

A Thought Exercise About Digits: Digital Data, Information, Knowledge, & Wisdom

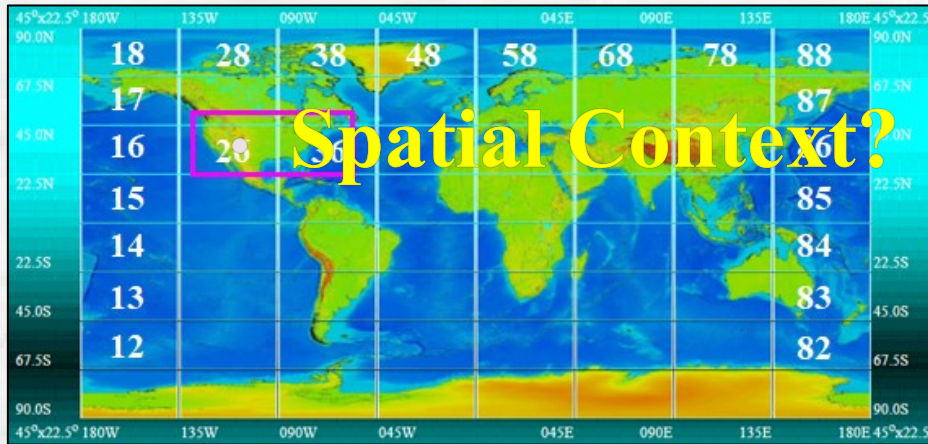
H. Roice Nelson, Jr.

2155 W 700 S #31, Cedar City, Utah 84720

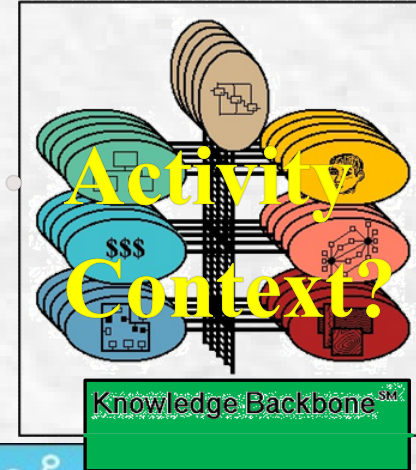
rnelson@walden3d.com 713.542.2207

What if your digits had:

The Context MachineSM



Spatial Context?



Activity Context?

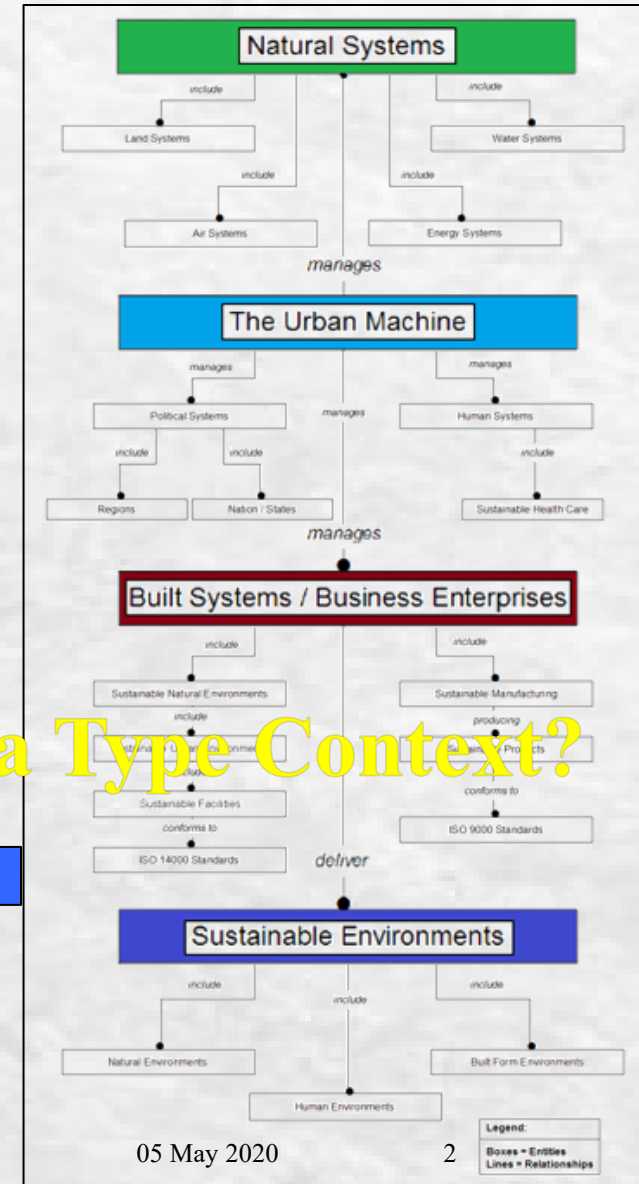
Infinite GridSM



Illustration: Mitch Blunt

Data Type Context?

Data Type



05 May 2020

2

Legend:
Boxes = Entities
Lines = Relationships

Interval Time Index:

Note that the TimedexSM works across astrophysical (A), geologic (G), historical (H), and project (P) times.

Billion Years	Million Years	Million Years	Million Years	Thousand Years	Thousand Years	Thousand Years	Thousand Years	Years
16	2,000	256	32	4,000	512	64	8	1,000
14	1,750	224	28	3,500	448	56	7	875
12	1,500	192	24	3,000	384	48	6	750
10	1,250	160	20	2,500	320	40	5	625
8	1,000	128	16	2,000	256	32	4	500
6	750	96	12	1,500	192	24	3	375
4	500	64	8	1,000	128	16	2	250
2	250	32	4	500	64	8	1	125
A11 to A18	G61 to G68	G51 to G58	G41 to G48	G31 to G38	G21 to G28	G11 to G18	H41 to H48	H31 to H38

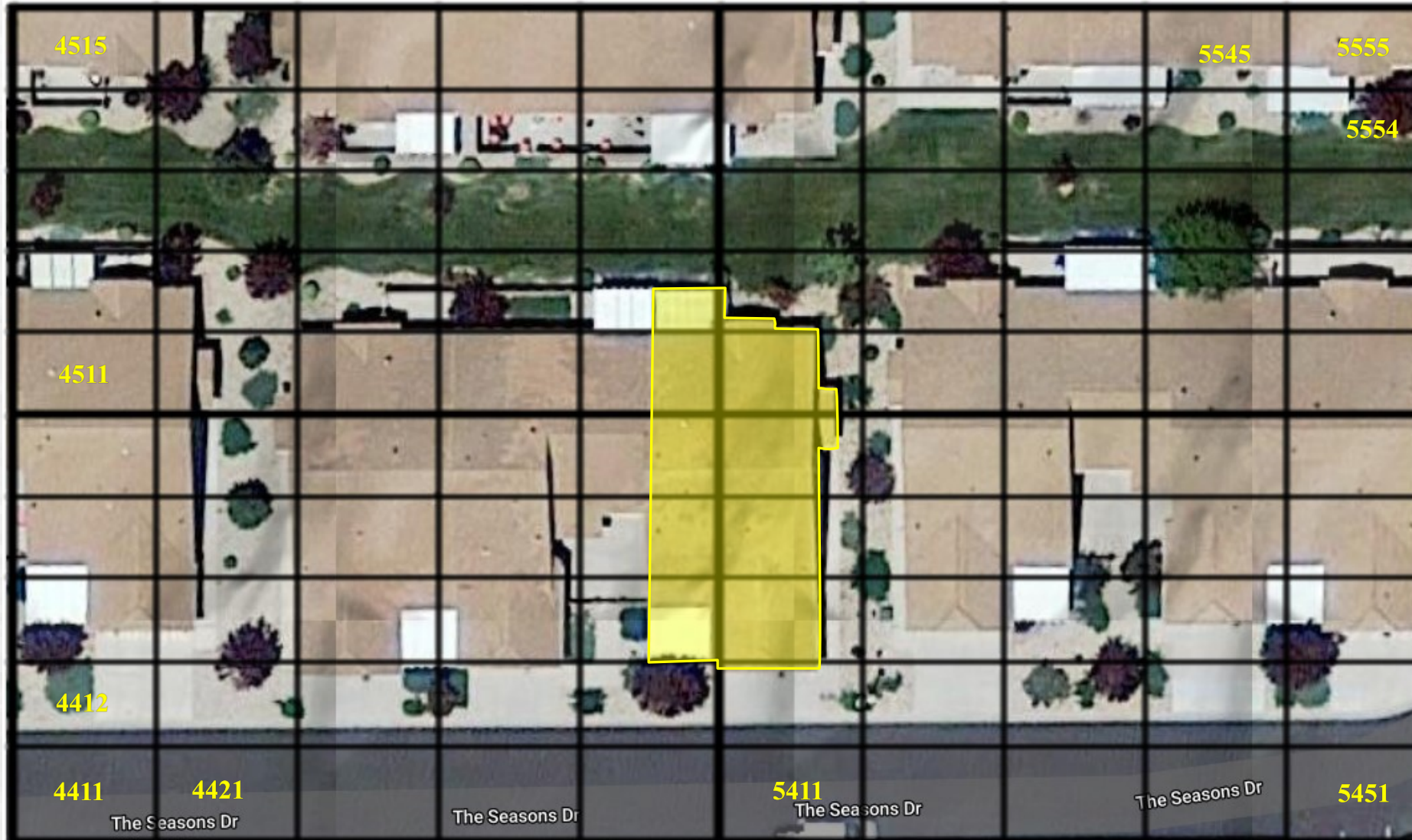
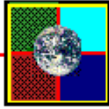
Years	Years	Months	Days	Days	Hours	Minutes	Minutes	Seconds
128	16	24	96	120	36.0	320	40	320
112	14	21	84	105	32.5	280	35	280
96	12	18	72	90	27.0	240	30	240
80	10	15	60	75	22.5	200	25	200
64	8	12	48	60	18.0	160	20	160
48	6	9	36	45	13.5	120	15	120
32	4	6	24	30	9.0	80	10	80
16	2	3	12	15	4.5	40	5	40
H21 to H28	H11 to H18	P71 to P78	P61 to P68	P51 to P58	P41 to P48	P31 to P38	P21 to P28	P11 to P18

A New Real Digital Infrastructure

TimedexSM

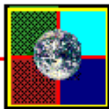
Indexing Everything

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2155 W 700 S #31
Cedar City, Utah is
in IG8 Grid Cells:

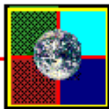
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2657218336335415,
2657218336335511, &
2657218336335512.



