

NIST & CATEGORY THEORY

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Outline

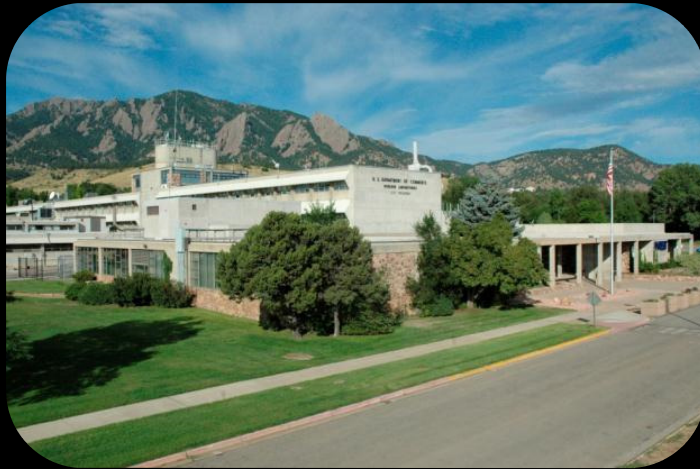
- Overview of NIST, ITL, and SSD
- NIST & Category Theory
- Summary

NIST – Bird's eye view

The National Institute of Standards and Technology (NIST) is where Nobel Prize-winning science meets real-world engineering.



Courtesy HDR Architecture, Inc./Steve Hall © Hedrich Blessing



With an extremely broad research portfolio, world-class facilities, national networks, and an international reach, NIST works to support industry innovation – our central mission.

NIST's Mission

•To promote U.S. innovation and industrial competitiveness by advancing **measurement science, standards, and technology** in ways that enhance economic security and improve our quality of life.



NIST Research Focus Areas



Energy



Healthcare



Environment



**Information
Technology and
Cybersecurity**



Manufacturing



**Physical
Infrastructure**

Director

Associate Director for
Laboratory Programs/Deputy Director

Physical Measurement Laboratory
Materials Measurement Laboratory
Engineering Laboratory
Information Technology Laboratory
NIST Center for Neutron Research
Center for Nanoscale
Science and Technology

Associate Director for
Innovation and Industry

Baldrige National
Quality Program
Hollings Manufacturing
Extension Partnership
Technology Innovation Program

Associate Director for
Management Resources

Chief Facilities Management Officer
Chief Financial Officer
Chief Human Capital Officer
Chief Information Officer
Chief Safety Officer

