

# Software Simplicity, and hence Safety

## -- Thwarted for Decades

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# Simplification stifled

- Computer users want simplicity.
- Providers benefit from complexity.

Result:

Intolerance of serious simplification.

Intolerance of truth about simplification.

A widening swath of death and destruction,  
waste, frustration, and ignorance.

# Documents

- Prose Specification, IBM 1977. Provides simpler SW than current languages.
- Computing Surveys, March 1996.  
69 articles spanning computer science (but ignoring simplicity).
- Sen. Kerry correspondence.  
He asked 8 US government agencies.  
All evaded question about 25 year lapse.

# How Intolerant of the Truth about Simplification?

- NSF, NIST, NASA, GAO, DoD, DoEd, etc.
- IBM
- World Wide Web Consortium
- ACM/IEEE
- Hewlett Packard
- Microsoft
- High Dependability Computing Consortium
- MIT

# How paralyzed , and why?

- Many incentives to complicate.  
Relentless, in many fields over centuries.
- SW users locked in. Competition glacial.
- Disconnect from traditional engineering.
- Responsibility is easily avoided.
- The story besmirches the elite.

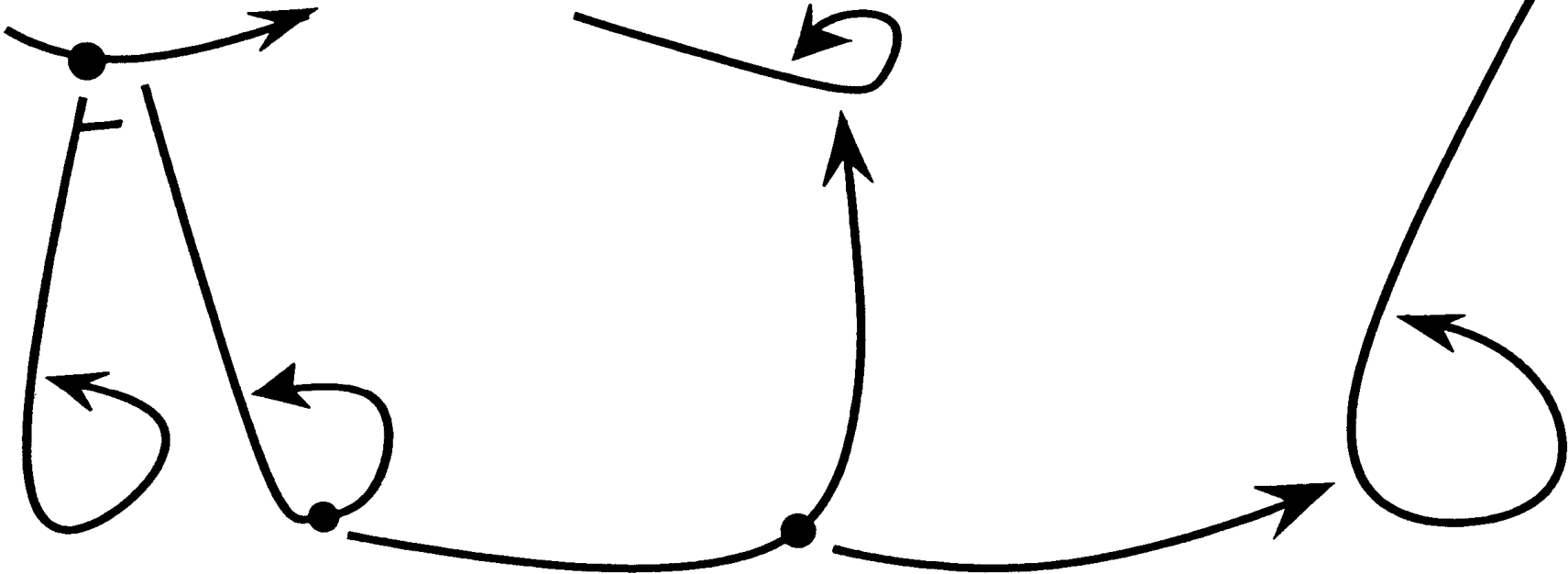
# What can we do?

- Find energy and will to simplify.
- Fix responsibilities by exposing.  
If you pay taxes or tuition, make demands.
- Investigate. Compare with other fiascos.
- Confront prestigious menaces to public safety.

# A number representing the age of a person

A person peg

An age class



2 persons

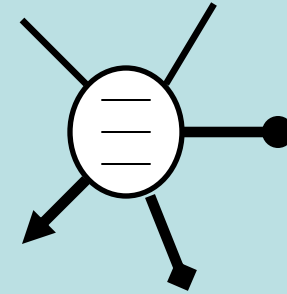
an age peg

an age link

a number

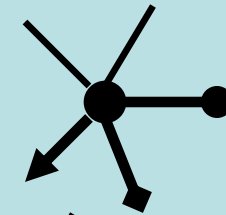
# Simplicity Constrains data objects

General data object



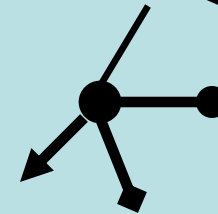
No internal state

→ avoid encodings



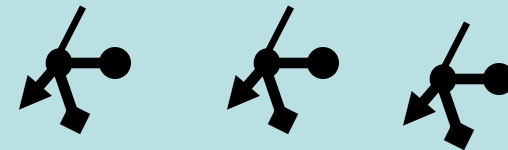
No symmetry

→ avoids ambiguity

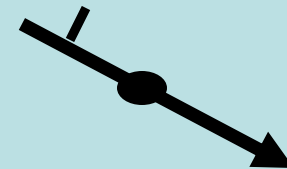


All the same

→ simpler language



Further constraints



# Many Minds Hobbled

- Knowledge workers massively arrange pieces of information.
- Educators massively teach how to arrange pieces of information.
- They have little idea what is a reasonable structure for pieces of information!

Result: a massive failure to express any precise information precisely. (Not just SW).

# Irreducibility optima

- Eliminate vibration → round wheels
- Eliminate distortion → flat mirrors
- Eliminate sliding → parallel brick faces
- Eliminate needless complexity →  
hierarchicaly interconnected pointer objects

About 25 similar engineering solutions

Permanent, practical, perfect

Enormous economic and social value

# Unblocked simplifications

- Combine functional (SQL, APL) and structural (C,Ada) expressiveness.
- Language generality.
- Fine grain application packaging.
- Reusability. Adaptability.
- Technological stability.
- Integrated learning.