



industrial technology transfer a personal view

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overview

- why this is a hard, pervasive, frustrating problem
- a personal, anecdotal recounting of some things that worked, and some that didn't
- a few rules of thumb about environment, motivation and rewards

Saturn and his children

- disruptive technology and the innovator's dilemma
 - entrepreneurs vs. caretakers

examples:

- RISC at IBM
- RISC at hp
- ink jet printing

observations

- need for separate organization and executive champion for disruptive technologies
- must solve clearly perceived company problem if not new opportunity
- guided executive review of in-place technology effective
- product line differentiation key for coexistence

the vision thing

- vital for executive backbone strengthening, employee morale and strategic decision making
- changes isolated product/technology adoption to support of strategic intent

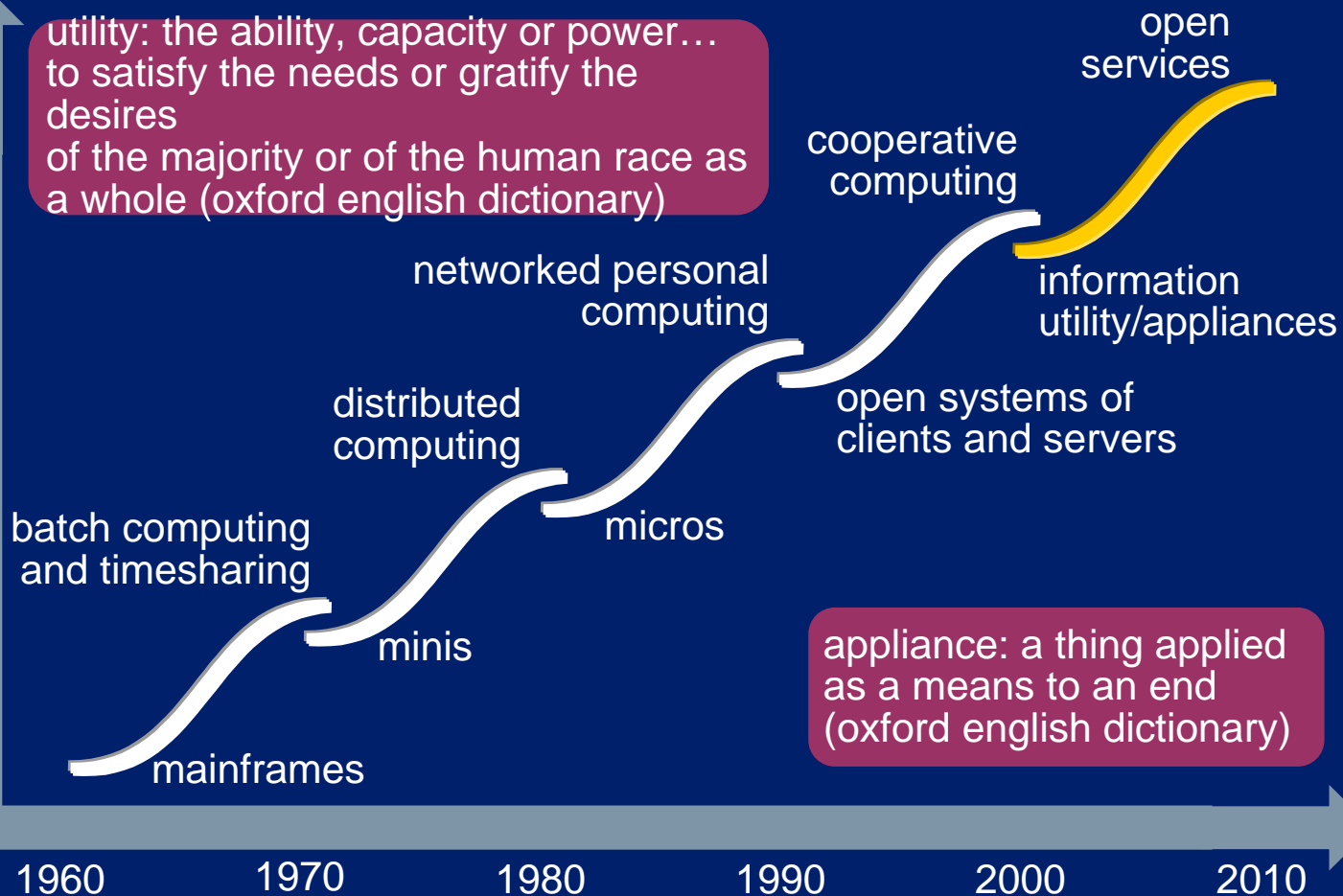
examples:

- pervasive computing: information appliances and utilities
- MC²: the fusion of measurement, computing and communication

toward pervasive information systems

penetration

utility: the ability, capacity or power...
to satisfy the needs or gratify the
desires
of the majority or of the human race as
a whole (oxford english dictionary)

