

NATIONAL RECONNAISSANCE OFFICE

# Developing the Foundation for the Ground Architecture

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VIGILANCE FROM ABOVE

CLASSIFY AS APPROPRIATE ON MASTER SLIDE



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# California Dreamin' on Ground Architecture



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# What I See

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- ✦ All data is aggregated in the same format
- ✦ Cost of collecting & processing data from space, air & surface sensors can be reduced significantly
- ✦ Ground infrastructure fully leveraging IT potential

**If you can do it at home, we should be able to do it for DoD / IC**

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# A.C.T.

## + Access

Information available & discoverable to all authorized to possess

## + Content

Fully exploited, relevant, comprehensive, properly formatted information

## + Timeliness

Information (& data) within users' decision loops

**Focus is on the User**

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# Access

- ✦ **Provide access to large data files – up to full data content**
- ✦ **Provide Internet ease of discovery**
- ✦ **Allow users to defined product content & structure**
- ✦ **Push key data/information as soon as available**
- ✦ **Provide information receipt assessment – Feedback**
- ✦ **Assure availability – Redundancy, capacity**
- ✦ **Assure security – Automated Identity Management**

**Don't Let the User Get Lost in the “Digital Junkyard”**

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# Content

- ✦ **Capture and extract ALL relevant data within sensed phenomenon – Signal Processing Improvements**
- ✦ **Capture and extract all new modalities from all available sensors and compare with existing libraries**
- ✦ **Process data to trustworthy information in real-time**
- ✦ **Display information in intuitive form – visualized, geo-referenced, cross referenced, attributable**
- ✦ **Allow for unanticipated information needs**
- ✦ **Real-Time assessment of information utility - Feedback**

**Federated architecture & IT developments enable more opportunities & flexibility**



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# Timeliness

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- ✦ **Capture, Stage, Process, Disseminate Data/Information in Real-Time – Streaming Processing**
- ✦ **Continuously Update Information**
- ✦ **Anticipate Data/Information Needs**

**Allow User to Act Faster than Adversary/Competitor**

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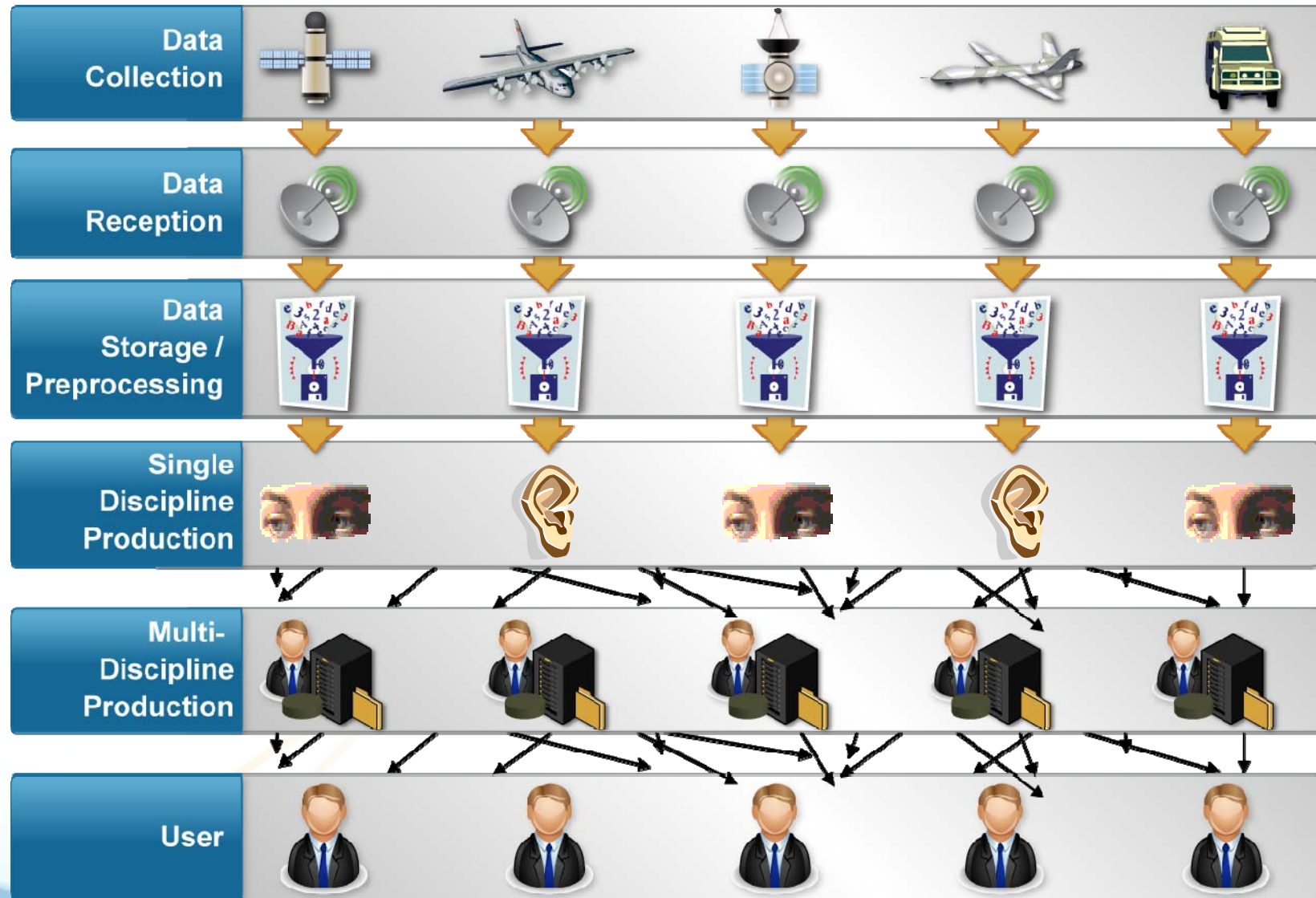