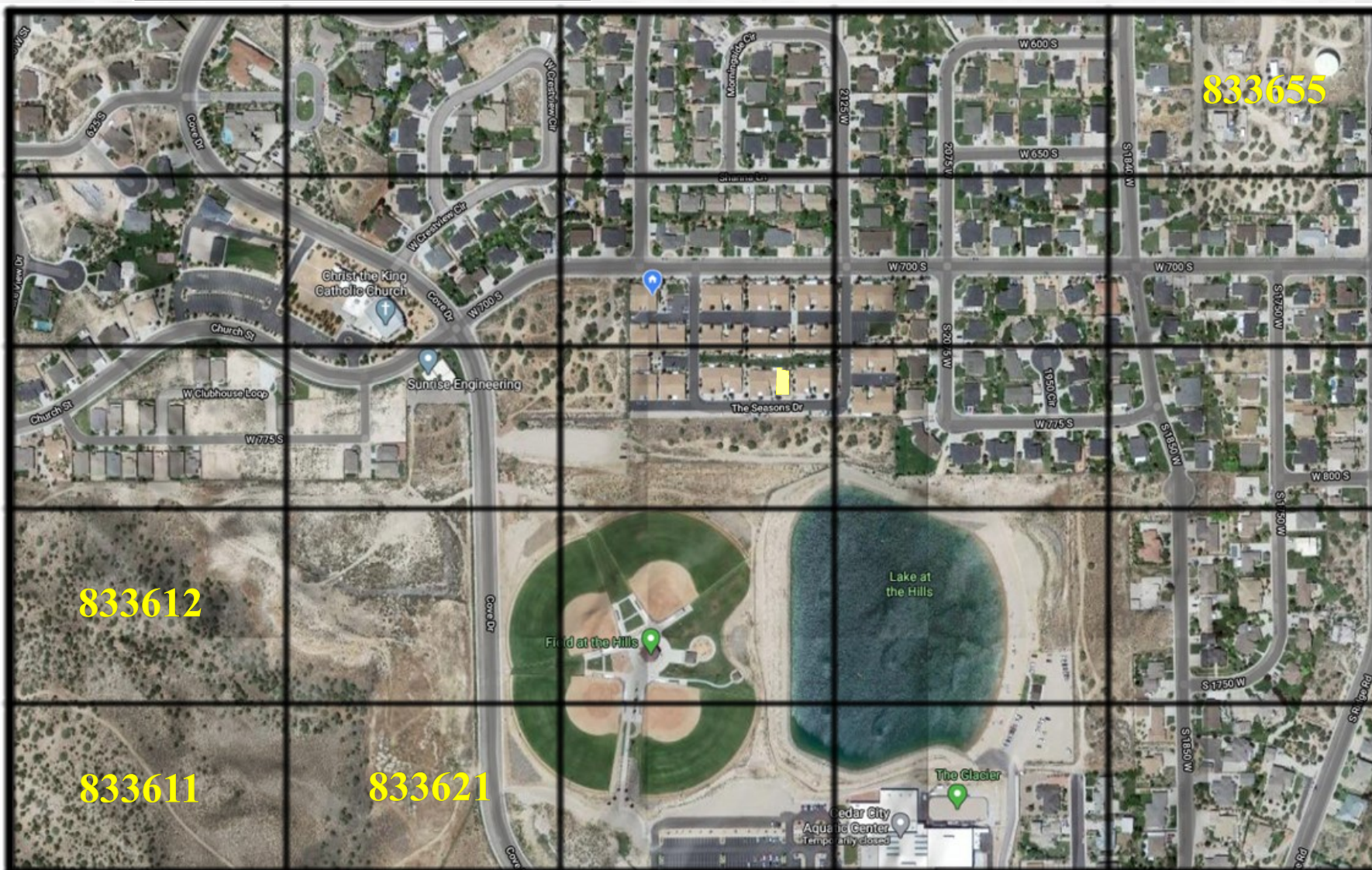
Where each IG8
Grid Cell knows it
is within either

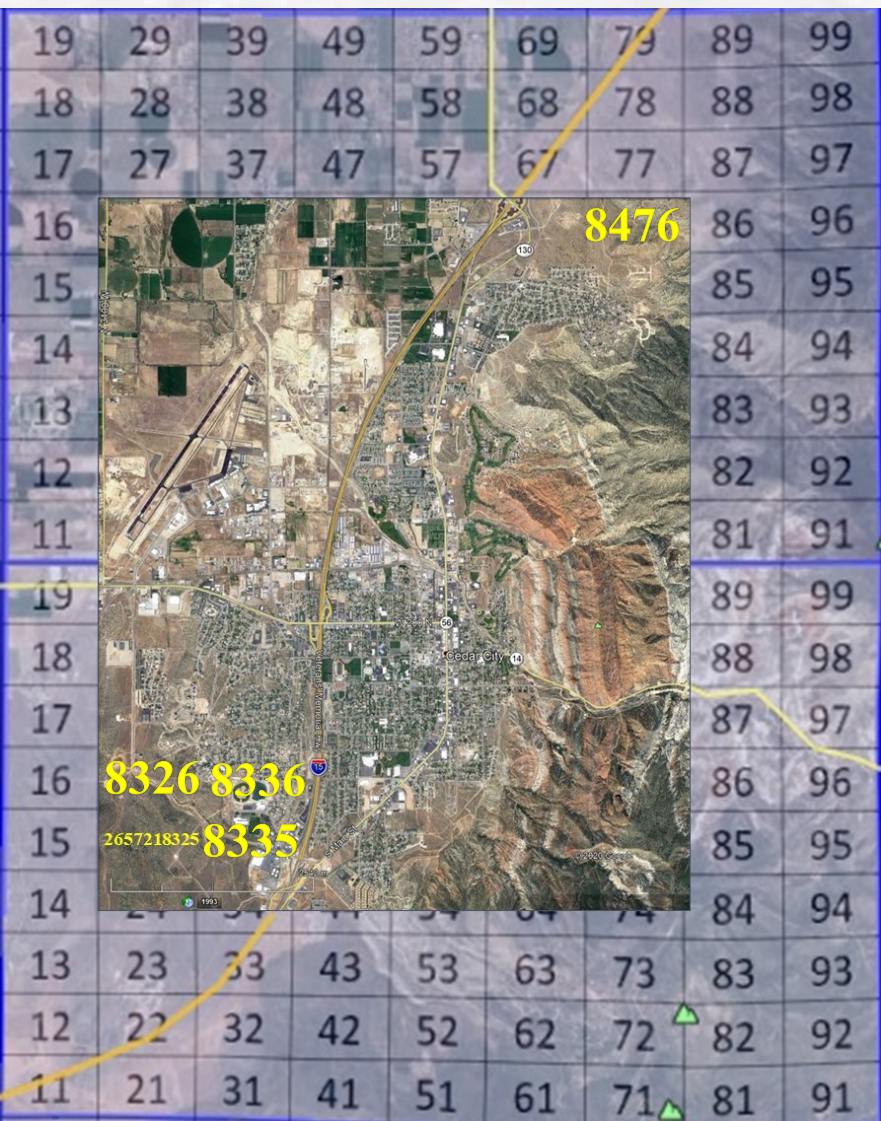
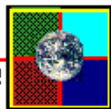
26572183363344,
26572183363345,
26572183363354, or
26572183363355

IG7 Grid Cells.



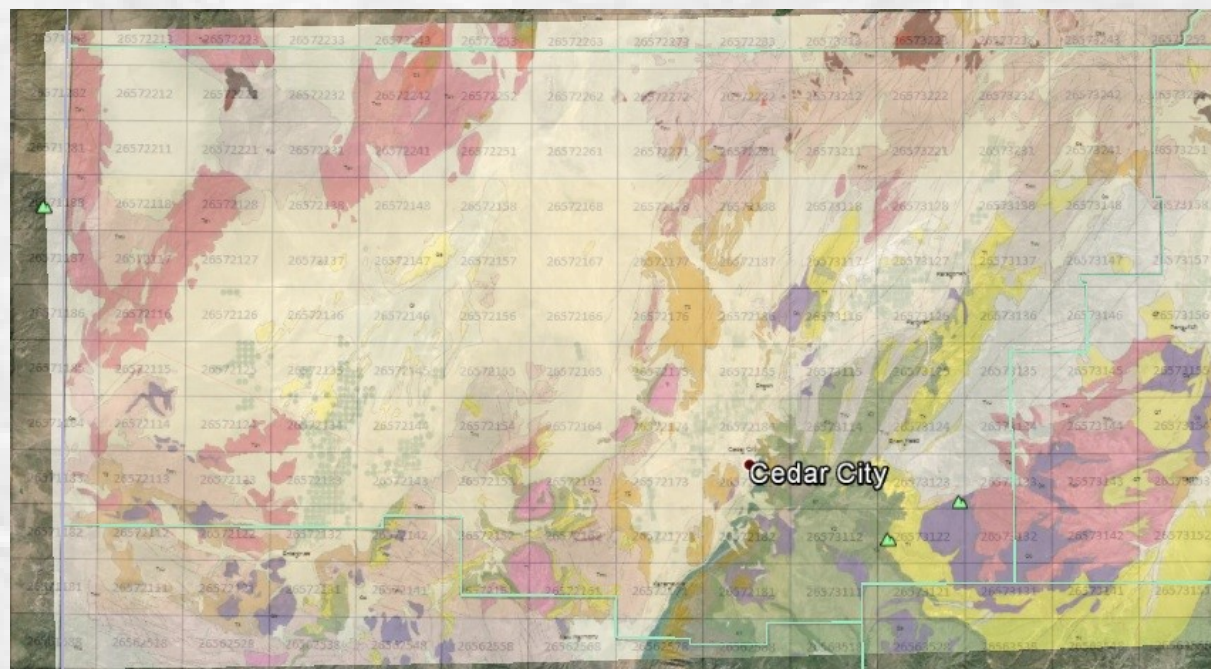
Where the IG7
Grid Cells know
they are within the
IG6 265721833633
Grid Cell.













