Information Technology Laboratory: Organization



Charles H. Romine, Director



**Deputy Director
Jim St. Pierre**



**Executive Officer
Alex Folk**



**Senior Management Advisor
Susan Loar**



**Chief Cybersecurity Advisor
Donna Dodson**



**Chief of Staff and Associate Dir for
Federal and Industrial Relations
Kamie Roberts**



**Associate Director for
Program Implementation
Ron Boisvert, Acting**

Senior Internet Policy Advisor



**Assistant Director for Boulder
Brad Alpert, Actg.**



**Applied & Computational Mathematics
Ron Boisvert**



**Advanced Network Technologies
Abdella Battou**



**Computer Security
Matthew Scholl**



**Information Access
Shahram Orandi**



**Software and Systems
Ram Sriram**



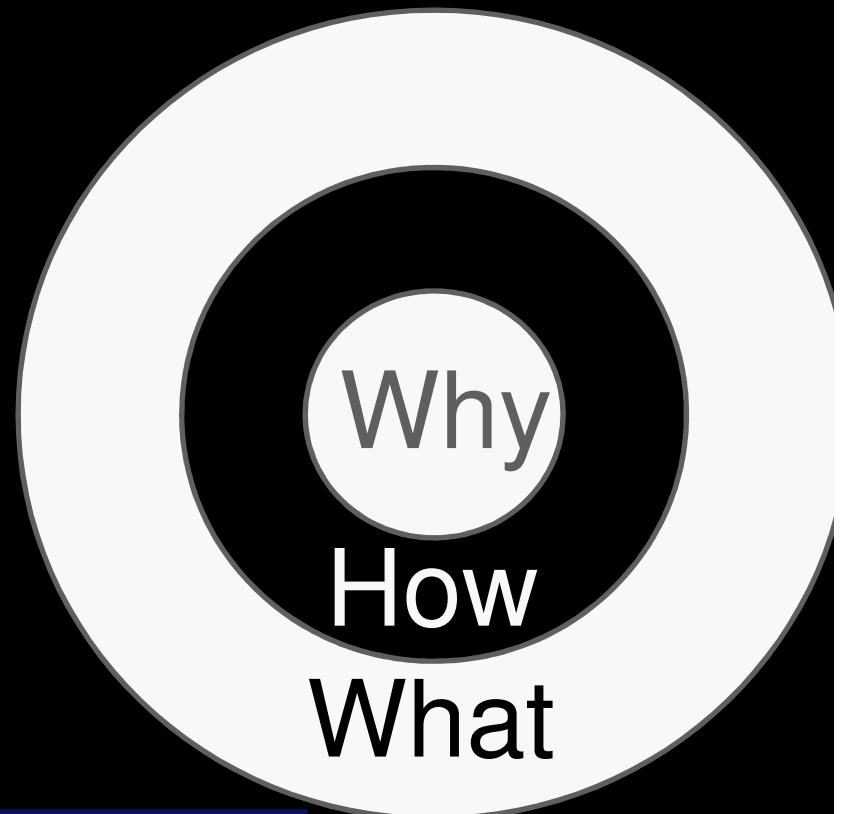
**Statistical Engineering
Will Guthrie**



**Applied Cybersecurity Division
Kevin Stine**

SSD Purpose & Mission

- Inspire confidence and cultivate trust in software, systems, and measurements
 - *by accelerating the development and adoption of correct, reliable, interoperable, testable software*



Focus Area: Software

- ***Software Identification and Quality Metrics (SIQ)***

Objective: Accelerate the development and adoption of correct, reliable, testable software, by developing methods and standard reference data sets for software quality assurance

IT Areas: Common weakness enumerations, software assurance metrics, reference datasets, computer forensics, software performance and scalability

Domains of interest: Software

- ***Software-Based Measurements (SBM)***

Objective: Develop software tools for aiding measurement science and for analyzing how well the software implementation of various algorithms to determine ground truth work

IT Areas: Uncertainty analysis, data/information/knowledge analytics

Domains of interest: Biomedical imaging, bioinformatics

Focus Area: Systems

- ***Standards (STD)***

Objective: Help define and promulgate timely, technically sound, open standards for the interoperation of software systems

IT Areas: Semantics (ontologies), Information modeling

Domains of interest: Health, voting, CPS, social networks, cloud, smart grid, materials

- ***Interoperability/Conformance Testing (ICT)***

Objective: Develop tools and techniques for testing the exchange protocols developed for software interoperability and for ensuring that software implementations conform to intended specifications

IT Areas: Formalization of specifications, test suites

Domains of interest: Health, voting, biomedical, cyber physical systems (CPS), social networks, materials

SOFTWARE

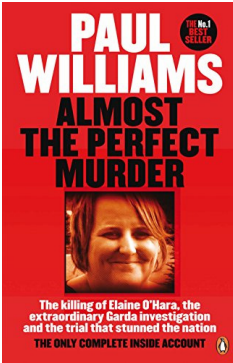
SIQ

STD

SBM

ICT

SYSTEMS



Supreme Court Cites NIST Mobile Forensics Guide in Ruling on Cell Phone Searches - July 1, 2014



STD

Confusion at Palm Beach County polls
Some Al Gore supporters may have mistakenly voted for Pat Buchanan because of the ballot's design.

Although the Democrats are listed second in the column on the left, they are the third hole on the ballot.