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# Environment for A.C.T.

## Today – Trapped in the “Digital Junkyard”



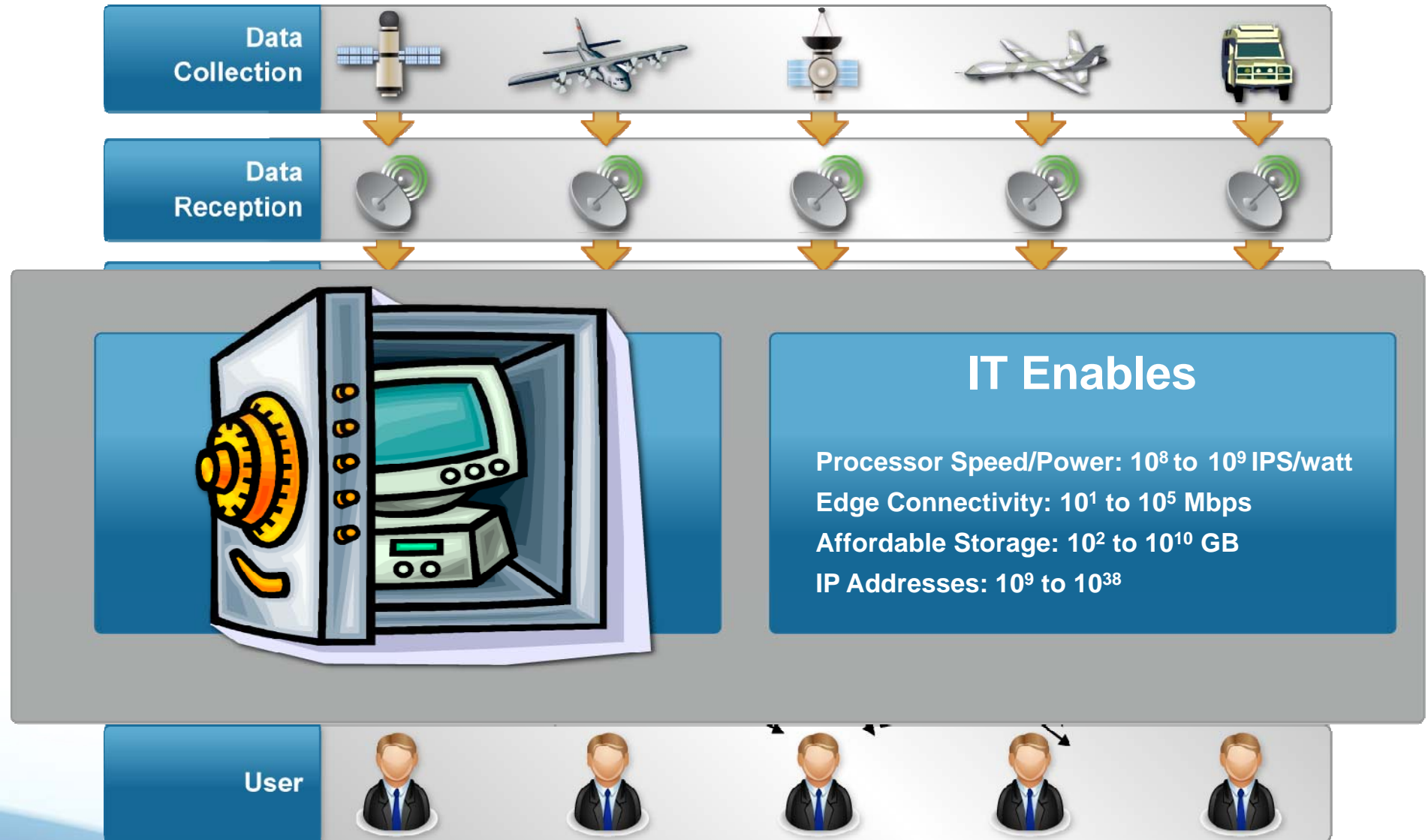
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# Environment for A.C.T. Need to Unlock the Architecture