Indexing Everything

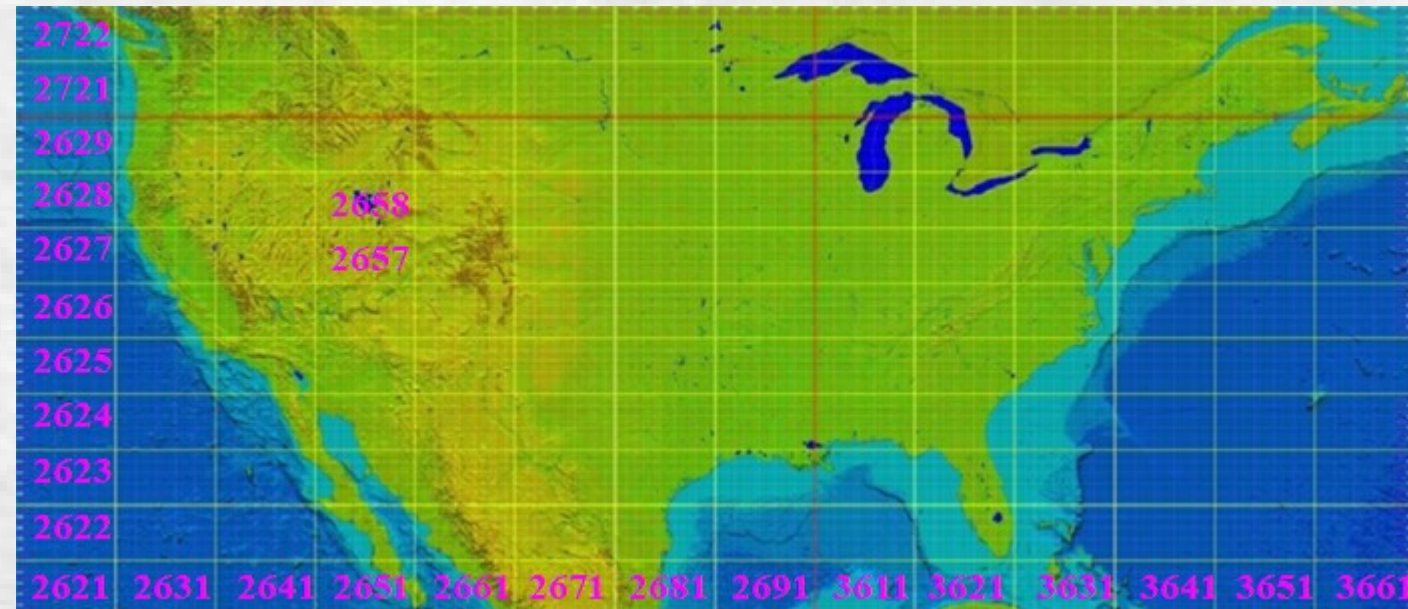
Where the IG6 Grid Cell knows it is within the IG5 2657218336 Grid Cell which is one of the Grid Cells associated with Cedar City, Utah. IG5 knows it is within IG4 26572183 Grid Cell, which is one of the Grid Cells associated with Iron County, Utah.

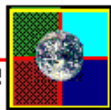


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265814				Digital Geology 265854 Map of Utah by Kent C. Douglas, A. Sprinkle, and Kent D. Brown, Utah Geological Survey	266814
					
					
265811				265851	266811
265715				265755	266715
					
					
					
265711				265751	266711
265615				265655	266615

Where the IG4 Grid Cell knows it is within the IG3 265721 Grid Cell which is one of the Grid Cells associated with Utah, and the IG3 Grid Cell knows it is within the IG2 2657 Grid Cell, which is one of the Grid Cells associated with The United States of America.

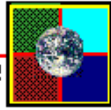




Where the IG2 Grid Cell knows it is within the IG1 26 Grid Cell which is one of the Grid Cells associated with Earth.



The Infinite Gridsm (IG) is an area-based hierarchical spatial language, where each level in the hierarchy knows its relationship to the hierarchy by a 64-bit Index Word, which can be used as an xml keyword or as a database table entry.



- ◆ Any (longitude, latitude) or (x, y) can be automatically assigned an area-based IG number.
- ◆ IG9 cells are 1.0959 meters x 0.7690 meters (43.15" x 30.28") at 45° latitude, and a single 64-bit word can index (as an xml keyword or a database table entry) any IG9 cell, anyplace on the earth.
- ◆ This means large spatial databases can be converted to area-based IG databases semi-automatically.
- ◆ Existing maps can be registered against appropriate IG level cells, where each level in the spatial hierarchy knows its relationship to the entire spatial hierarchy by a single 64-bit index IG name.
- ◆ These maps can be put as background images in a spread-sheet, and multiple worksheets can track different “digits” (data, information, knowledge, and wisdom) spatially, then mathematical and Boolean operations can be performed on these spreadsheets, creating an easy and inexpensive GIS.
- ◆ The Infinite Gridsm provides intuitive understanding of the spatial relationships of “digits.”
- ◆ Provides a way to relate geology to raw materials to meteorology to agriculture to biology to zoology to transportation to manufacturing to construction to financial to real estate to public administration to medical data like diseases to collections to publications to education to history to genealogy, etc.
- ◆ This methodology can map existing and new spatial “digits” dynamically, allowing real-time modeling and optimization of alternative spatial futures.

- ◇ Similar to an IG number being an area-based index, a TimeDexsm (TD) number indexes a time interval.
- ◇ Any time (astrophysical, geological, historical, real-time, or atomic) can be assigned an interval-based TD number.
- ◇ This means large databases can be converted to interval-based TD databases semi-automatically.

TD-Code	Age	Year	Month	Day	Hour	Minute	Second	Description
I167464	0	1949						Birth of H. (Howard) Roice Nelson, Jr.
I167464H040000000	0	3Q49						Birth of H. (Howard) Roice Nelson, Jr.
I167464H042720000	0	1949	November	3				Birth of H. (Howard) Roice Nelson, Jr.
I167464H040000000	0	1Q50						

Interval Time Index:

Note that the TunedexSM works across astrophysical (A), geologic (G), historical (H), and project (P) times

Billion Years	Million Years	Million Years	Million Years	Thousand Years	Thousand Years	Thousand Years	Thousand Years	Years
16	2,000	256	32	4,000	512	64	8	1,000
14	1,750	224	28	3,500	448	56	7	875
12	1,500	192	24	3,000	384	48	6	750
10	1,250	160	20	2,500	320	40	5	625
8	1,000	128	16	2,000	256	32	4	500
6	750	96	12	1,500	192	24	3	375
4	500	64	8	1,000	128	16	2	250
2	250	32	4	500	64	8	1	125

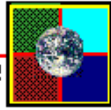
A11 to A18	G61 to G68	G51 to G58	G41 to G48	G31 to G38	G21 to G28	G11 to G18	H41 to H48	H31 to H38
------------	------------	------------	------------	------------	------------	------------	------------	------------

Years	Years	Months	Days	Days	Hours	Minutes	Minutes	Seconds
128	16	24	96	12.0	36.0	320	40	320
112	14	21	84	10.5	32.5	280	35	280
96	12	18	72	9.0	27.0	240	30	240
80	10	15	60	7.5	22.5	200	25	200
64	8	12	48	6.0	18.0	160	20	160
48	6	9	36	4.5	13.5	120	15	120
32	4	6	24	3.0	9.0	80	10	80
16	2	3	12	1.5	4.5	40	5	40
H21 to H28	H11 to H18	P71 to P78	P61 to P68	P51 to P58	P41 to P48	P31 to P38	P21 to P28	P11 to P18

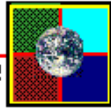
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Easy human entry of and interaction with TD Codes requires a user interface and computer translation.

Cell Counter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49																					
Years	1996				1997				1998				1999				2000				2001				2002				2003				2004				2005				2006				2007				2008																					
P71 (3 months / cell)	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																						
Score	World War I										World War II										Southeast Asia Wars										Computer Wars										Middle East Wars																													
H11 (2 years / cell)	1912	1914	1916	1918	1920	1922	1924	1926	1928	1930	1932	1934	1936	1938	1940	1942	1944	1946	1948	1950	1952	1954	1956	1958	1960	1962	1964	1966	1968	1970	1972	1974	1976	1978	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008																					
Centuries	Dark Ages										Renaissance										Colonialism										Industrial Age																																							
H21 (16 years / cell)	1240	1250	1260	1270	1280	1290	1300	1310	1320	1330	1340	1350	1360	1370	1380	1390	1400	1410	1420	1430	1440	1450	1460	1470	1480	1490	1500	1510	1520	1530	1540	1550	1560	1570	1580	1590	1600	1610	1620	1630	1640	1650	1660	1670	1680	1690	1700																							
Millennium	1st Millennium										2nd Millennium										3rd Millennium										4th Millennium										5th Millennium										6th Millennium																			
H31 (125 years / cell)	-4000	-3875	-3750	-3625	-3500	-3375	-3250	-3125	-3000	-2875	-2750	-2625	-2500	-2375	-2250	-2125	-2000	-1875	-1750	-1625	-1500	-1375	-1250	-1125	-1000	-875	-750	-625	-500	-375	-250	-125	0	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750																							
Period											Pleistocene																				Holocene																																							
H41 (1,000 years / cell)	46000	45000	44000	43000	42000	41000	40000	39000	38000	37000	36000	35000	34000	33000	32000	31000	30000	29000	28000	27000	26000	25000	24000	23000	22000	21000	20000	19000	18000	17000	16000	15000	14000	13000	12000	11000	10000	9000	8000	7000	6000	5000	4000	3000	2000	1000	0																							
Period																					Pleistocene																				Holocene																													
G11 (8 kyears / cell)	-382	-374	-366	-358	-350	-342	-334	-326	-318	-310	-302	-294	-286	-278	-270	-262	-254	-246	-238	-230	-222	-214	-206	-198	-190	-182	-174	-166	-158	-150	-142	-134	-126	-118	-110	-102	-94	-86	-78	-70	-62	-54	-46	-38	-30	-22	-14	-6	2																					
Period											Pliocene																				Pleistocene										Holocene																													
G21 (64k years / cell)	-3072	-3008	-2944	-2880	-2816	-2752	-2688	-2624	-2560	-2496	-2432	-2368	-2304	-2240	-2176	-2112	-2048	-1984	-1920	-1856	-1792	-1728	-1664	-1600	-1536	-1472	-1408	-1344	-1280	-1216	-1152	-1088	-1024	-960	-896	-832	-768	-704	-640	-576	-512	-448	-384	-320	-256	-192	-128	-64	0																					
Period											Miocene																				Pliocene										Pleistocene																													
G31 (500 kyears / cell)	-24,000	-23,500	-23,000	-22,500	-22,000	-21,500	-21,000	-20,500	-20,000	-19,500	-19,000	-18,500	-18,000	-17,500	-17,000	-16,500	-16,000	-15,500	-15,000	-14,500	-14,000	-13,500	-13,000	-12,500	-12,000	-11,500	-11,000	-10,500	-10,000	-9,500	-9,000	-8,500	-8,000	-7,500	-7,000	-6,500	-6,000	-5,500	-5,000	-4,500	-4,000	-3,500	-3,000	-2,500	-2,000	-1,500	-1,000	-500	0																					
Period																					Paleocene										Eocene										Oligocene										Miocene										Pliocene									
Era	Jurassic																				Cretaceous																				Tertiary																													
Eon											Mesozoic																				Cenozoic																																							
G41 (4 M years / cell)	-192	-188	-184	-180	-176	-172	-168	-164	-160	-156	-152	-148	-144	-140	-136	-132	-128	-124	-120	-116	-112	-108	-104	-100	-96	-92	-88	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4	0																					
Era																															Permian										Triassic										Cretaceous										Tertiary									
Eon											Precambrian																				Paleozoic																				Mesozoic										Modern									
G51 (32 M years / cell)	-1,516	-1,504	-1,492	-1,480	-1,468	-1,456	-1,444	-1,432	-1,420	-1,408	-1,396	-1,384	-1,372	-1,360	-1,348	-1,336	-1,324	-1,312	-1,300	-1,288	-1,276	-1,264	-1,252	-1,240	-1,228	-1,216	-1,204	-1,192	-1,180	-1,168	-1,156	-1,144	-1,132	-1,120	-1,108	-1,096	-1,084	-1,072	-1,060	-1,048	-1,036	-1,024	-1,012	-1,000	-988	-976	-964	-952	-940																					
Eon											Precambrian																				Paleozoic																				Mesozoic										Modern									
G61 (250 M years / cell)	-12,000	-11,750	-11,500	-11,250	-11,000	-10,750	-10,500	-10,250	-10,000	-9,750	-9,500	-9,250	-9,000	-8,750	-8,500	-8,250	-8,000	-7,750	-7,500	-7,250	-7,000	-6,750	-6,500	-6,250	-6,000	-5,750	-5,500	-5,250	-5,000	-4,750	-4,500	-4,250	-4,000	-3,750	-3,500	-3,250	-3,000	-2,750	-2,500	-2,250	-2,000	-1,750	-1,500	-1,250	-1,000	-750	-500	-250	0																					



