ACD Data and Informatics Working Group

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Data Are A Vital Resource

The World’s Technological Capacity to Store, Communicate, and Compute Information

Martin Hilbert1 and Priscila López2

We estimated the world’s technological capacity to store, communicate, and compute information, tracking 60 analog and digital technologies during the period from 1966 to 2007. In 2007, humankind was able to store $2.9 \times 10^{15}$ bytes, and carry out $6.4 \times 10^{18}$ instructions per second on general-purpose computers. General-purpose computing capacity grew at an annual rate of 58%. The world’s capacity for bidirectional telecommunication grew at 28% per year, closely followed by the increase in globally stored information (23%). Humankind’s capacity for unidirectional information diffusion through broadcasting channels has experienced comparatively modest annual growth (6%). Telecommunication has been dominated by digital technologies since 1990 (99.9% in digital format in 2007), and the majority of our technological memory has been in digital format since the early 2000s (94% digital in 2007).
Working Group Charge

- Provide the ACD and the NIH Director with expert advice on the management, integration, and analysis of large biomedical datasets
- The ACD WG will integrate their efforts with the
  - NCBI Needs-Assessment Panel
  - NIH IT Assessment Group
Areas to Address

- Research data spanning basic science through clinical and population research
  - The connection and integration of large volumes of “omics” data with other large data sets including clinical and phenotypic data
  - The management and curation of these large data sets, including the use of new and emerging technologies (e.g. clouds)
  - The analysis of these integrated data sets to facilitate the development of more sophisticated predictive models of disease susceptibility and pathobiology
Areas to Address

- Administrative data related to grant applications, reviews, and management
  - The management and curation of large administrative data sets, including the use of new and emerging technologies (e.g. clouds)
  - The analysis of integrated data sets to facilitate strategic planning and portfolio management
- Where applicable, the release of this information in a ‘user-friendly’ manner
Areas to Address

- Management of information technology (IT) at the NIH
  - The appropriate level of centralization of IT and/or data management
  - The identification of best practices of IT and data management for the NIH to adopt
# Proposed Membership of Working Group

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<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Title</th>
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<tbody>
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