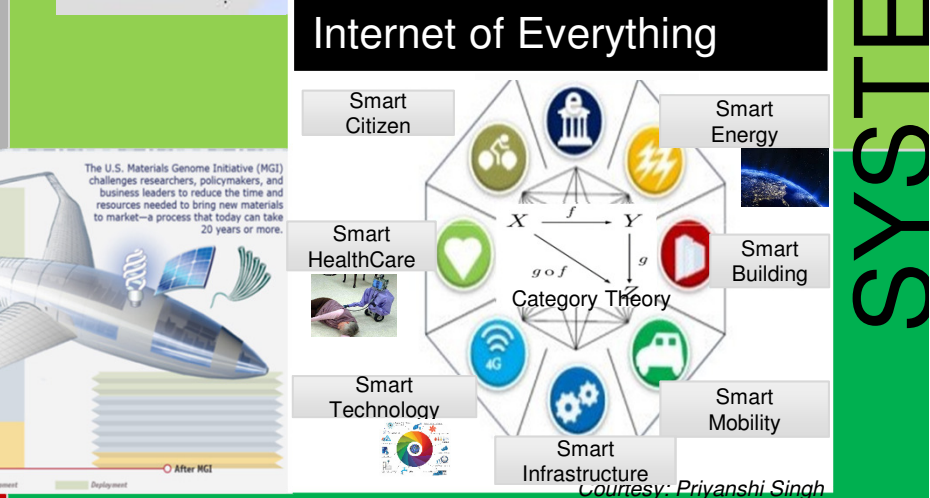
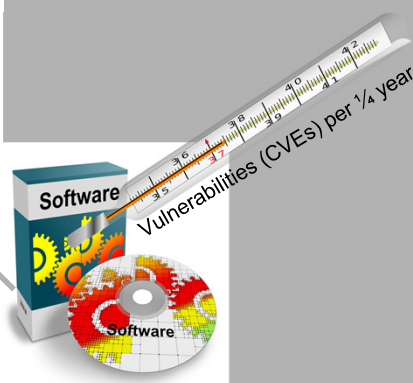
Punching the second hole casts a vote for the Reform party.

GEORGE W. BUSH (REPUBLICAN)	1	PAT BUCHANAN (REFORM)	4
DICK CHENEY (DEMOCRATIC)	2	DAVID BARTYWOOLS (SOCIALIST)	5
AL GORE (DEMOCRATIC)	3	MARY CAL WELLS (CONSTITUTION)	6
JOE LIEBERMAN (LIBERTARIAN)	4	HOWARD PHILLIPS (WORKERS WORLD)	7
HARRY BROWNE (LIBERTARIAN)	5	J. CURTIS FRAZDER (WORKERS WORLD)	8
ART OLIVIER (LIBERTARIAN)	6	MÓNICA MOGHREAB (WORKERS WORLD)	9
JOHN HANCOCK (LIBERTARIAN)	7	GLOEIA LA ROYA (WORKERS WORLD)	10
RALPH NADEAU (GREEN)	8		
WINDRA LABOUE (GREEN)	9		
JAMES HANCOCK (SOCIALIST WORKERS)	10		
MARGARET TROHE (SOCIALIST WORKERS)	11		
JOHN HASELIN (NATURAL LAW)	12		
NAT GOLDHABER (NATURAL LAW)	13		

WRITE IN CANDIDATE
To vote for a write-in candidate, follow the directions on the long side of your ballot card.