- ◆ Any time or time-line can be semi-automatically assigned an interval-based TD number.
 - ◆ TDH cells are in 40 second, 5 minute, 40 minute, 4.5 hour, 1.5 day, 12 day, 3 month, and 2 year interval blocks.
 - ◆ THI cells are in 3 year, 27 year, 16 year, 144 year, 125 year, and 1,000 year interval blocks.
 - ◆ TDG cells are divided by Ear, Period, Epoch, and Age or Stage to a start or end time and a duration time.
 - ◆ TDA cells are astrophysical time intervals, and TDa cells are atomic time intervals.
- ◆ A single 64-bit word can index (as an xml keyword or a database table entry) any TDa, TDH, TDI, TDG, or TDA time interval.
- ◆ This means large temporal databases can be converted to temporal-based TD databases semi-automatically.
- ◆ Existing times can be registered against appropriate TD level cells, where each level in the temporal hierarchy knows its relationship to the entire temporal hierarchy by a single 64-bit index TD name.
- ◆ These time-intervals can be background time-lines in a spread-sheet, and multiple worksheets can track different “digits” (data, information, knowledge, and wisdom) temporally, then mathematical and Boolean operations can be performed on these spreadsheets.
- ◆ The TimeDexsm provides intuitive understanding of the temporal relationships of “digits.”
- ◆ Provides a way to relate geology to evolution to anthropology to archaeology to history to projects to public administration to storms to pandemics to education to genealogy to measurements, etc.
- ◆ This methodology can map existing and new temporal “digits” dynamically, allowing real-time modeling and optimization of alternative spatial futures.

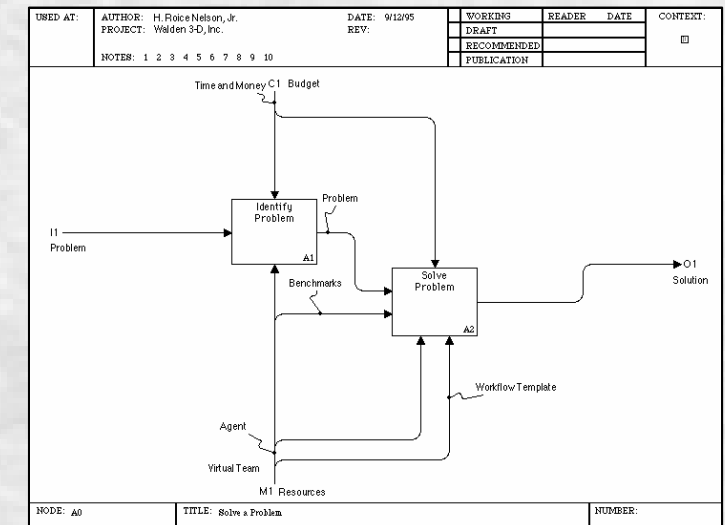
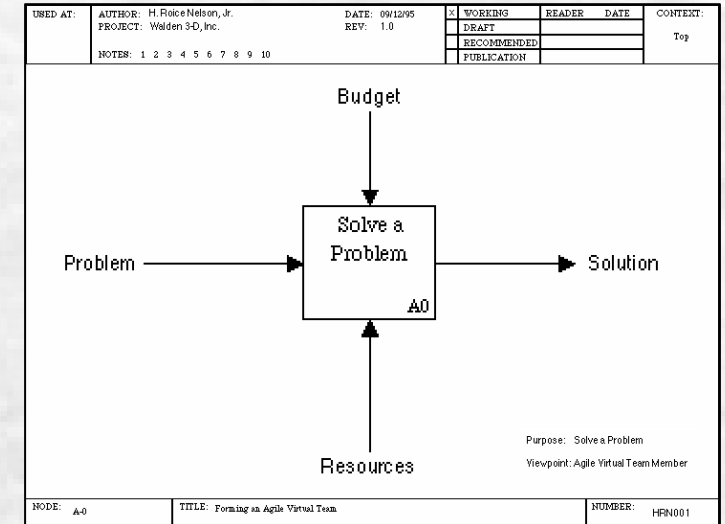
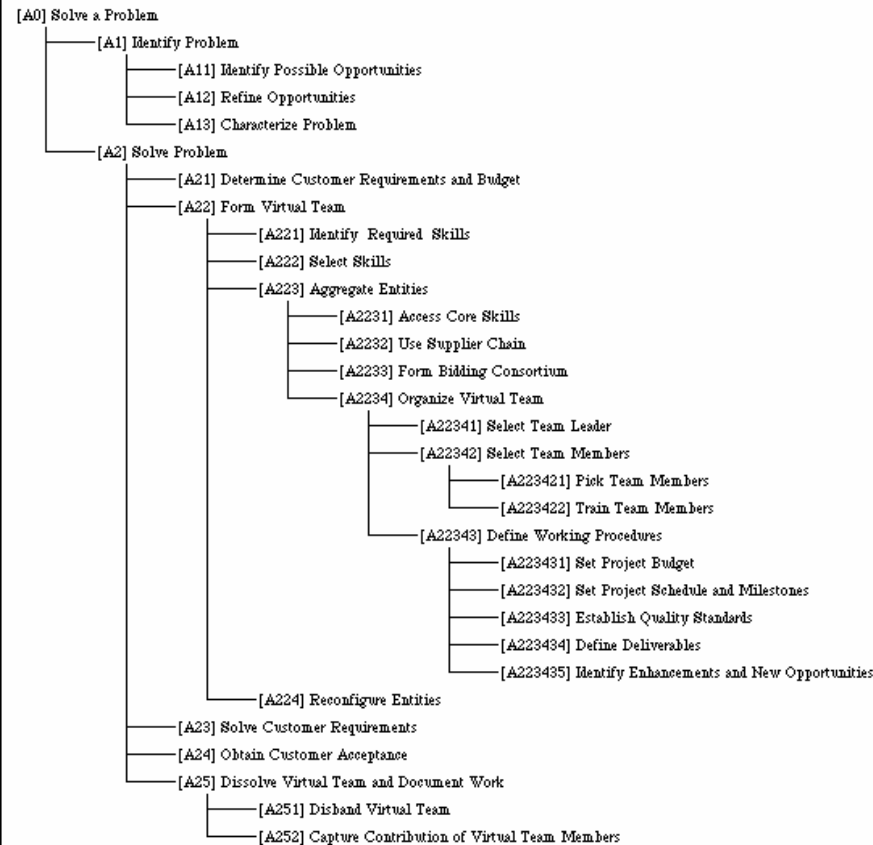


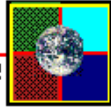
Activity Context

IDEF-0 is a language of Lines and Boxes, where lines represent things (ICOMs: Inputs, Controls, Outputs, & Mechanisms), where the box represents a Process or Activity, and where each are named or labeled.

- Organizes activity around process;
- Creates a checklist for each activity;
- Is an easy way to communicate with all stakeholders;
- And provides a Best Practice documentation framework.

