DATA CENTER

Make sense of your data

David Brock, Founder and Director
Data Center
Massachusetts Institute of Technology
40% to 60% annual data increase
PROBLEM

What are you going to do with all your Data?
DATA CENTER

Make sense of your data
EXAMPLE - LOGISTICS
EXAMPLE - LOGISTICS
DATA
DATA

Data
DRIVERS

Inside the Future: Tracking Moore's Law

XML
HTML
EPC
HTTP
TCP/IP
SOAP

U.S. Census Bureau

Low Temperature (F) Ending Thu Jul 06 2006 02:00 EDT

National Digital Forecast Database
Experimental graphics updated 07/06/2006 02:00 EDT
VISION

Mission
- Make sense of your data

Task
- Create the standards and systems for interoperable data and modeling
How do we synchronize data?
XML
XML is like a form.
PROBLEM

Different forms?
Can’t we just agree on one form?
STANDARD?

Whose form?
INTEGRATE
INTEGRATE
M

A Modeling Language
EXAMPLE – SHELF LIFE
EXAMPLE – SHELF LIFE

Current Type 3 Tag w/Temp Sensor

Next Generation Application Specific Integrated Circuit (ASIC)

350 Micron NanoBlock™ chips
EXAMPLE – SHELF LIFE
EXAMPLE – SHELF LIFE
EXAMPLE – SHELF LIFE

\[
\frac{\partial Q}{\partial t} = -k_1 e^{\left[-\frac{E_a}{R_g T(t)}\right]} Q^n
\]

Variables

- \( E_a \)  Activation energy
- \( k_1 \)  Arrhenius constant
- \( n \)  Order of the reaction
- \( T \)  Temperature
- \( Q \)  Quality
- \( t \)  Time
EXAMPLE – SHELF LIFE

\[ Q = \frac{t_k}{T_g R_a E Q_t} \]
EXAMPLE – SHELF LIFE

Name: Food Quality
Description: Food Quality based Arrhenius
Developer: Natick Army Laboratories
ID: EPC: 010300908808BF60000000AA
Comp: $0.25 per month
Type: Analytic
Rate: 1 to 10,000 sec
Algorithm:

---

Name: Activation Energy
Symbol: \( E_a \)
Access: Read
ID: EPC: 010300908808BF6000000102
Class: Scalar
Type: Float
Unit: \( m = 2 \ kg = 1 \ s = -2 \ u = -1 \)
Default: 25000.0

Name: Arrhenius Constant
Symbol: \( k_1 \)
Access: Read
ID: EPC: 010200908238760000023877
Class: Scalar
Type: Float
Unit: \( s = -1 \)
Default: 0.002

Name: Temperature
Symbol: \( T \)
Access: Read
ID: EPC: 010200908238760000023877
Class: Scalar
Type: Float
Unit: \( k = 1 \)
Default: 286.0

Name: Quality
Symbol: \( Q \)
Access: Write
ID: EPC: 010200907ABC8 60000012875
Class: Scalar
Type: Float
Unit: \( s = -1 \)
Default: 100.0

Name: Order of Reaction
Symbol: \( n \)
Access: Read
ID: EPC: 01020084191000001289731
Class: Scalar
Type: Int
Default: 1
### Example – Shelf Life

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<th>080 Deg</th>
<th>100 Deg</th>
<th>120 Deg</th>
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**Graph:**

- **Mean Acceptance**
- **WEEKS**
- **080 Deg.**
- **100 Deg.**
- **120 Deg.**
EXAMPLE – SHELF LIFE

\[ T, \text{n, k}_1, E_a \]

Keep or Toss

\[ Q \]

PML
EXAMPLE – SHELF LIFE

Class 1 Assessment

ISSUE

INSPECT

DISPOSE
EXAMPLE – SHELF LIFE

- 76 Million cases of foodborne disease
- 325,000 hospitalizations
- 5000 deaths*

- 1.8 Million deaths from foodborne illness worldwide

- 91 Million tons of food disposed
- Transported to landfills
- 26% of food supply*

* United States figures
PETROLEUM INDUSTRY WORKSHOP
www.mitdatacenter.org