Sun-Sentinel graphic

SOFTWARE



SYSTEMS

Algorithms + Data Structures

- + Scheduling
- + Memory Management
- + Data Motion

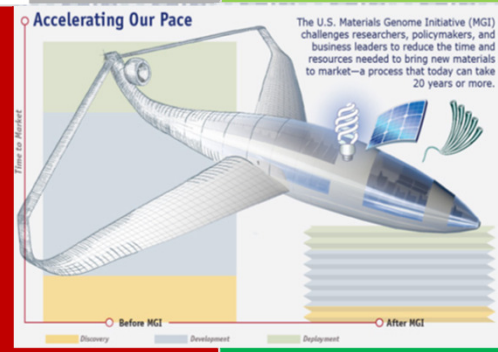
= HPC Programs



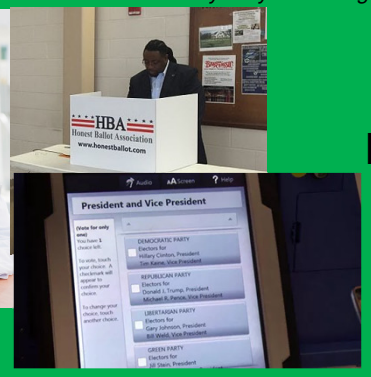
AMD blurred vision



20/20 Vision



SBM

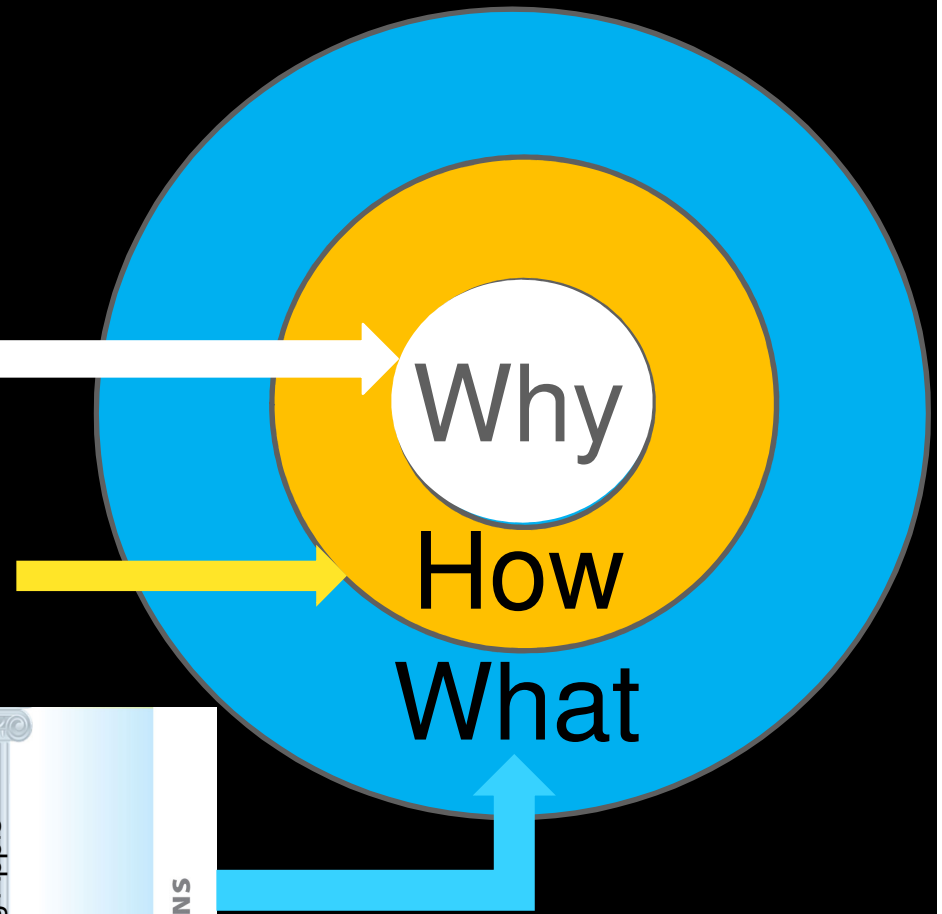
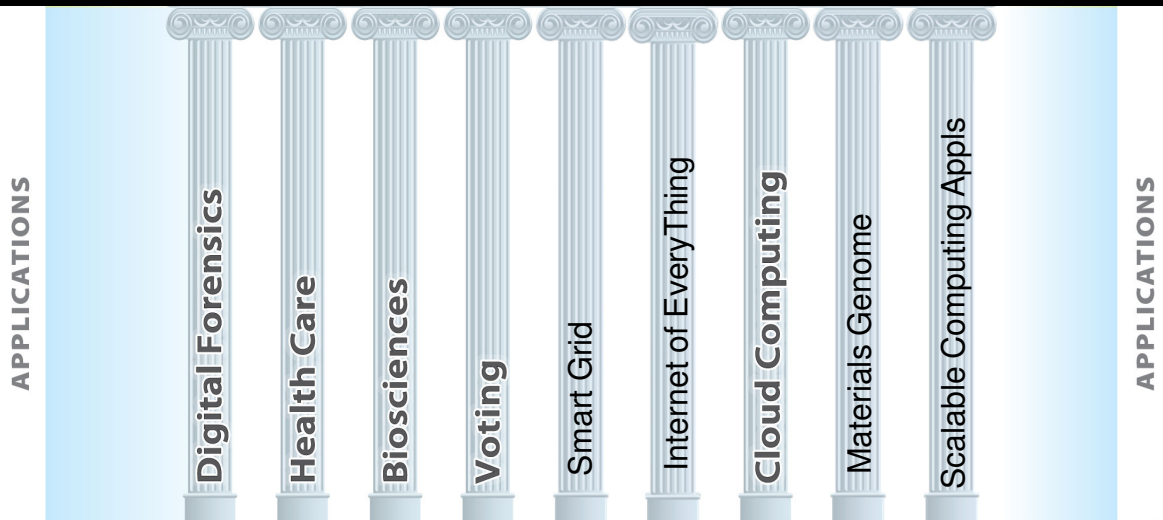