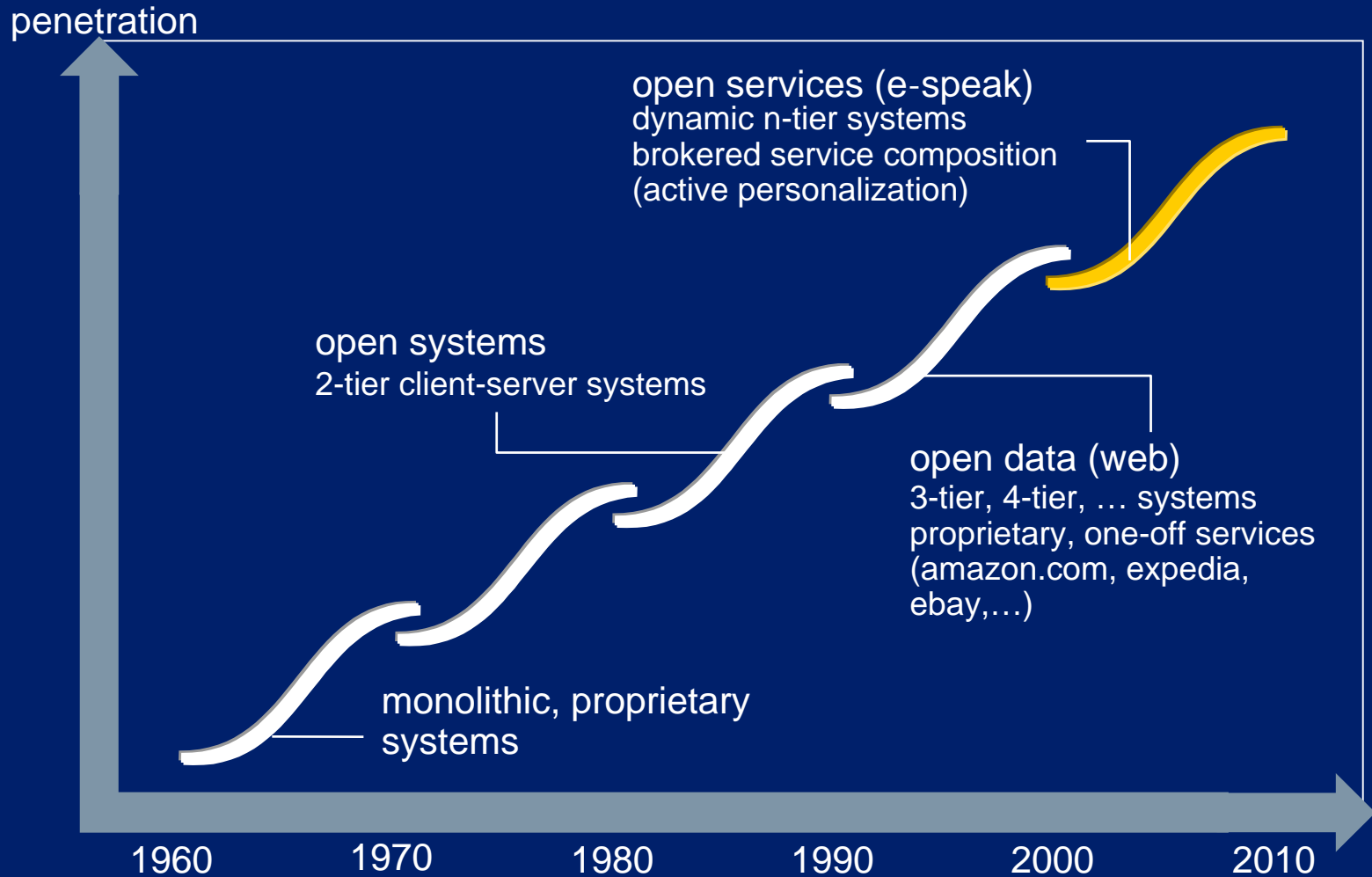


appliance: a thing applied
as a means to an end
(oxford english dictionary)

