

List of items to be looked at:

every site is looking at things anyway for infrastructure improvements (local view, 'adiabatic' improvements):

Hardware (essentially requirements for the regular procurements)

- next generation of processors
- next level of HDD sizes
- form factors of servers
- next generation of switches and routers
-

Software

- site automation improvements
- configuration management
- VMs and container
- SDN
-

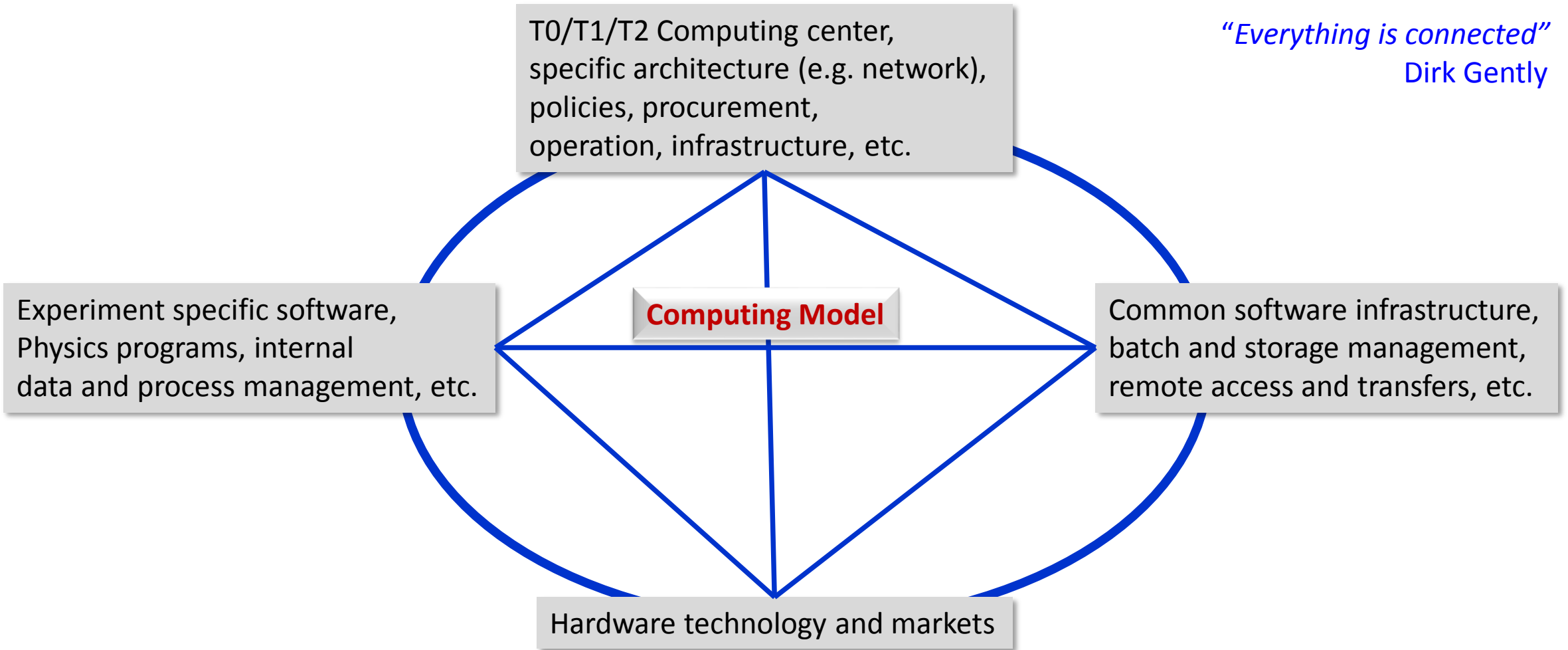
Coordination ?!
Central list of topics ?!

special effort to look much further:

potential hardware changes

- power9, ARM, RiscV, Tensor processors, GPU, FPGA, DSP,.....
- quantum computing , optical computing, DNS storage, PCM/FeRAM/RRAM,
- Machine Learning processors
-

"Everything is connected"
Dirk Gently



Interacting/influencing each other, choices and side-effects

How do we know that some hardware/software implementations makes things 'better' ?

How do we know whether certain choices improve the overall costing ?

Examples

Memory:

what is the size of the HEP 'memory' problem ? latency, memory speed, caches, server throughput limitations ?

software solution versus hardware changes ?!

'memory' problem → change server type → changes price/performance, rack density, rack tetris,... → increase cost

is it worthwhile ? qualitative size of the problem ← → cost of the solution

Analysis :

Federated, remote access, latency hiding, trains, SDN, network provisioning, storage and workload management enhancements

OR

Local facility, 100 Gbit network, PB level SSD storage, simple batch setup

Averages:

distributing job types with different requirements (high/low IO, large/small memory, low/high CPU/wall) in a random and flat manner across all servers saves cost (lower NIC speed, server simplicity, higher network blocking factors, switch-router setups, etc.)

side-effects ? from combination of batch system, VM/container orchestration, pilot jobs, experiment specific workload management, request for dedicated resources

requires effort and investment (e.g. CERN techlab+openlab ~1 MCHF/y)

who and how to decide a new technology is worthwhile investment ?

- **just on-paper**
- **few days hardware tests**
- **longer term instance**
- **pre-production**

how to investigate and understand the 'side-effects' ?

creates important input for the cost working group

**Forum to discuss, bring up issues, collect numbers, benchmarks, recipes, centralized information 'repository' ?
Continuous activity over the next 10 years**