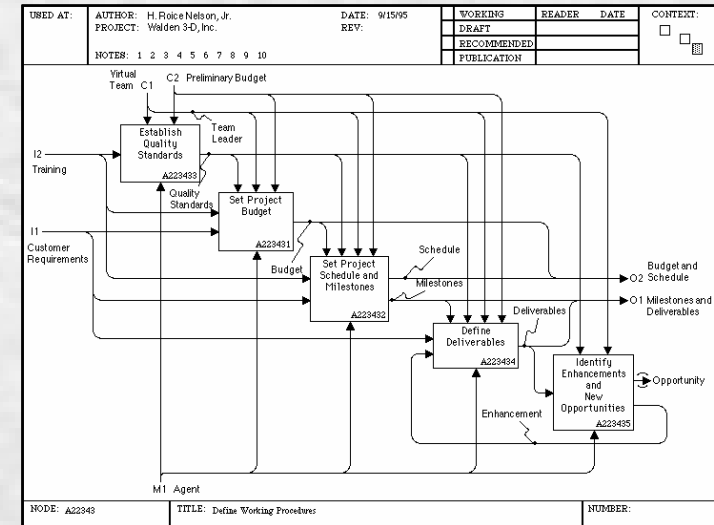
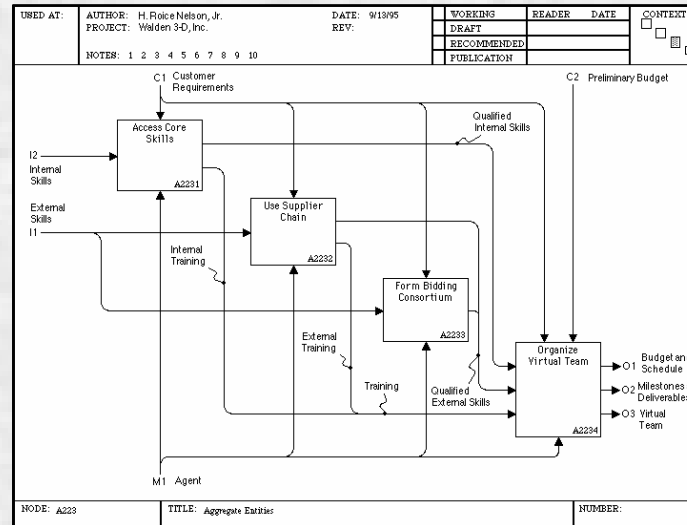
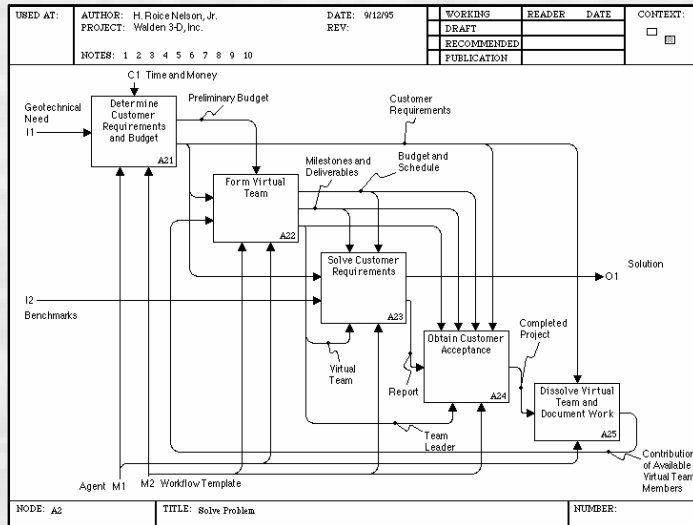
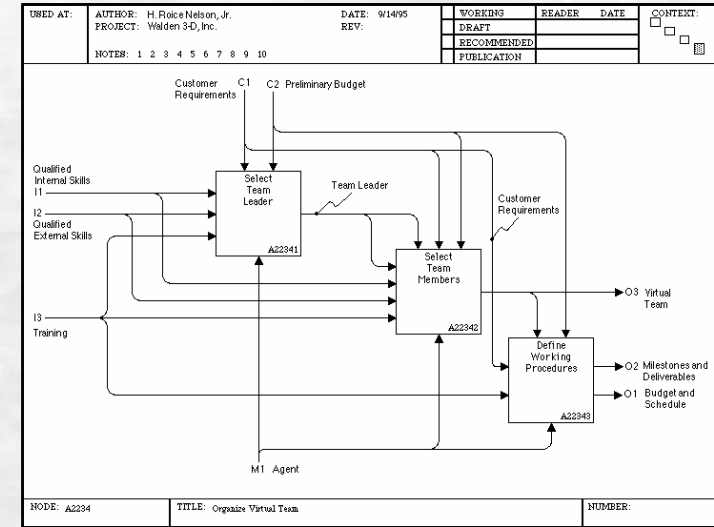
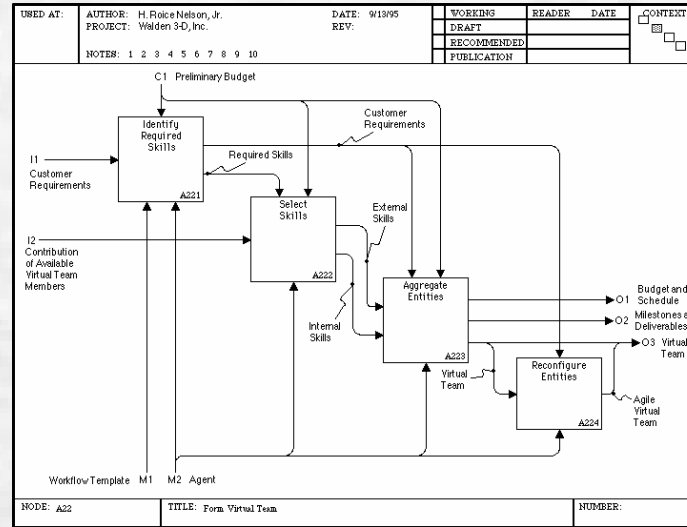
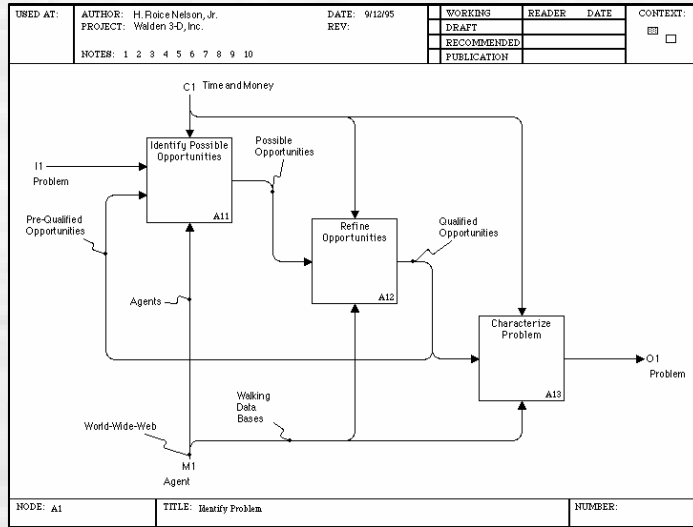
Node Tree for AVT





