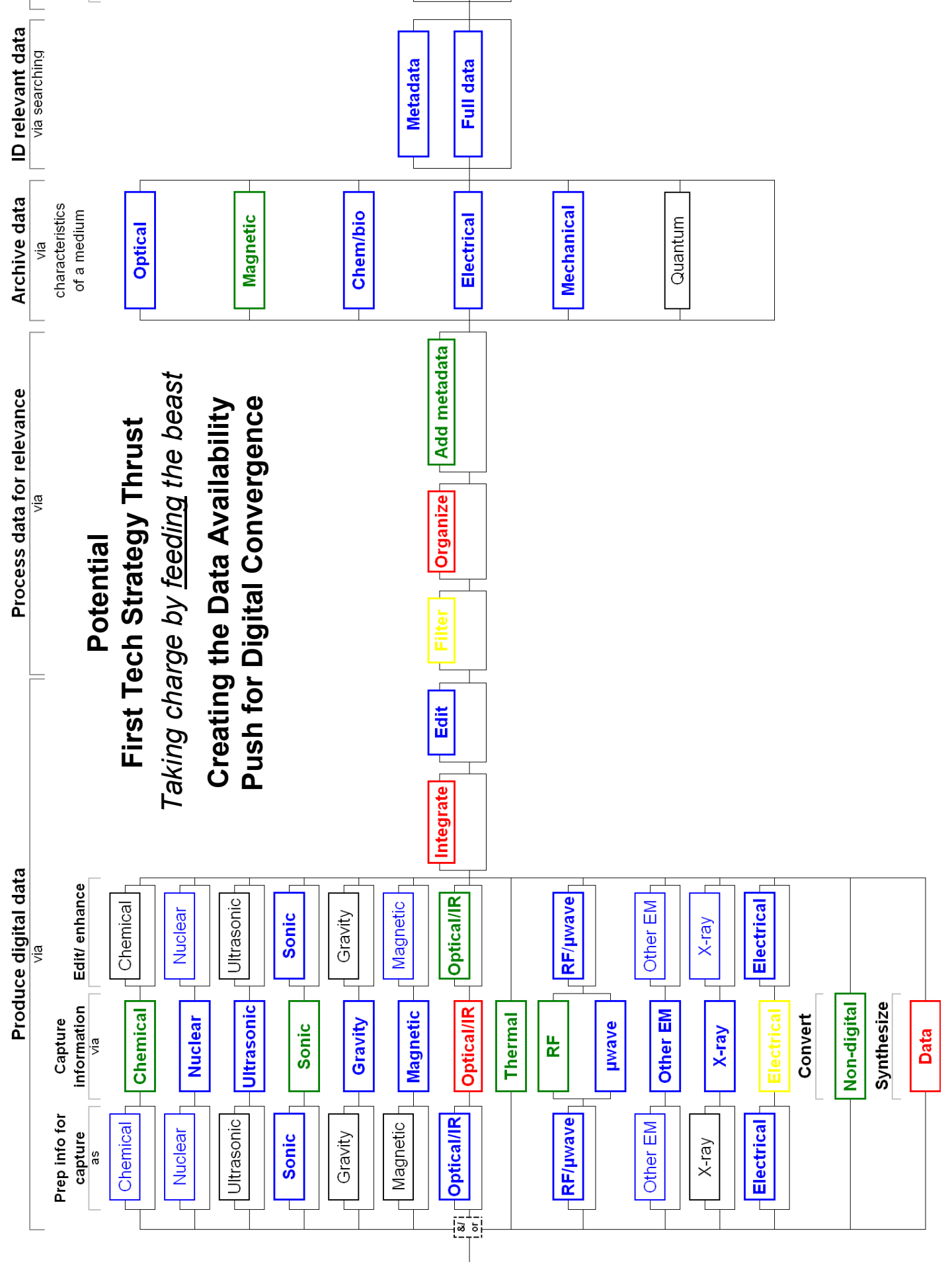
- Coordinate capabilities in remaining *Data Capture* techs

