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Session II: Building Our Digital Future
What We Want

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The Kansas City Plant is operated and managed by Honeywell Federal Manufacturing & Technologies, LLC, for the NNSA.

National Nuclear Security Administration

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Readiness 24 X 7 X 365

- **Readiness: Capability to meet objectives because mission-critical digital information and computer-based processes are always available and usable no matter what the circumstances.**
- **Able to adapt to a rapidly changing digital environment without disrupting operations.**
- **Able to reuse processes and knowledge at will.**

Results We Want

Results

- + A positive culture to digital preservation
- + Ability to place a value on knowledge
- + Achievement of a reuse culture
- + Enhanced user experience of knowledge workers
- + Greater trust in the use of computers to assist preservation tasks
- + Higher confidence in the integrity of product data
- + Increased amount of reusable knowledge with high integrity
- + Increased customer confidence in the organization's competencies for preservation
- + Insure protection against future litigation
- + One place for preservation data
- + Prevention of irretrievable loss of product data
- + Decreased cost and effort of managing record life cycle
- + Provide consistent and high quality service
- + Measures

(from Situation Analysis)

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The Crisis We Expect

- **Aerospace manufacturers are driven to go digital.**
  - **NASA digital shuttle**
  - **Boeing military aircraft**
  - **Lockheed Martin Joint Strike Fighter**
- **Huge integrated knowledge bases with millions of files of many different file formats will be the order.**
- **Efficiency and collaboration are high on the list.**
- **NNSA is moving to Model Based Enterprise.**
- **No manufacturer has a sustainability strategy.**
- **Loss of data is inevitable without a sustainability strategy.**

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We Want to Stay Afloat!

When the water comes in faster than the bilge pumps can run, the ship sinks. Data may be growing so rapidly that we may already be "sinking" and don't know it.

The possibility of a digital disaster is high.

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We Want More than Sustainable Data Formats

- A data format is a carrier for a message.
- A future system could understand the format but not the message – it could also forget the format.
- Preserving a message is a lot bigger deal than preserving the data format that carries the message.
- A message can be encoded into many formats and each message will probably survive.
- It probably is not possible to preserve a message in the ideal sense.
- A realistic goal: extended message provenance that informs the user, in myriad ways, about the meaning of the message (metadata on steroids).

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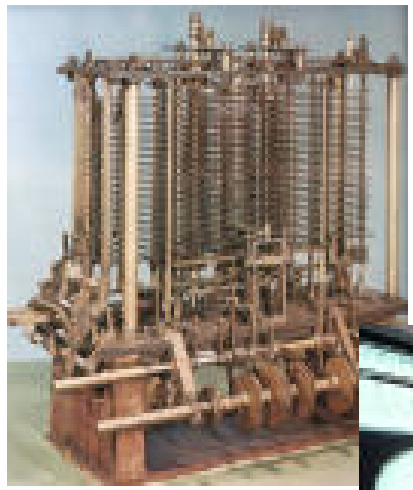
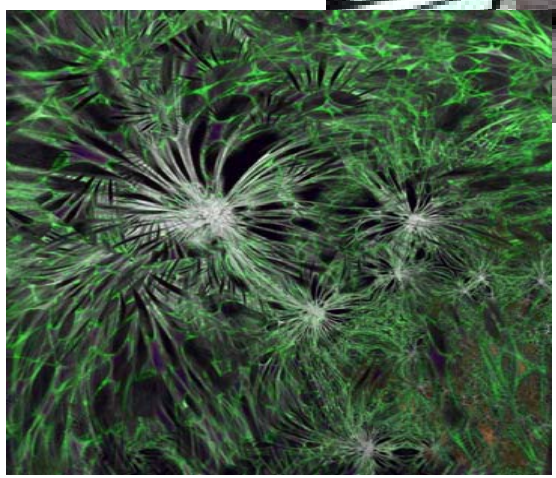
Something Must Change