Decomposing Activities

The Context Machinesm

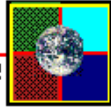


- # Provide Hierarchical Descriptions of Functional Tasks
-
- ```

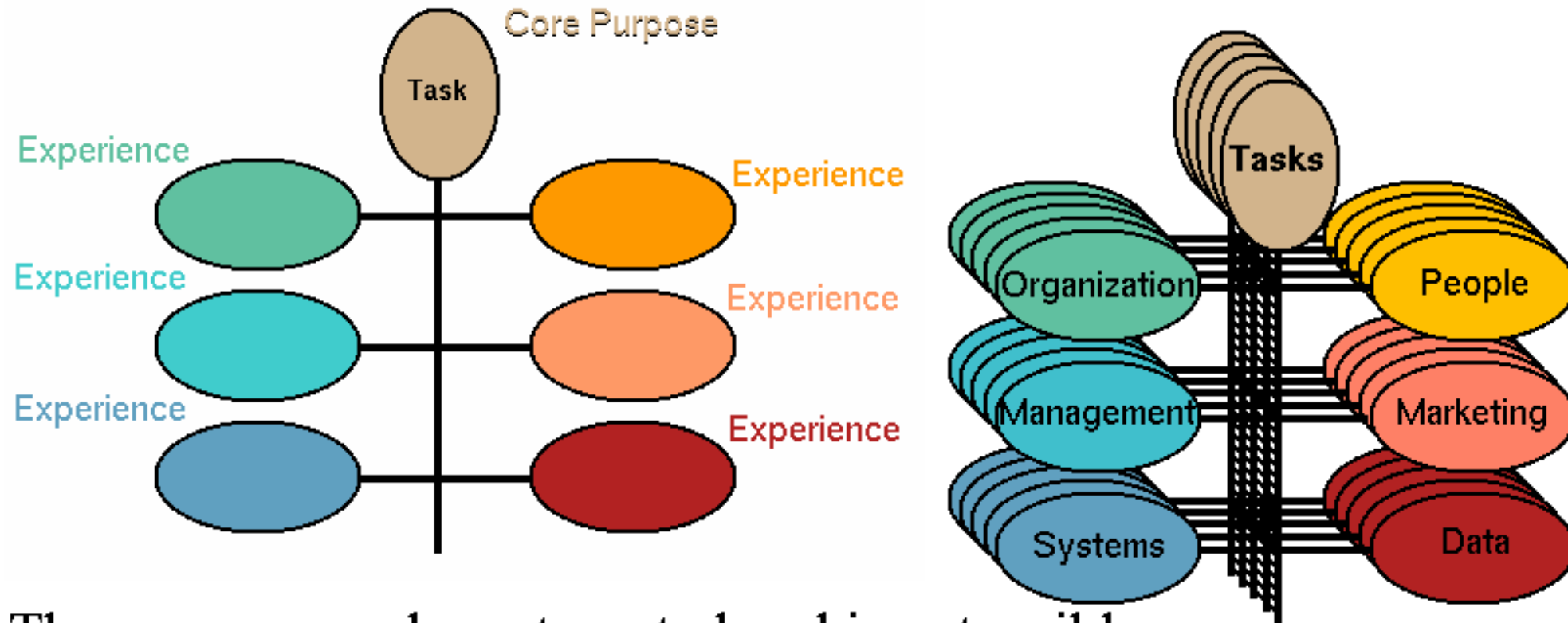
graph TD
 M3["[M3] Monitor & Manage System"]
 M3 --> M31["[M3.1] Monitor & Manage Land System"]
 M3 --> M32["[M3.2] Monitor & Manage Water System"]
 M3 --> M33["[M3.3] Monitor & Manage Air System"]
 M3 --> M34["[M3.4] Monitor & Manage Energy System"]
 M3 --> M35["[M3.5] Monitor & Manage Political System"]
 M35 --> M351["[M3.5.1] Monitor & Manage Domestic Political System"]
 M35 --> M352["[M3.5.2] Monitor & Manage Regional Political System"]
 M35 --> M353["[M3.5.3] Monitor & Manage Trans Political System"]
 M35 --> M354["[M3.5.4] Monitor & Manage National Political System"]
 M3 --> M36["[M3.6] Monitor & Manage Human System"]
 M36 --> M361["[M3.6.1] Monitor & Manage Sustainable Health Care"]
 M3 --> M37["[M3.7] Monitor & Manage Built System and Business Enterprise"]
 M37 --> M371["[M3.7.1] Monitor & Manage Sustainable Built System"]
 M371 --> M3711["[M3.7.1.1] Monitor & Manage Sustainable Natural Environment"]
 M371 --> M3712["[M3.7.1.2] Monitor & Manage Sustainable Urban Environment"]
 M371 --> M3713["[M3.7.1.3] Monitor & Manage Sustainable Vices Environment"]
 M371 --> M3714["[M3.7.1.4] Monitor & Manage Sustainable Facilities"]
 M371 --> M3715["[M3.7.1.5] Monitor & Manage Sustainable Business Enterprise"]

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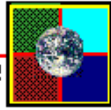


Provide a formal procedure or method to  
capture experience against specific objectives:

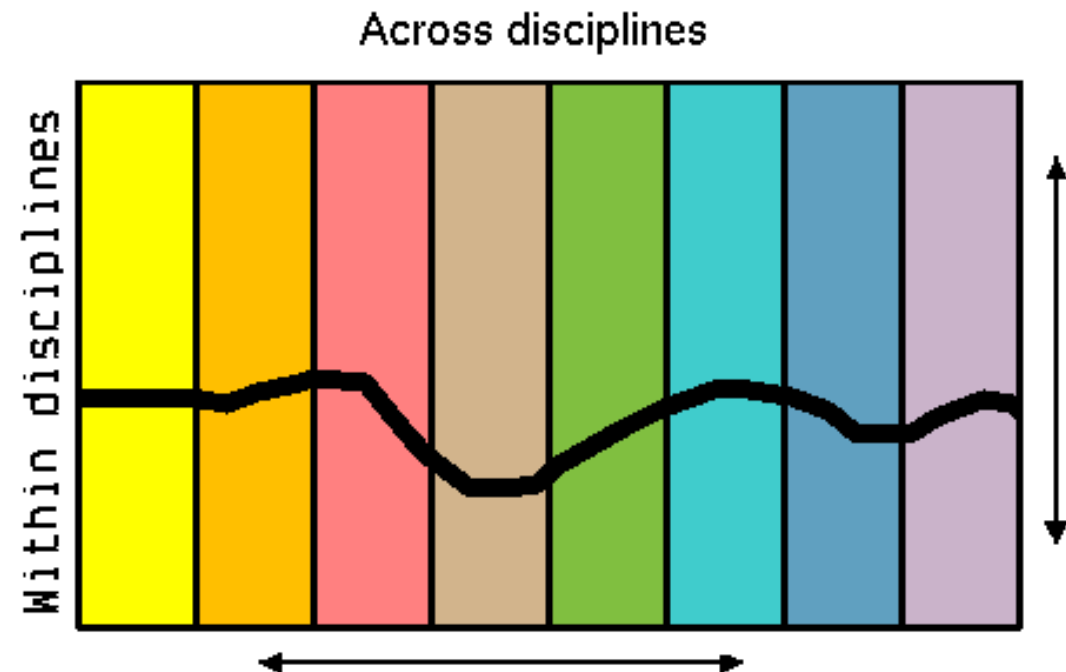
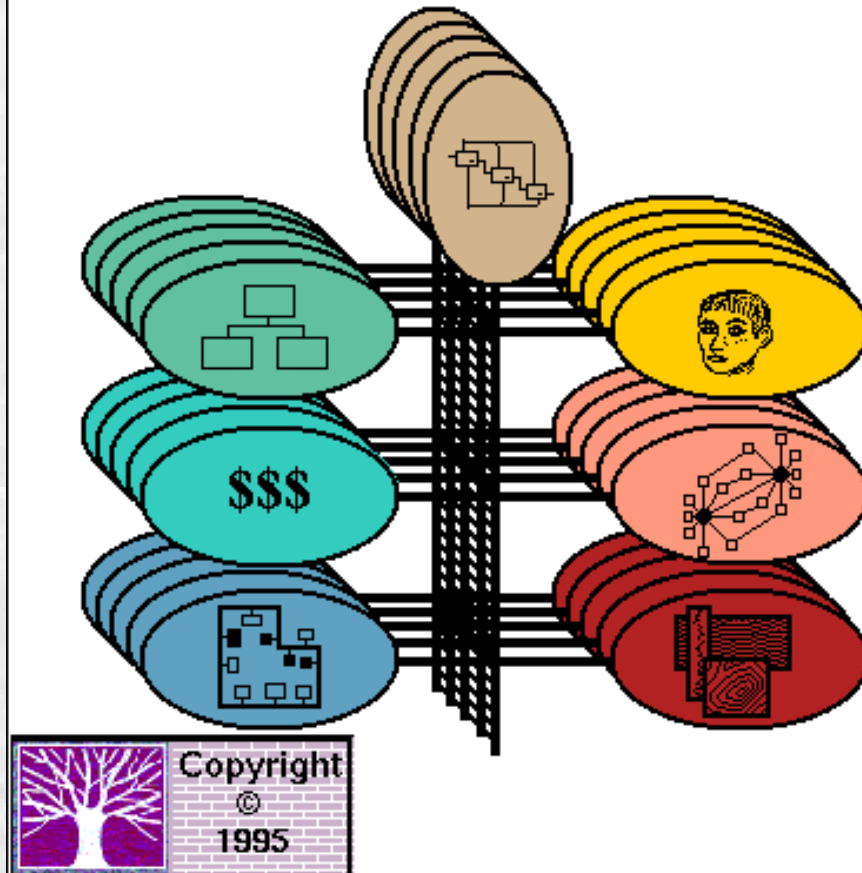


The process can be automated and is extensible.





Automated data capture makes data instantly available  
within disciplines and across different disciplines:



| Library of Congress | KB     | Description                                              |
|---------------------|--------|----------------------------------------------------------|
| -                   | W      | Manage Data, Information, Knowledge, & Wisdom            |
| -                   | W1     | Identify Work                                            |
| -                   | W2     | Index Work                                               |
| -                   | W3     | Store Work                                               |
| -                   | W4     | Retrieve Work                                            |
| -                   | W5     | Maintain Work                                            |
| Class A             | A1     | General Works                                            |
| Class A             | A1a    | Collections                                              |
| Subclass AC         | A1a1   | Collections. Series. Collected Works                     |
| Subclass AE         | A1a2   | Encyclopedias Subclass Newspapers                        |
| Subclass AG         | A1a3   | Dictionaries and other general reference works           |
| Subclass AI         | A1a4   | Indexes                                                  |
| Subclass AM         | A1a5   | Museums. Collectors and collecting                       |
| Class A             | A1b    | Publications                                             |
| Subclass AN         | A1b1   | Newspapers                                               |
| Subclass AP         | A1b2   | Periodicals                                              |
| Subclass AS         | A1b3   | Academies and learned societies                          |
| Subclass AY         | A1b4   | Yearbooks. Almanacs. Directories                         |
| Subclass AZ         | A1b5   | History of scholarship and learning. The humanities      |
| Class L             | A2     | Education                                                |
| Subclass L          | A21    | Education (General)                                      |
| Subclass LA         | A211   | History of education                                     |
| Subclass LB         | A212   | Theory and practice of education                         |
| Subclass LC         | A22    | Special aspects of education                             |
| Subclass LD         | A221   | Individual institutions - United States                  |
| Subclass LE         | A222   | Individual institutions - America (except United States) |
| Subclass LF         | A223   | Individual institutions - Europe                         |
| Subclass LG         | A224   | Individual institutions:                                 |
| Subclass LG         | A2241  | Asia                                                     |
| Subclass LG         | A2242  | Africa                                                   |
| Subclass LG         | A2243  | Indian Ocean islands                                     |
| Subclass LG         | A2244  | Australia                                                |
| Subclass LG         | A2245  | New Zealand                                              |
| Subclass LG         | A2246  | Pacific islands                                          |
| Subclass LH         | A23    | College and school magazines and papers                  |
| Subclass LJ         | A24    | Student fraternities and societies, United States        |
| Subclass LI         | A25    | Textbooks                                                |
| Class Z             | A3     | Bibliography                                             |
| Class Z             | A4     | Library Science                                          |
| Subclass Z          | A41    | Books (General)                                          |
| Subclass Z          | A42    | Writing                                                  |
| Subclass Z          | A43    | Paleography                                              |
| Subclass Z          | A44    | Book industries and trade                                |
| Subclass Z          | A45    | Libraries                                                |
| Subclass Z          | A46    | Bibliography                                             |
| Class Z             | A5     | Information Resources (General)                          |
| Class G             | B1     | Geography                                                |
| Subclass G          | B11    | Geography (General). Atlases. Maps                       |
| Subclass GA         | B12    | Mathematical geography. Cartography                      |
| Subclass GB         | B13    | Physical geography                                       |
| Subclass GF         | B14    | Human Ecology. Anthropogeography                         |
| Subclass GC         | B15    | Oceanography                                             |
| Subclass GE         | B16    | Environmental Sciences                                   |
| Class Q             | B2     | Science                                                  |
| Subclass Q          | B21    | Science (General)                                        |
| Q1-390              | B211   | Science (General)                                        |
| Q1-295              | B2111  | General                                                  |
| Q300-390            | B2112  | Cybernetics                                              |
| Q350-390            | B2113  | Information theory                                       |
| Subclass QB         | B212   | Astronomy                                                |
| QB1-991             | B2121  | Astronomy                                                |
| QB1-139             | B21211 | General                                                  |
| QB140-237           | B21212 | Practical and spherical astronomy                        |
| QB273-343           | B2122  | Geodesy                                                  |
| QB349-421           | B21221 | Theoretical astronomy and celestial mechanics            |
| QB455-466           | B2123  | Astrogeology                                             |
| QB460-466           | B2124  | Astrophysics                                             |
| QB468-480           | B21241 | Non-optical methods of astronomy                         |
| QB495-503           | B21242 | Descriptive astronomy                                    |
| QB500-5-785         | B2125  | Solar system                                             |
| QB799-903           | B2126  | Stars                                                    |
| QB980-991           | B2127  | Cosmogony. Cosmology                                     |
| Subclass QC         | B213   | Physics                                                  |

In 1994 a formal IDEF-0 Knowledge Backbone<sup>sm</sup> of the Ideal Oil & Gas Company was completed for Fletcher Challenge Petroleum, with a caveat Walden 3-D, Inc. kept ownership.