ICT

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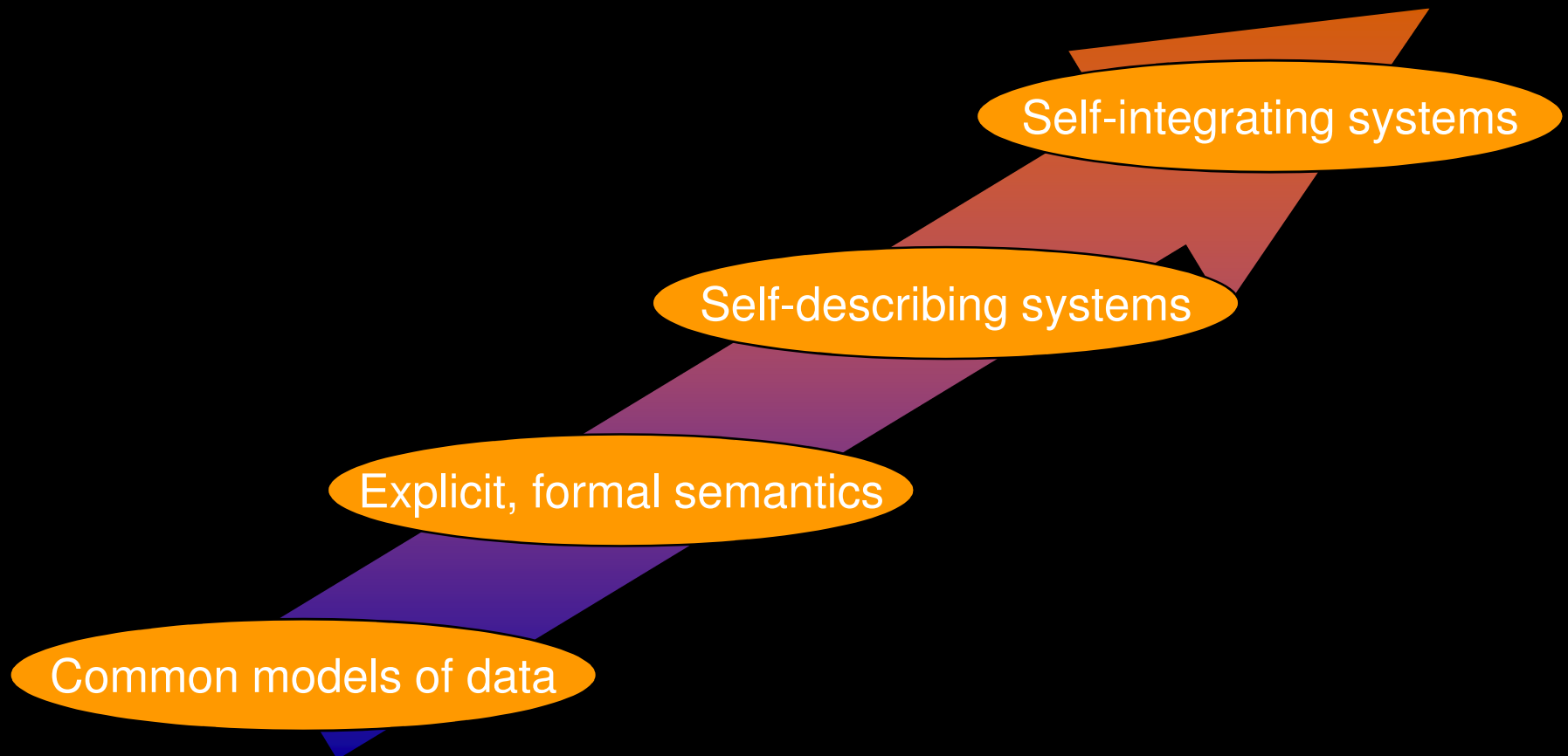
Interacting with NIST