- **The Past**
  - **Mechanics prominent – data is subordinate**
- **The Present**
  - **Electronics prominent – data still slaved to technology**
- **The Future**
  - **Content is finally emancipated from technology**
  - **Knowledge is connected**



mechanical

electronic



cerebral

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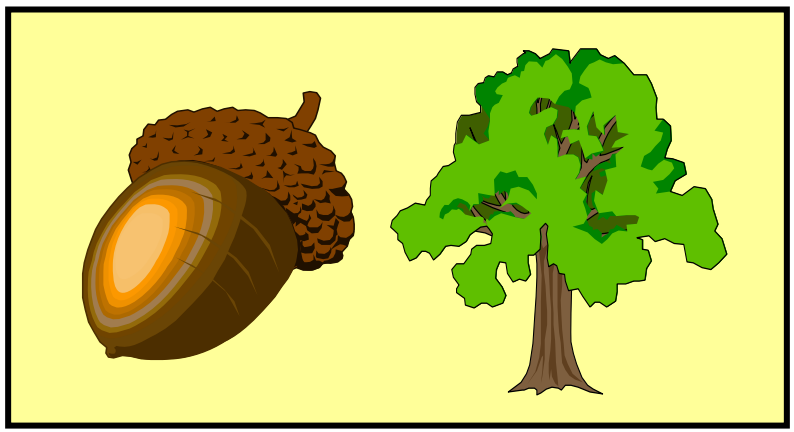
We Want the ERA to Copy Nature

- **Nature stores a basic biological recipe in natural objects.**
- **This recipe is very stable and compact and does not degrade over time.**
- **The recipe is quite robust and to a high degree independent of its environment.**



Acorns to Oaks over and over again

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Our Partnership with NARA

- **Started in spring of 2003**
- **Has given us access to research prototype systems.**
  - **Distributed computing - Storage Resource Broker (SRB)**
  - **MCAT – metadata cataloging system**
  - **MySRB – Web interface to SRB**
  - **Archivist Workbench – Digital data accession system**
- **Has offered training and implementation assistance.**
- **Has brought recognition of KCP preservation efforts to national leaders.**
- **Has advised on preservation directions.**

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A Common Interest

- **OAIS Reference Model**
  - **Strong requirements for knowing and representing the data and information that we submit for preservation**
  - **Parallels the KCP experience in ISO standards development**
- **International Standards for engineering data**
- **Need for long-term durable digital data**
- **A sense of timing and pace and what can be done**
- **NARA and NNSA embrace all data that's digital**

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What We Like about the ERA Conceptualization and Design

- Strong vision backed by research
- Accurate understanding of current situation
- Careful envisioning – putting feet on vision
- Based on expansive roadmap (OAIS) that allows incremental accomplishments as well as breakthroughs – big thinking not narrow thinking.
- Balanced human and systems viewpoints (ConOps, RD)
- Design latitude is BIG but unfolds over time

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KCP's Feelings: NARA Analysis is on the Right Track

- **NARA ConOPS and RD are concentrated on the development step at which most system developments fail: solution envisioning.**

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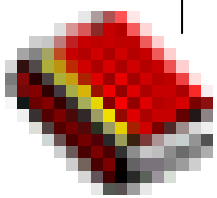
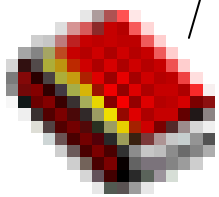
KCP Response to ConOps/RD: NARA Builds Dual View (user and system)

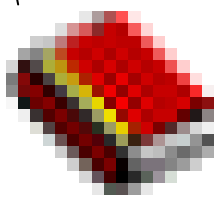
Analyze Situation	Envision Solution	Build the System
What does NARA value? What matters to NARA? What is NARA's Business? (role-based scenarios) Reconciles views into a framework	What does a future system do for NARA? (user viewpoint) What are the NARA detailed Functional Specifications? (system viewpoint)	How do we build the NARA system? How do we deploy the NARA system?