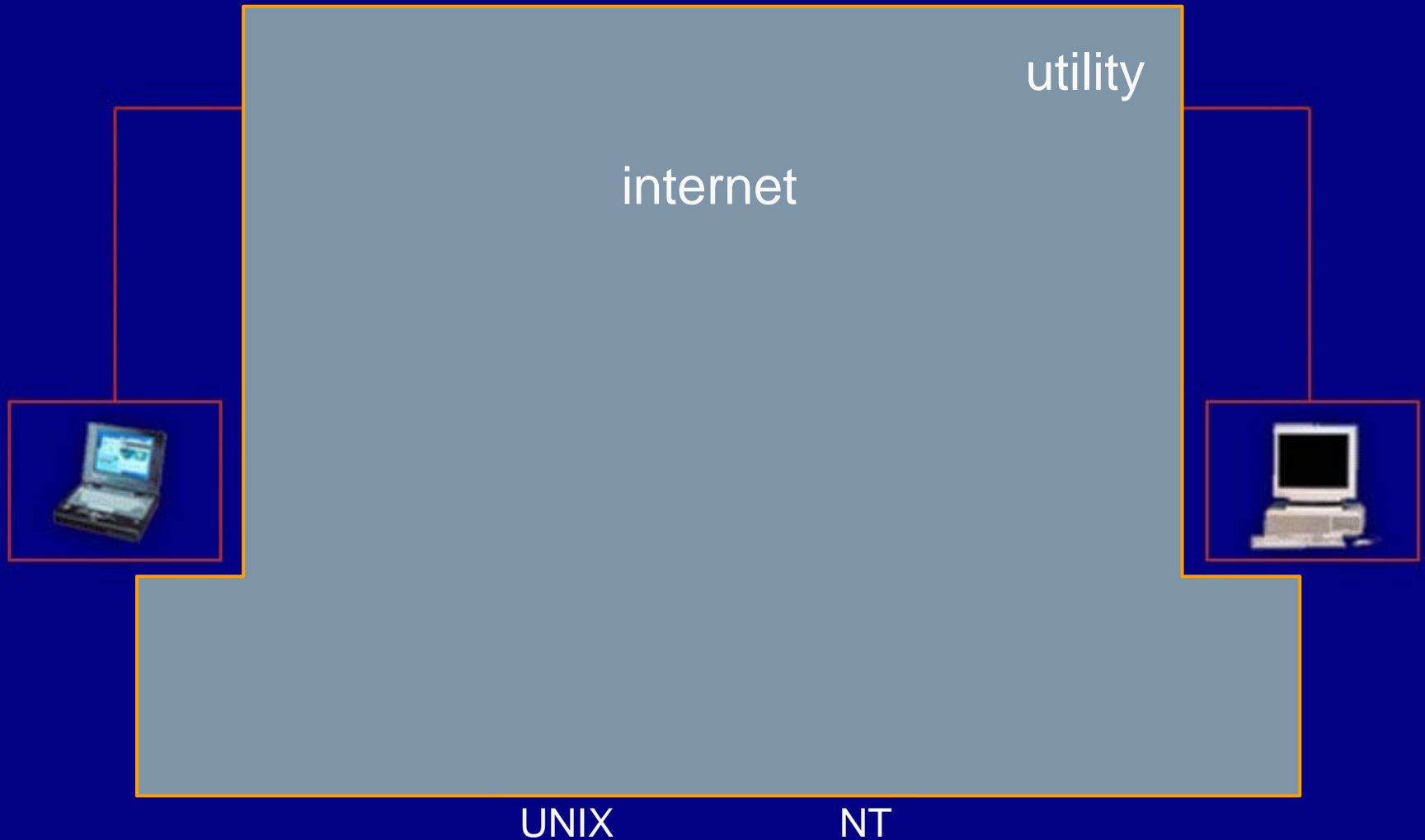
enablers of pervasive information systems

- general accessibility through intuitive interfaces
- a supporting infrastructure, perceived valuable, based on enduring standards
- MOSAIC browser and world wide web are enablers of global information infrastructure

systems evolution



architecture of an information utility for electronic services



information appliances:

- are characterized by what they do
- hide their own complexity
- conform to a mental model of usage
- are consistent and predictable
- can be tailored
- need not be portable