- Align remaining *Data Capture* techs with *Data Integration* techs

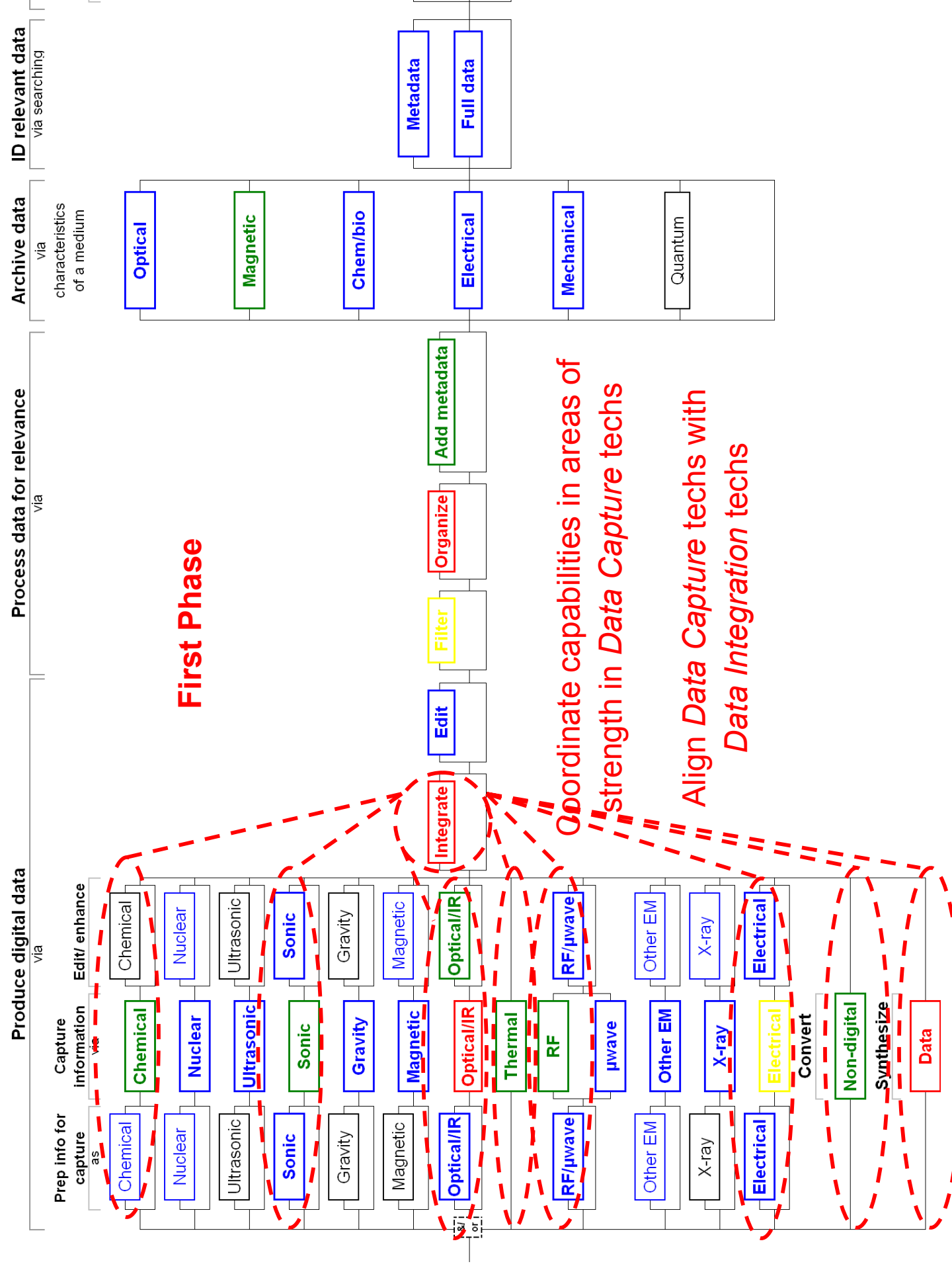
- 3rd phase:

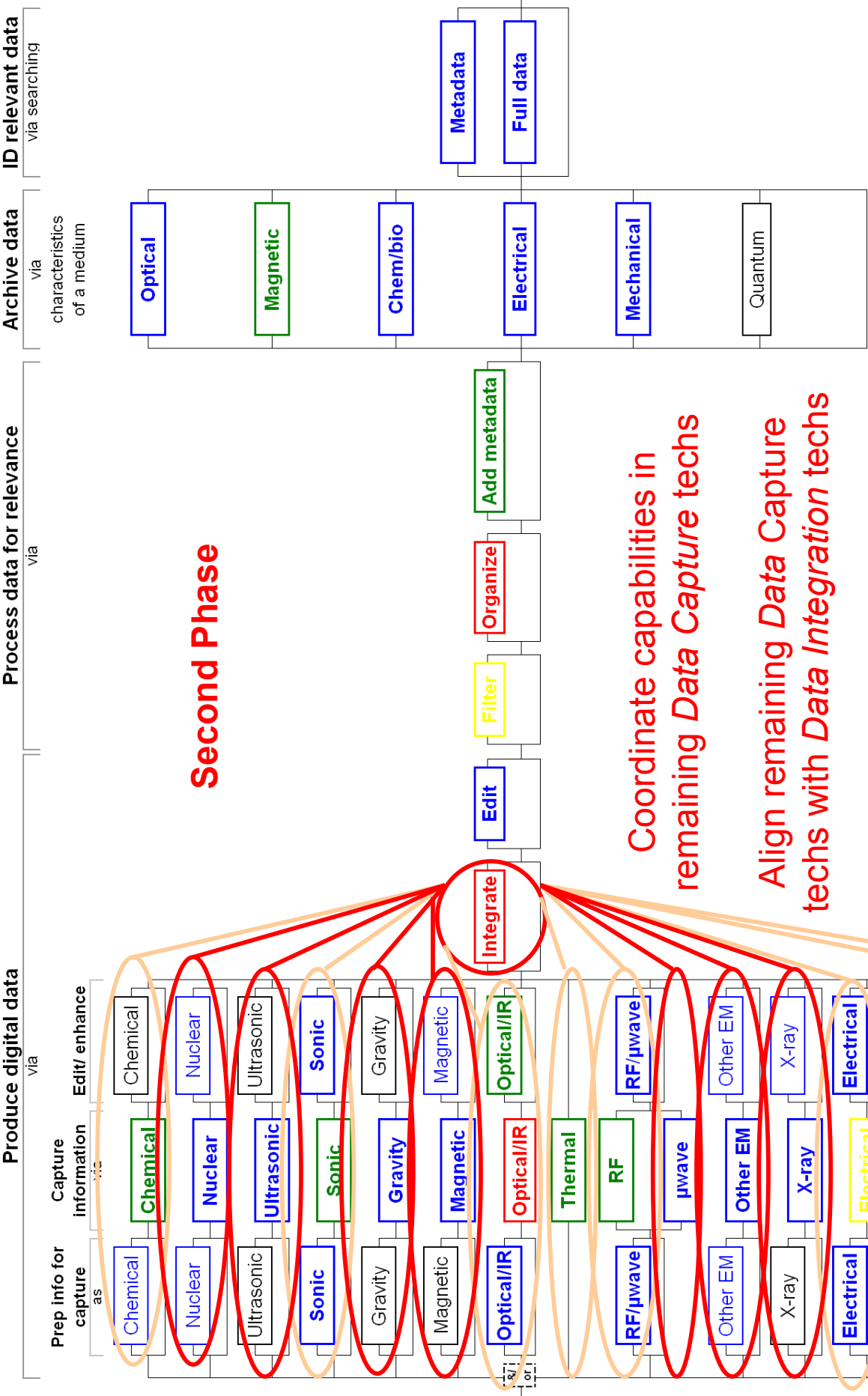
- Coordinate and align *Modify* to create knowledge from data techs with *Data Integration* techs