This KB included mapping ICOMs for 3,032 Activities, including Asset Management, Acquire Assets, Seismic Acquisition, Exploration, Development, Exploitation, etc.

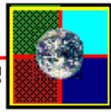
The Knowledge Backbone<sup>sm</sup> has recently been correlated with The Library of Congress as a next step of indexing all activities.

The same detailed oil & gas industry ICOM mapping can be created to map “as is” and “ideal” activities for any activity, enabling best practice capture & continuous process improvement.

ICOM mapping results in an ever expanding KB, where each activity within the KB has a unique hierarchical number, where each level in the activity hierarchy knows its relationship to the entire activity hierarchy by a single 64-bit index name.

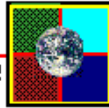


- ◆ Once an IDEF-0 Model is generated for any process, including the first pass conversion of The Library of Congress Index to the Knowledge Backbone<sup>sm</sup>, the resulting KB enables semi-automatic assignment of an activity-based KB number.
- ◆ The simple computer-aided IDEF-0 language allows digital mapping of any activity with lines (nouns) and boxes (verbs).
- ◆ Using keyword searches, this means large digital databases can be cross-referenced to KB databases semi-automatically.
- ◆ Existing indexes and databases can be registered against appropriate KB levels, where each level in the activity hierarchy knows its relationship to the entire activity hierarchy by a single 64-bit index KB name.
- ◆ These KB indices can be used as organizing columns or rows in a spread-sheet, and multiple interlocking matrices highlight component relationships and unravel transaction patterns in all different kinds of “digits” (data, information, knowledge, and wisdom) from all kinds of different databases.
- ◆ The Knowledge Backbone<sup>sm</sup> provides intuitive understanding of the activity or process relationships of “digits.”
- ◆ Provides a way to relate collections to education to bibliography to library sciences to geography to astronomy to physics to electricity to magnetism to chemistry to geology to geophysics to meteorology to biology to botany to zoology to physiology to microbiology to medicine to technology to engineering to agriculture to mathematics to languages to literature to music to arts to history to anthropology to archaeology to history to social sciences to philosophy to psychology to religion to scriptures to political sciences to law to military science to genealogy, etc.
- ◆ This methodology can map existing and new activity “digits” dynamically, allowing real-time modeling and optimization of alternative activity futures.



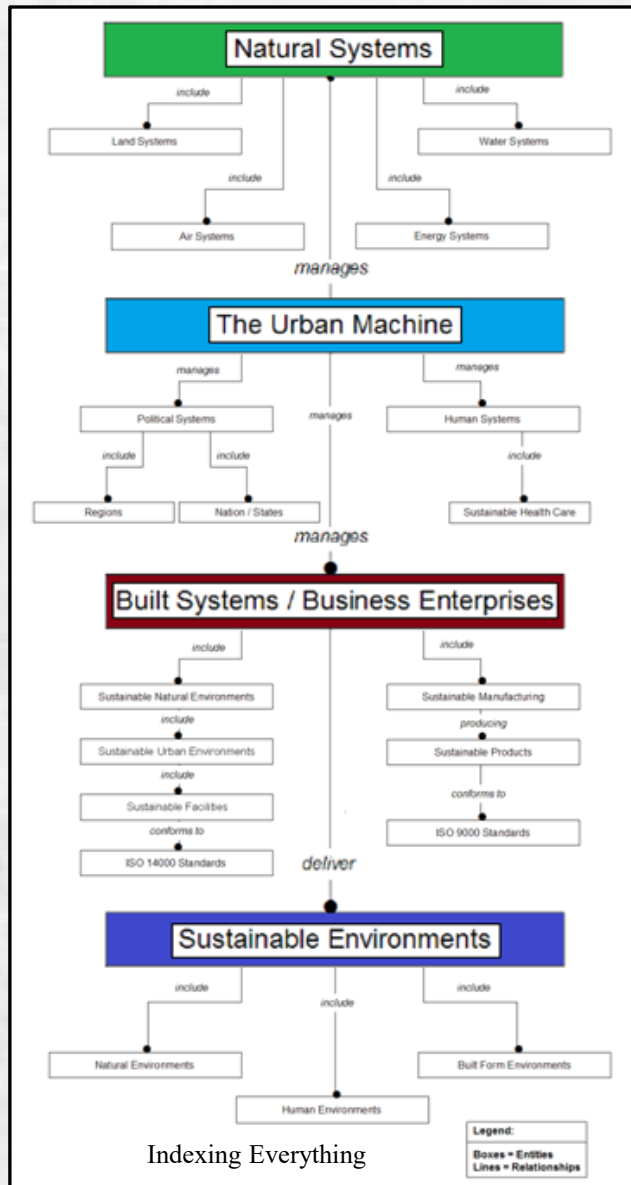
- A. Hierarchical Descriptions of Entity-Relationships (IDEF-1X: language of lines and boxes, where lines are verbs and boxes are nouns).
  - i. Lines represent relationships between things.
  - ii. Boxes represent entities or things about data (people, places, ideas, events, etc.)
  - iii. Characteristics of things are represented by attribute names within the box.
- B. Typically thought of as a DBMS (Data Base Management System).
- C. Supports development of conceptual schemas, as a teachable coherent language, which is automatable.
- D. Data Type and Knowledge Backbone<sup>sm</sup> are inverted languages, and ideally are kept in sync as improvements are made to one or the other.

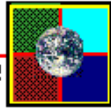




Data Types are integrally tied database organization schemas like POSC (Petrotechnical Open Software Consortium) now Energistics, and EIP (Energy Industry Profile) Metadata Standard. These non-proprietary open metadata exchange standards have been important ways to share structured and unstructured information resources between oil companies and contractors.

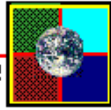
The chart to the left shows an IDEF-1X information mapping approach to urban planning, known as The Urban Machine<sup>sm</sup>, where information manages natural systems and built systems / business enterprises in order to deliver sustainable environments.





- ❖ Data Types (DT) can be defined by IDEF-1x Models, which are also known as Entity-Relationship Models.
- ❖ The computer-aided IDEF-1x language defines digital data storage schemas with lines (verbs) and boxes (nouns).
- ❖ Given large mature digital databases, the organization (DT) can be directly tied to activities mapped by IDEF-0, with lines (nouns) and boxes (verbs). Keeping activities and databases in sync is not common, and can significantly improve performance.
- ❖ Existing indexes and databases are ideally defined by DT levels, where each level in the Data Type hierarchy knows its relationship to the entire activity hierarchy by a single 64-bit index DT name.
- ❖ These DT indices are the typical keys for database organization. Formalizing naming of xml keywords and database tables with DT indices provides an improved way of integrating activities with the data supporting those activities.
- ❖ The Data Type provides visual understanding of the storage structure of “digits.”
- ❖ In the oil industry, the open data storage definitions provided a way to share well, seismic (field, processing, and attribute formats), electrical survey, aeromagnetic, gravity, satellite, and lighting data between oil companies and between contractors. Only the military handles as much data as the oil industry. As more data, information, knowledge, and wisdom becomes digits, with improvements to the digital infrastructure, there is a need for common storage formats.
- ❖ The formal DT definition provides a mechanism for identifying gaps in data needed for key activities, and improves dynamic real-time modeling and optimization of alternative data storage and activity futures.

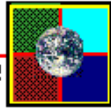




The Context Machine<sup>sm</sup> integrates these four indices (IG, KB, TD, and DT), which become the building blocks of a real digital infrastructure.

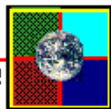
- I. Establishing a formal program to model the Digital Infrastructure.
- II. Indexing each component of the model by:
  1. Activity (IDEF-0 Models, hereafter The Knowledge Backbone<sup>sm</sup>);
  2. Space (The Infinite Grid<sup>sm</sup>);
  3. Time (The TimeDex<sup>sm</sup>); and
  4. Data Type (IDEF-1X Models).
- III. Run IDEF-2 Optimization Simulations of IDEF-0 & IDEF-1X Models.
- IV. Enhance IDEF-0 Process Models with IDEF-3 Process Descriptions by adding Boolean Logic to Better Represent Real World Scenarios.
- V. Use Model to Optimize Measurement of Natural Systems and Built Form monitoring differences in real-time measurements to update models and simulations and improve decisions.





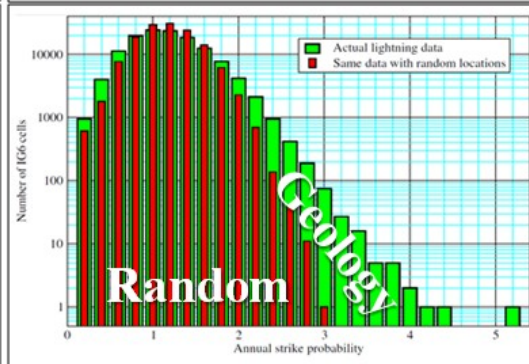
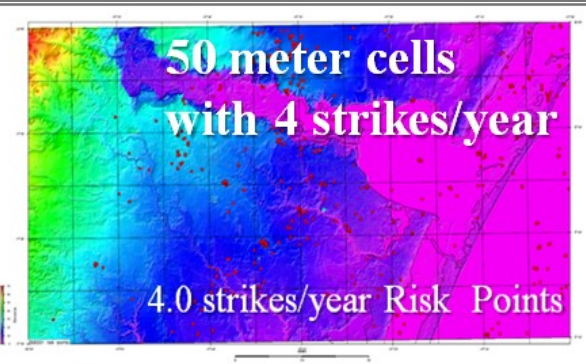
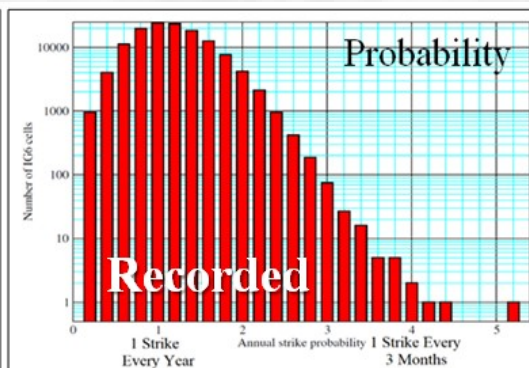
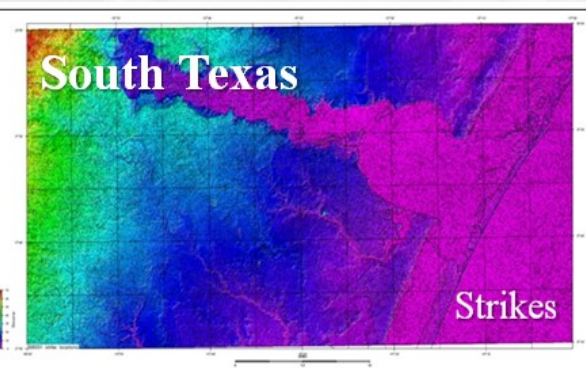
- ◆ These concepts have been in development since the 1980's.
- ◆ IP protection is currently by copyright (©), ServiceMarks (<sup>sm</sup>), and Trade Secrets and is owned by Walden 3-D, Inc.
- ◆ Subcomponents have been implemented in Dynamic Measurement LLC, Dynamic Resources Corporation, and Walden 3-D, Inc., each company started by H. Roice Nelson, Jr. For example, Dynamic Measurement:
  - ◆ Organizes millions of lightning strike locations using IG6 or IG7 cells. Not only does this approach allow the mapping and aggregation of lightning strike locations and attributes, it led to the development of Risk Points, where Dynamic Measurement can predict the probability lightning will strike within specific IG6 or IG7 cells.
  - ◆ Projects are organized and documented against the KB.
  - ◆ Time-lapse lightning analysis (for earthquake prediction and hydrocarbon migration studies) is being planned around the TD.
  - ◆ Data, Information, Reports, Knowledge, and Wisdom is stored in DT indexed folders.
- ◆ Southern Utah University's (SUU) Special Collections has agreed to archive 120+ boxes of historical data related to the founding of Landmark Graphics Corporation (also founded by Roice and doing over \$1 billion in annual business as a division of Haliburton on the 25<sup>th</sup> Anniversary year of the company (2007). An SUU student and Roice have completed indexing of over 90 posters and maps, and as COVID-19 restrictions are relaxed will start indexing the data in the different boxes against the IG, KB, TD, and DT indices as a proof-of-concept project.

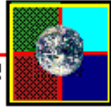




DML regional analysis of lightning strikes in South Texas, showing individual strikes, and IG7 cells which have the probability of having 4 lightning strikes per year (Risk Points).

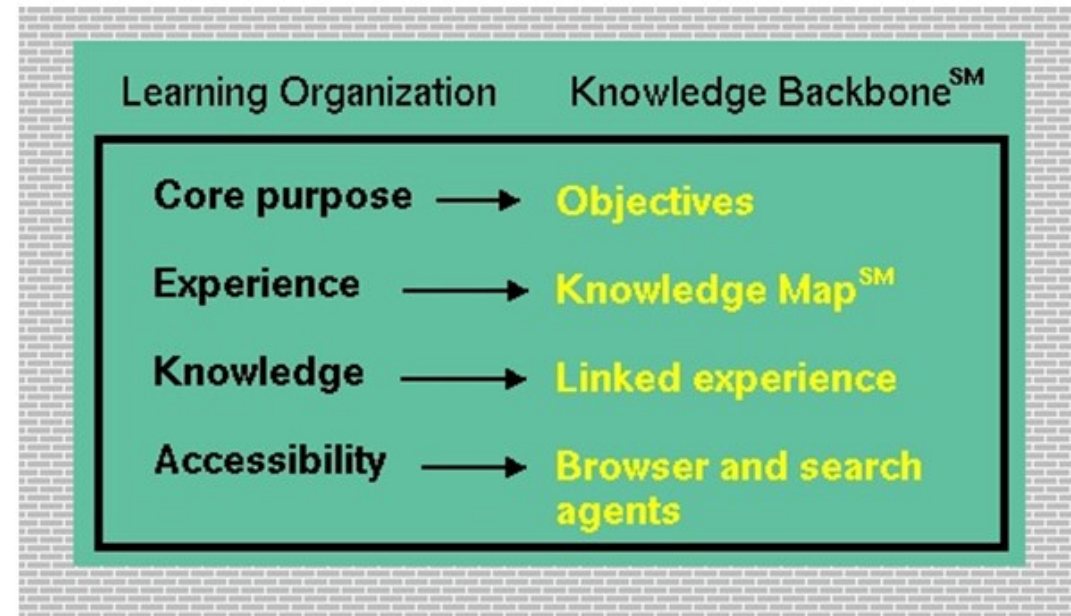
| Collection Register                           | Sub-Register                     | H. Roice & Andrea Shirts Nelson, Jr. Collection           |