- Guest Researchers/Faculty Associates
- Grants and Contracts
- IPA
- Summer Students
- NRC Post Doctoral Program
- Collaborative Proposals

Outline

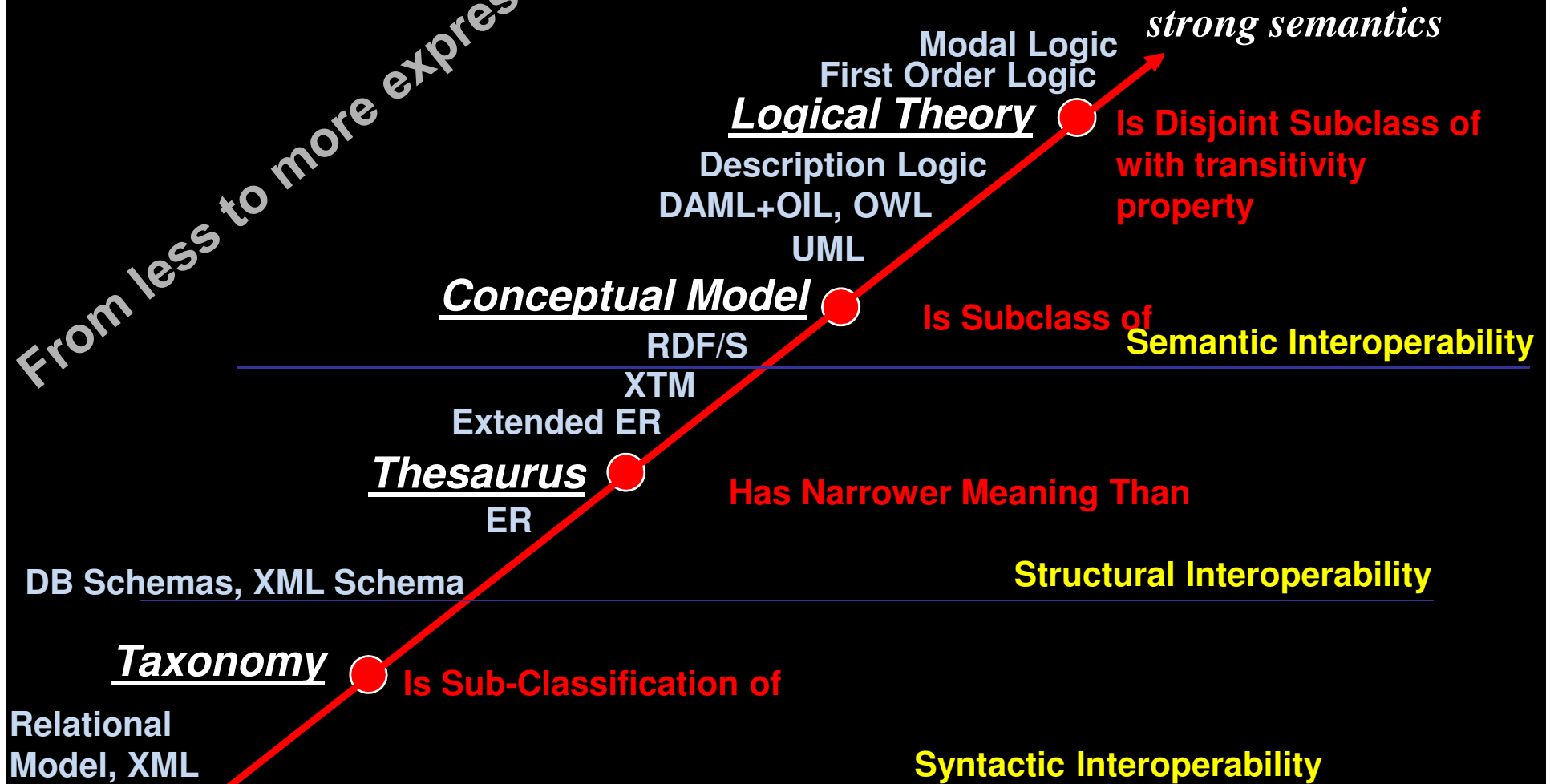
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Roadmap for Systems Integration/Interoperability