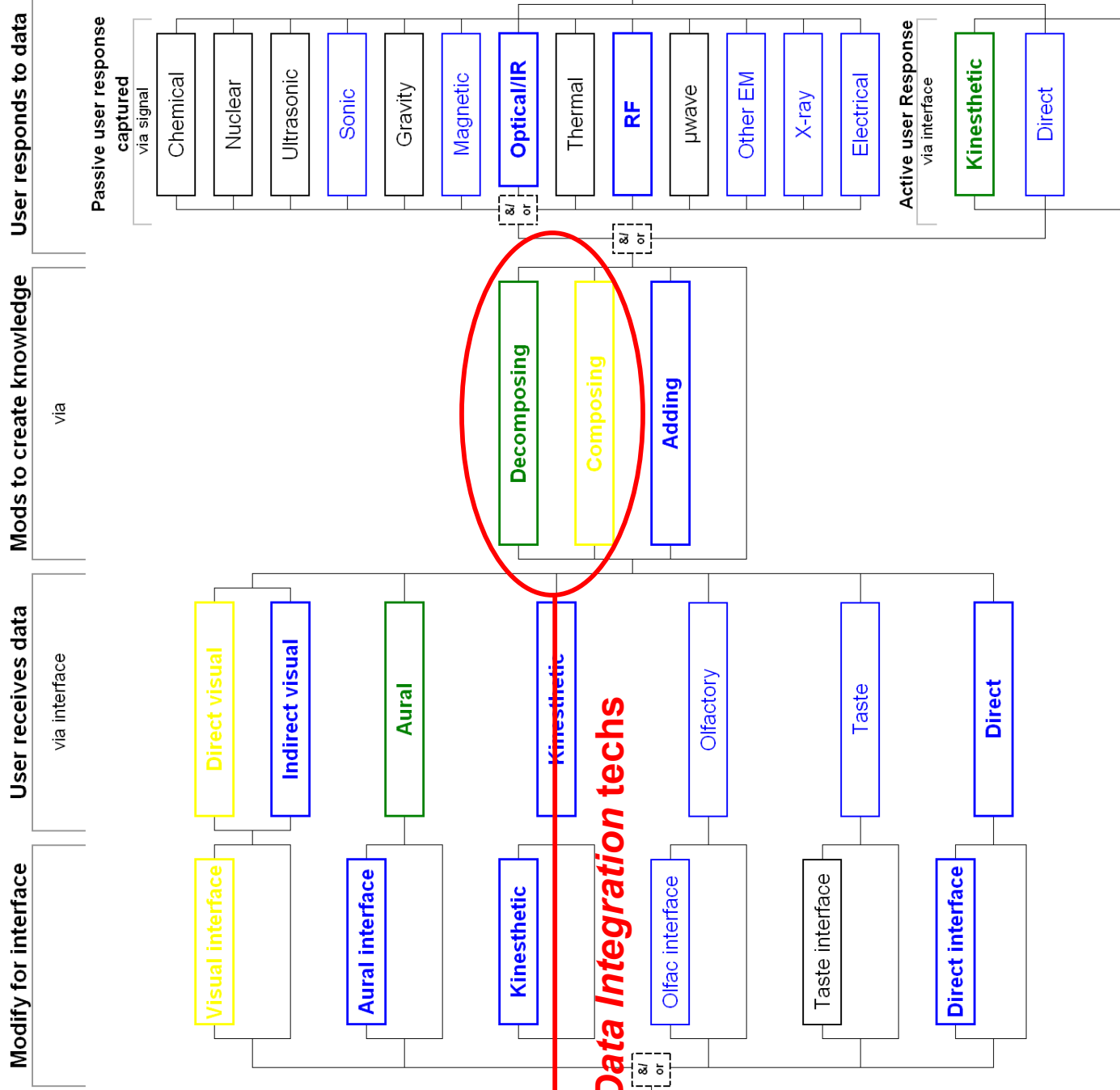




**Second Phase**

Coordinate capabilities in remaining Data Capture techs

Align remaining Data Capture techs with Data Integration techs



## Third Phase

Coordinate and align *Modify* to create knowledge with *Data Integration* techs

To *Data Integration* techs

# Workshop: Developing Digital Convergence Tech Strategy Options

Explore and create strategy options for DCI participants

1. Full regional DC S&T resource map distributed

2. Present method of technology strategic planning

Foundation of all competitive advantage is satisfying the customer's needs better than the competition

Technology Strategic Planning is the method of understanding techs & their interconnections to develop strategies that effectively wed an org's internal techs with external techs to produce products or services that consistently excel at satisfying customer needs

3. Explore regional and organizational tech strategy options

Experiment with how various corridor techs can be interconnected to produce various present and future products that will excel at satisfying existing and new customer needs



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