ConOps



RD



OAIS Reference Model

KCP Response: NARA Puts Analysis Energy in the Right Place - Envisioning

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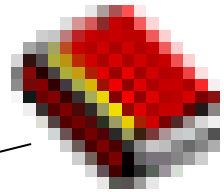
Envision Solution

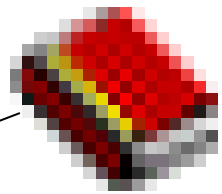
What does a Future system Do for NARA?
(user viewpoint)



ConOps

"The *preserver* ensures that ERA captures and retains metadata . . ." role-based use

What are the Specific NARA System Requirements?
(system viewpoint)



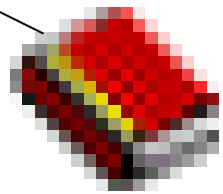
RD

"ERA3.1 The system shall support description of records at multiple levels."

"ERA3.1.1 The system shall provide for the description of record groups.

ERA 3.1.2 The system shall provide for the description of collections.
..."

OAIS is system reference architecture



OAIS Reference Model

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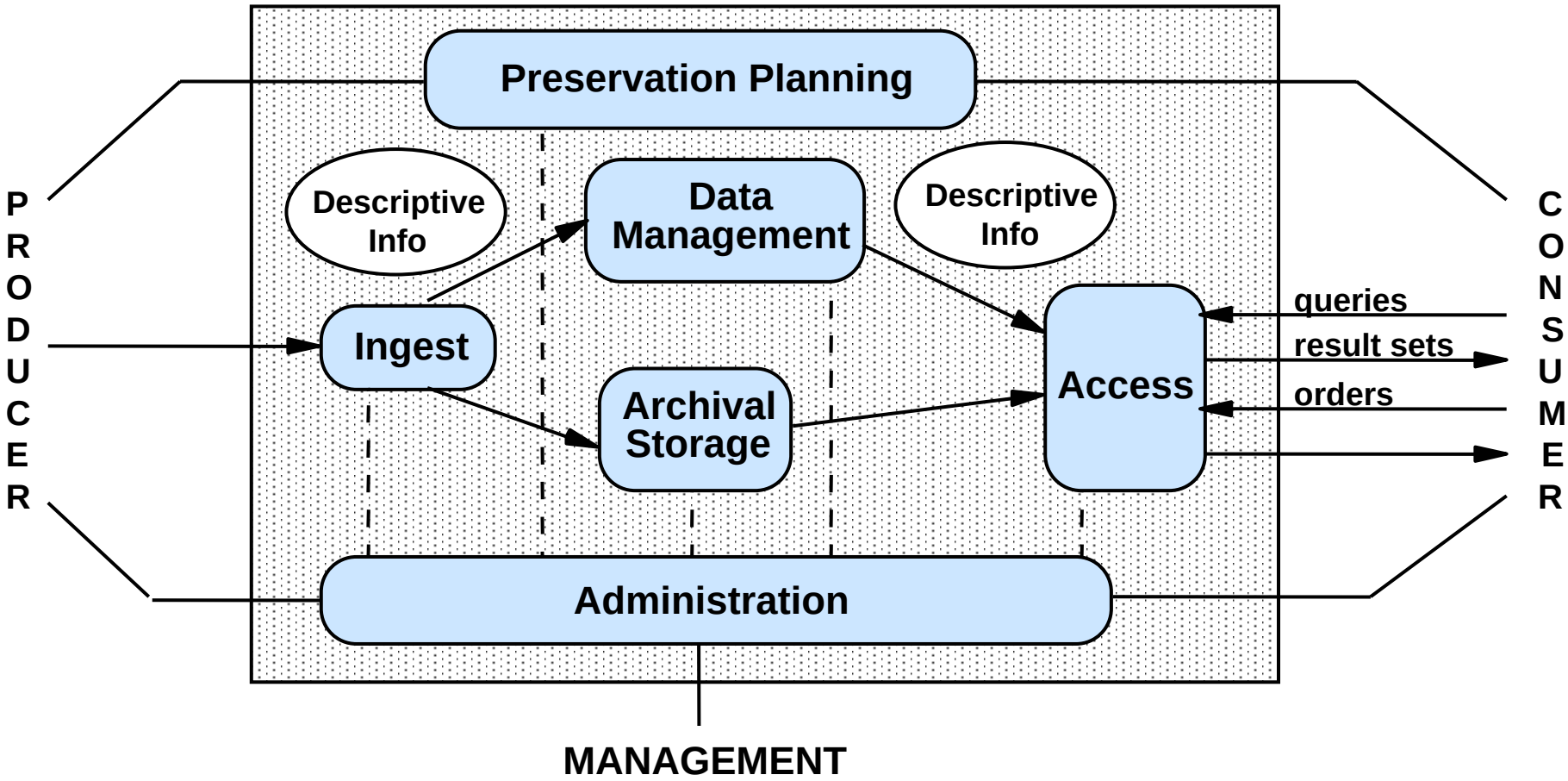
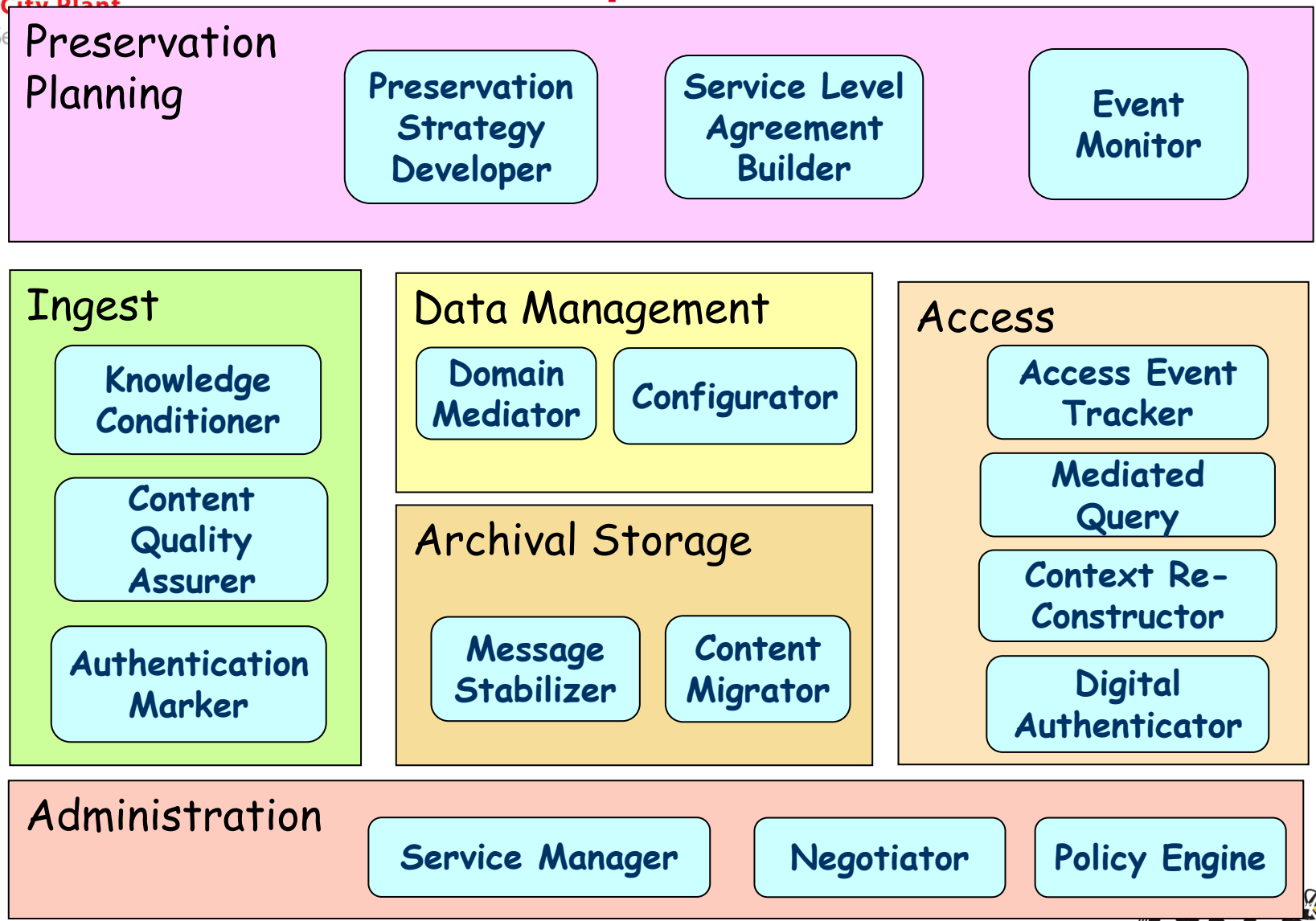
OAIS Reference Model