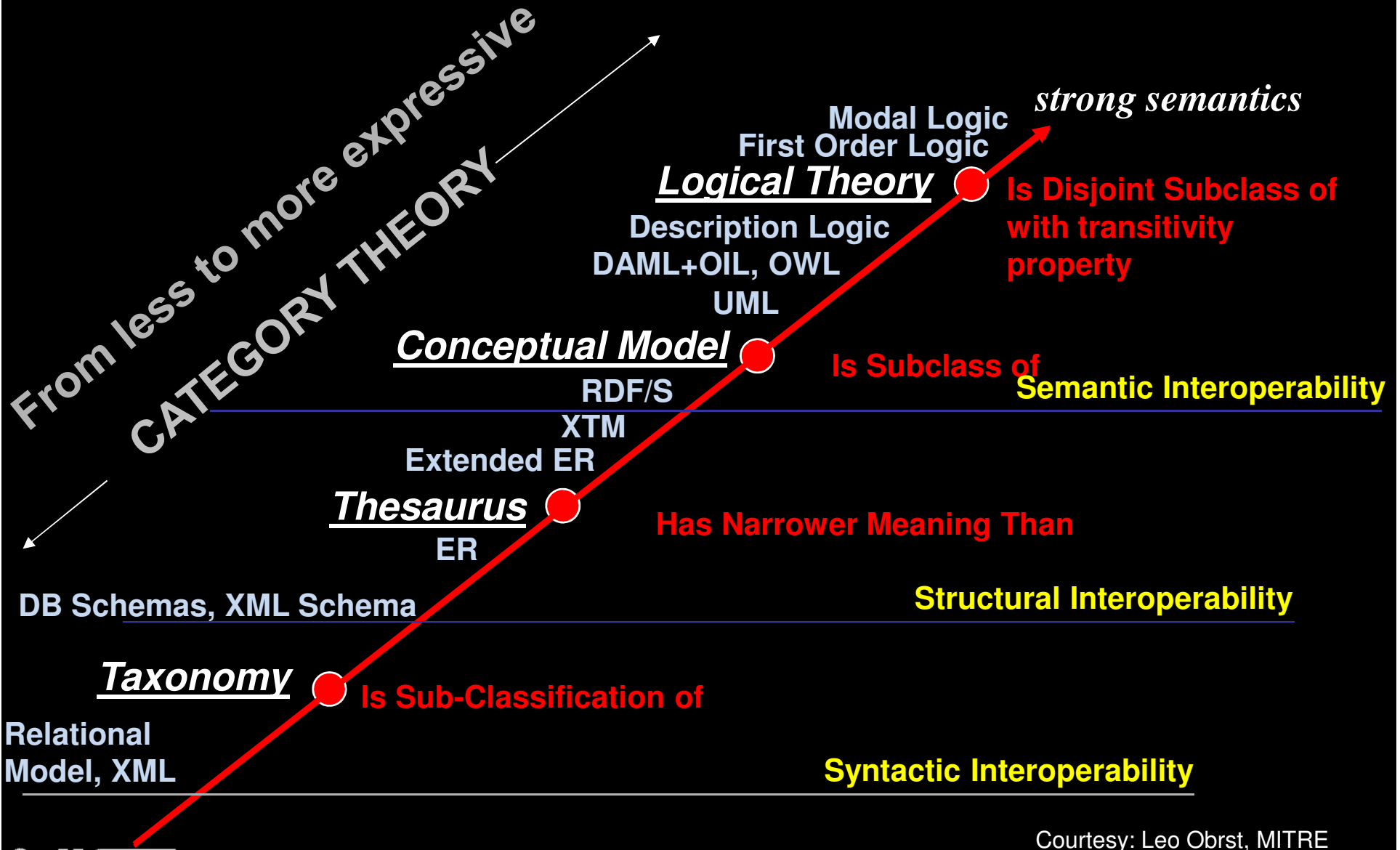


Ontology Spectrum

From less to more expressive



Ontology Spectrum



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Some Future Expectations

- Provide a generic template for structuring knowledge
 - May be CT can form basis for OKN
- Produce use cases
- Implement tools
- Develop evaluation methodologies