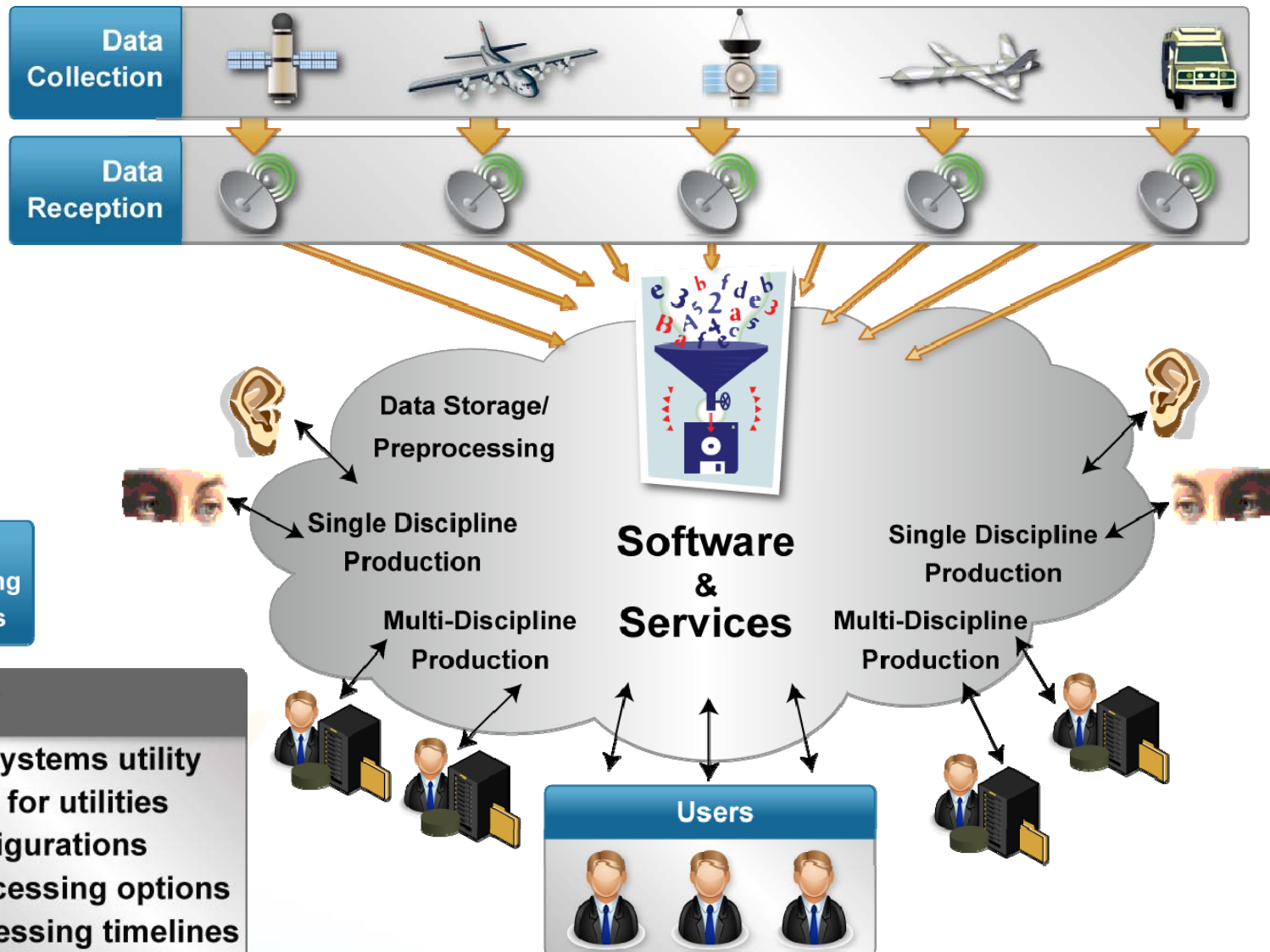


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# Environment for A.C.T. Future – Leveraging Power of IT



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# Case Study: Neural Networks On Cloud Computing “EvoDevo”

1000s of Commercial  
Imagery Chips of Ships  
and non-ships  
from Navy

GEO-EYE



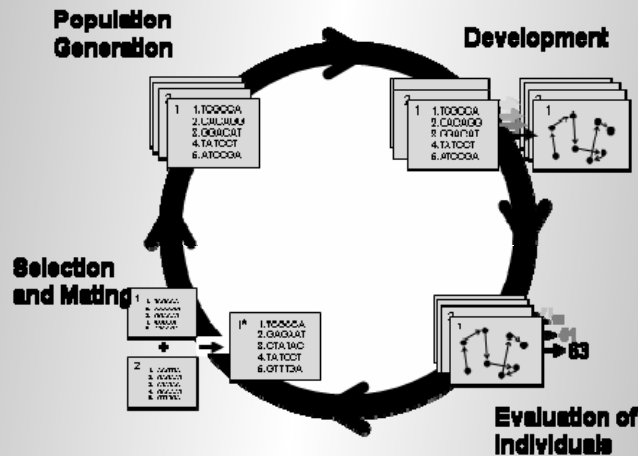
QuickBird



GEO-EYE



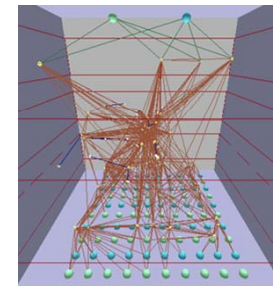
Elastic Cloud Computing (EC2) provides  
800 CPUs dynamically and simultaneously



EvoDevo “grows”  
millions of networks looking for the  
best candidate



Result:  
A network  
capable of  
detecting ships  
in imagery



## Key Successes

- Achieved 97% Pd / 10% Pfa
- \$2M+ reduced to \$200/run
- 2+ week runtime reduced to 2 hours

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# What We Need From Our Industry

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- ✦ **Leverage the most advanced tools from the commercial industry**
  - Develop SW/Tools to implement
- ✦ **Expand our pursuit**
  - Address today's problems
  - Use the very best apps for each problem
  - Minimize cost while increasing capabilities
- ✦ **Recognize/mitigate hazards/risks**
  - Security – Identity Management
  - Assurance

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