i n v e n t

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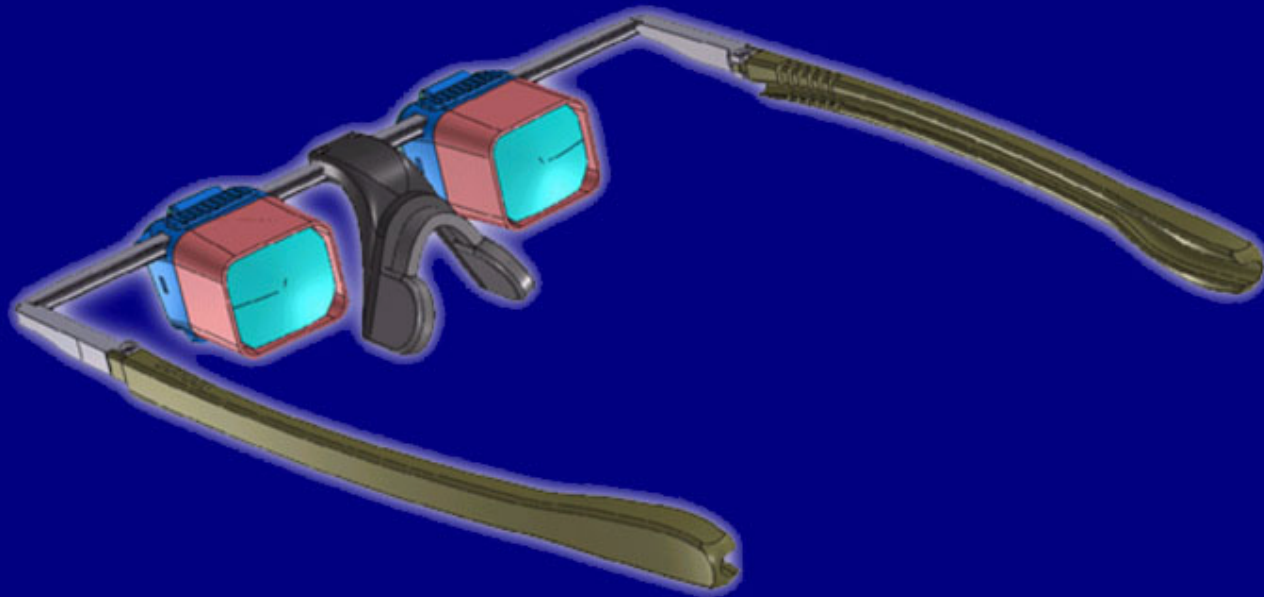
- visualization of concept products and systems can help employee and end customer buy-in
- integrated strategies must be led from the top
- flexible business models necessary
- organizational integration more important than technology alignment

new life for old technologies

examples:

- digital photography and ink, image capture
- gps and precision agriculture
- blue diodes and personal displays

eyeglass appliance



new life for old technologies

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observations:

- sometimes a good defense is a better argument than a good offense
- research-based market assessment team vital

to a hammer,
everything looks
like a nail

application of core competencies
to new problems can produce
disruptive solutions

examples:

- ink jet technology and optical network switches
- ink jet technology and gene chips
- ink jet technology and printed circuits

observations:

- won't work without flexible, interdisciplinary organization structure
- reward system for teamwork essential
- executive support for new organization often needed early in cycle
- voluntary open houses help

standards and open systems

critical for global networked solutions, many consumer markets

examples:

- DVD+RW
- I²O
- EPIC architecture (IA-64)
- e"speak

what is e“speak?

e“speak.

The universal language of e-services

- e“speak is an open services platform for the
 - creation,
 - composition,
 - mediation,
 - virtualization,
 - management and
 - accessing
- of internet-based services.

standards and open systems

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observations:

- requires significant, full-time resource of high-quality people
- partners, consortia and compromise necessary ingredients
- company follow-through for sustainable competitive advantage crucial
- often, half a loaf is better than none

if at first you
don't succeed...

new life for transfer failures
in new markets or
with new customers

examples:

- advanced dictation system → voicemail
- scanner navigation system → optical mouse

hp CapShare 910 information appliance



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observations:

- systematic post-mortem process, including time for participants to seek new customers
- market development staff very helpful
- don't attack new markets with old organization money

some personal observations

review process essential for buy-in

- attendance
- timing
- multiple exposures
- follow-up
- competitive analysis

prototypes usually necessary/desirable

- full solutions, not cross-section
- balancing credibility with cost and speed
- replication capabilities for field trials
- skilled observers/evaluators for field trials
- special budgets needed

some personal observations (continued)

partnership: a two-edged sword

- internal
 - share costs, consult on design for manufacturability, etc.
 - people exchange/collaboration through process *sometimes* desirable
 - need flexible people transfer, consistent titles/pay in research and development
 - non-elite research organization
 - but...
- external
 - vital for standards creation
 - potentially helpful for customer knowledge, market understanding, cost sharing
 - but...

some personal observations (continued)

know thy customer, but not too well

- adversarial vs. collegial relations with development organization
- negotiated right to say no
- use of senior scientists and engineers in staff roles, market evaluation
- distinguish between customer and end user
- imaginative understanding of user needs

metrics

- they DO change behavior
- simplistic quantification very dangerous
- informed but accurate assessments (self and customer) work best
- doing “no measurement” is unacceptable

some personal observations (continued)

creating the environment for transfer

- collaboration on creation of business strategy, tactics
- sabbaticals for key people
- funded transfer of team
- funding models
- research representation at top executive levels
- independence for disruptive efforts

some personal observations (continued)

incentives and motivation

- separate criteria for basic and applied research, viewed as continuum
- celebration of “failure”
- fellows: rolling reappointment
- awards: individual and team
- grass roots sponsorship of research
- summer employment of students/experts
- the Birnbaum Prize

summary

the big three

research management

- promote consistent vision, strategic intent
- seek executive champions
- separate organization, funding for disruptive technologies

researchers

imaginative understanding of user needs

collegial relationship with customers

understanding of market dynamics



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