Digital Depot – an Integrated Set of Capabilities



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What We See in the Future

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The New Face of Archiving

- **Mandates the notion of persistence: the capability to recover digital resources to sustain operations.**
- **Expands scope of applicability beyond data to include processes and computer programs.**
- **Has a much tighter and synergistic link to operational systems.**
- **Does not entomb the resources it protects.**
- **Becomes a technology and business asset that is used throughout the entire life cycle of data and process.**
- **New systemic characteristics – open and distributed.**

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From Time and Space to Time-Space

- **Today:**
  - **Operate across space when we transfer data between two systems**
  - **Operate across time when we submit data for long term preservation**
- **Future:**
  - **Operations across space and time will go hand-in-hand**
  - **Cannot separate operations across space and operations across time**
- **Not just two dimensions but the coordinate space they frame**

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What Drives Us to the Future

- **Making digital preservation part of the business processes that support the NNSA mission.**
- **Wanting our people to understand how to prepare for digital preservation.**
- **Building retention and preservation into new systems.**
- **Knowing the digital resources we have. Being able to retrieve, manage, and protect them.**

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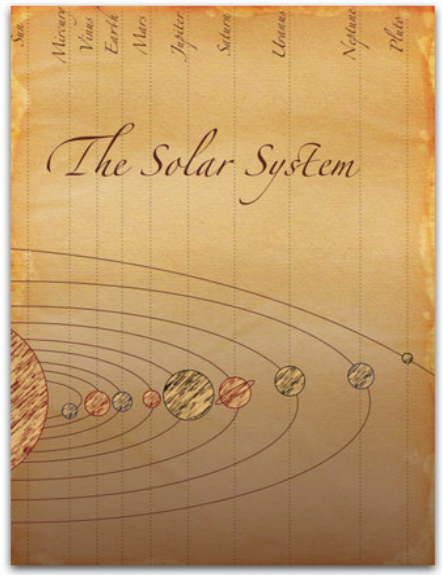
Copernicus Revisited

- **Now**
  - **Technology is center of universe**
  - **Data and Knowledge adapt**
  - **to technology**

Armillary spheres



- **Future**
  - **Knowledge is center of the universe**
  - **Technology adapts to knowledge**

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How We See ERA

- **We see the release of the first production ERA as an inaugural moment.**
- **We see a line being drawn in the sand that says "let's do something about preservation of digital data" – we want to take the first step with NARA and other government agencies.**
- **We see an invitation to move away from the hegemony of systems over knowledge.**
- **We see an opportunity to grow.**
- **We are in for the long haul.**