|-----------------------------------------------|----------------------------------|-----------------------------------------------------------|
| 1 Administrative History                      | 0.10 subject files               | 1. Nelson Meat Packing Plant                              |
| 2 Associations and Conventions                | 0.20 minutes                     | 2. The KeyNotes                                           |
| 3 Athletics                                   | 0.30 correspondence/memos        | 3. Pan American                                           |
| 4 Academics, Curriculum and Coursework        | 0.40 scrapbooks                  | 4. Amoco                                                  |
| 5 Boy Scouts                                  | 0.50 press releases              | 5. Mobil Oil                                              |
| 6 Budget7                                     | 0.60 newspaper clippings         | 6. Computer Genealogical Services                         |
| 7 Commencement                                | 0.70 reports, annual             | 7. University of Houston's Seismic Acoustics Laboratory   |
| 8 Committees                                  | 0.80 reports, accreditation      | 8. University of Houston' Allied Geophysical Laboratories |
| 9 CommunityRelations                          | 0.90 policies and procedures     | 9. Landmark Graphics Corporation                          |
| 10 Development and Donations                  | 0.10 newsletters                 | 10. China Cattle Corporation                              |
| 11 Growth                                     | 0.11 newspapers                  | 11. Barker, Texas Design Project                          |
| 12 Enrollment                                 | 0.12 programs (awards)           | 12. Walden 3-D, Inc.                                      |
| 13 Extension Services and Farm                | 0.13 budgets, request            | 13. HyperMedia Corporation                                |
| 14 Facilities                                 | 0.14 budgets, analysis           | 14. Dynamic Oil & Gas Corporation                         |
| 15 Faculty                                    | 0.15 budgets, final (annual)     | 15. Advanced Structures Incorporated                      |
| 16 Financial Affairs                          | 0.16 audits                      | 16. The Global Basin Research Network                     |
| 17 High School                                | 0.17 surveys                     | 17. Virtual Seminars                                      |
| 18 Land Grants                                | 0.18 flyers, brochures, handouts | 18. Knowledge Backbone <sup>sm</sup>                      |
| 19 Legislative                                | 0.19 new program reports         | 19. Walden Visualization Systems Corporation              |
| 20 Library                                    | 0.20 financial statements        | 20. CES LLC (Creative Enterprise Solutions)               |
| 21 Payroll                                    | 0.21 program report              | 21. VR-Geo (Virtual Reality Geosciences)                  |
| 22 Pruchasing                                 | 0.22 studies, prioritization     | 22. Heritage Galleries On-Line Corporation                |
| 23 Alumni                                     | 0.23 one time report, speech     | 23. Continuum Resources International Corporation         |
| 24 Students-General                           | 0.24 proposals, reports orplans  | 24. North American RC-SIG                                 |
| 25 Students-Events                            | 0.25 reports (master plan)       | 25. vPatch, LLC                                           |
| 26 Student-Housing                            | 0.26 posters                     | 26. Periodic Newsletter / Virtual Seminar                 |
| 27 Student-Organizations                      | 0.27 yearbooks                   | 27. Dynamic Resources Corporation                         |
| 28 Student-Organizations-Executive Council    | 0.28 handbook, manual            | 28. Abbott's On-Line Atlas                                |
| 29 Student-Organizations-Greek                | 0.29 directory                   | 29. Layton Energy                                         |
| 30 Other Universities                         | 0.30 catalog                     | 30. Geophysical Development Corporation / Geokinetics     |
| 31 Outside Publicatinos                       | 0.31 schedule                    | 31. Dynamic Measurement LLC                               |
| 32 World War II                               | 0.32 publication                 | 32. The Urban Machine <sup>sm</sup>                       |
| 33 World War II-Army Contracts                | 0.33 publications, promotional   | 33. The Context Machine <sup>sm</sup>                     |
| 34 World War II-Civil Aeronautics Association | 0.34 publications, promotional   |                                                           |
| 35 World War II-Federal Works Agency          | 0.35 blueprints                  |                                                           |
| 36 Post World War II-Planning Commission      | 0.40 bills (Senate)              |                                                           |
| 37 World War II-Vetran Affairs                | 0.49 electronic mailings         |                                                           |
| 38 Korean War                                 | 0.50 slides                      |                                                           |
| 39 Viet Nam War                               | 0.51 photogrpahs                 |                                                           |
| 40 Middle East Wars                           | 0.52 VHS tapes                   |                                                           |
| 41 People Database                            | 0.53 microfilm/microfiche        |                                                           |
| 42 Collections:                               | 0.56 DVD/CD                      |                                                           |
| Michael O. Leavitt Collection                 | 0.60 proposed buidling report    |                                                           |
| Alva Leon & Barbara Matheson Collection       | 0.61 building in progress        |                                                           |
| Raymond S. Gardner Collection                 | 0.62 finished buidling report    |                                                           |



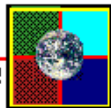


A KS is needed to take the Context Machine<sup>sm</sup> to the next level of demonstration.

- A. Replicated Computer Systems with automated backup.
- B. Oracle Database organized in 4 key components, each a 64-bit Word Index:
  - 1. Knowledge Backbone<sup>sm</sup>
  - 2. Infinite Grid<sup>sm</sup>
  - 3. TimeDex<sup>sm</sup>
  - 4. Data Type
- C. Contact (People) Database.
- D. Document Management System.
- E. Browser Front End.
- F. Integration of these Components.







## Donate:

- ◆ A related website, owned by Walden 3-D, Inc., is set up for donations. To donate go to: <https://squareup.com/store/psalmscountdown>
- ◆ Walden 3-D, Inc. is, in theory, a for-profit entity.
- ◆ Tax deductible donations can be made to SUU's Special Collections.\*
- ◆ Any amount will help buy and build a Knowledge Server<sup>sm</sup>, create rectified IG images with and without cell boundaries, and hire programmers to build a databases and User Interface for the 4 indices: IG, KB, TD, & DT.

## License:

- ◆ W3D will sell licenses to each of the 4 Indices for \$100,000 each per company (plus 20% of the price annual maintenance).
- ◆ W3D will license the Context Machine<sup>sm</sup> for \$500,000.
- ◆ W3D will grant a license to (a) specific index(ices) to companies providing software development or other equivalent benefits in exchange for a license.

\*Paula Mitchel  
SUU Special Collections Librarian  
Gerald R. Sherratt Library  
351 West University boulevard  
Cedar City, UT 84720  
Office: 435.586.7976  
[mitchellp@suu.edu](mailto:mitchellp@suu.edu)

## Site Host:

- ◆ W3D is seeking an entity (non-commercial / non-governmental) to host the master Context Machine<sup>sm</sup> collection.
- ◆ Once the master collection site is established, licenses will be sold to establish remote replicated collection sites. The goal is to have self-funded rectified and verified Context Machines<sup>sm</sup> distributed across the globe supporting academia, industry, governments, and individuals.

For further information please contact:

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Cedar City, UT 84720

[rnelson@walden3d.com](mailto:rnelson@walden3d.com)

713.542.2207