

Architect's Reality Check

**TSensors Summit
November 13, 2014**



CUBICON

ENABLING INTELLIGENT EVERYTHING

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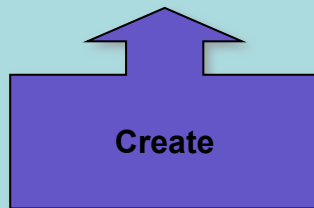
Cathy Kobre

**What it really takes
to support
TSensors from a
software
perspective**

TSensor Software Requirements



A common format is needed to create and share taxonomies of sensor characteristics across manufacturers.

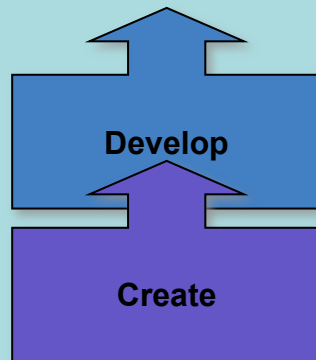


Taxonomy standardization

TSensor Software Requirements



Automation will be required to enlarge the programmer population able to meet TSensor demand.

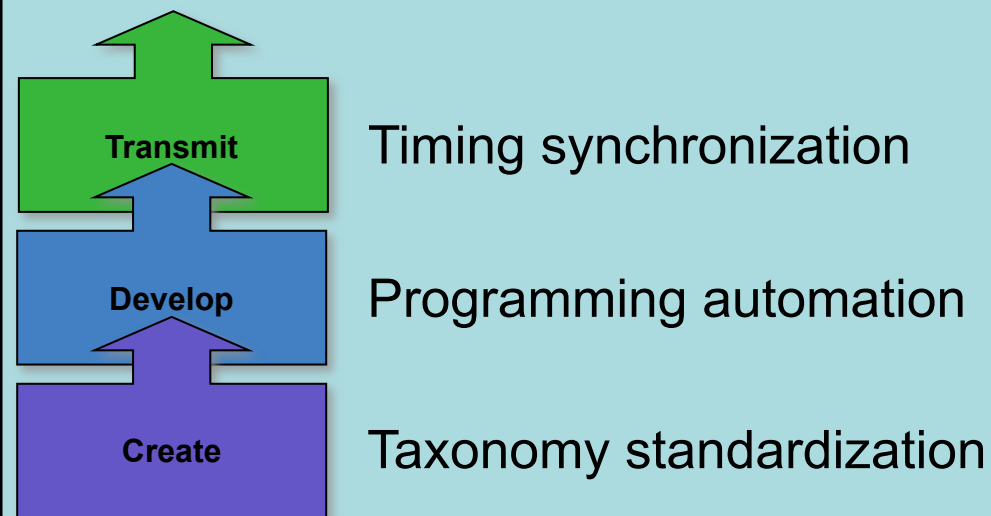


Programming automation

Taxonomy standardization

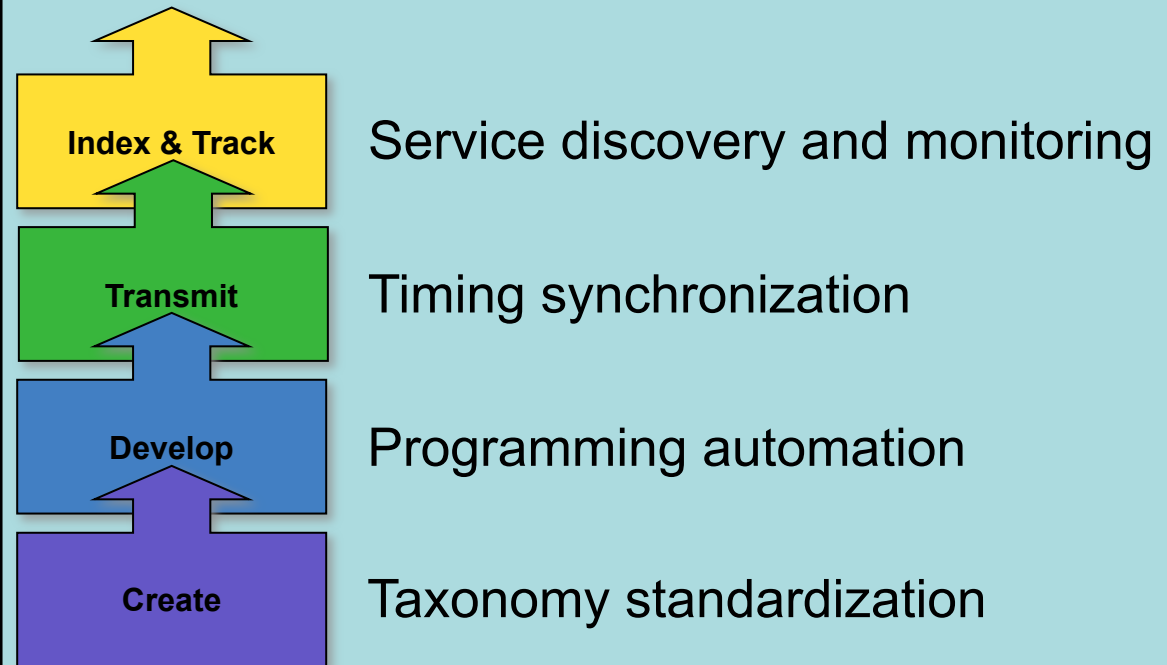
TSensor Software Requirements

Network latency will require global synchronization of events generated by geographically distributed sensors.



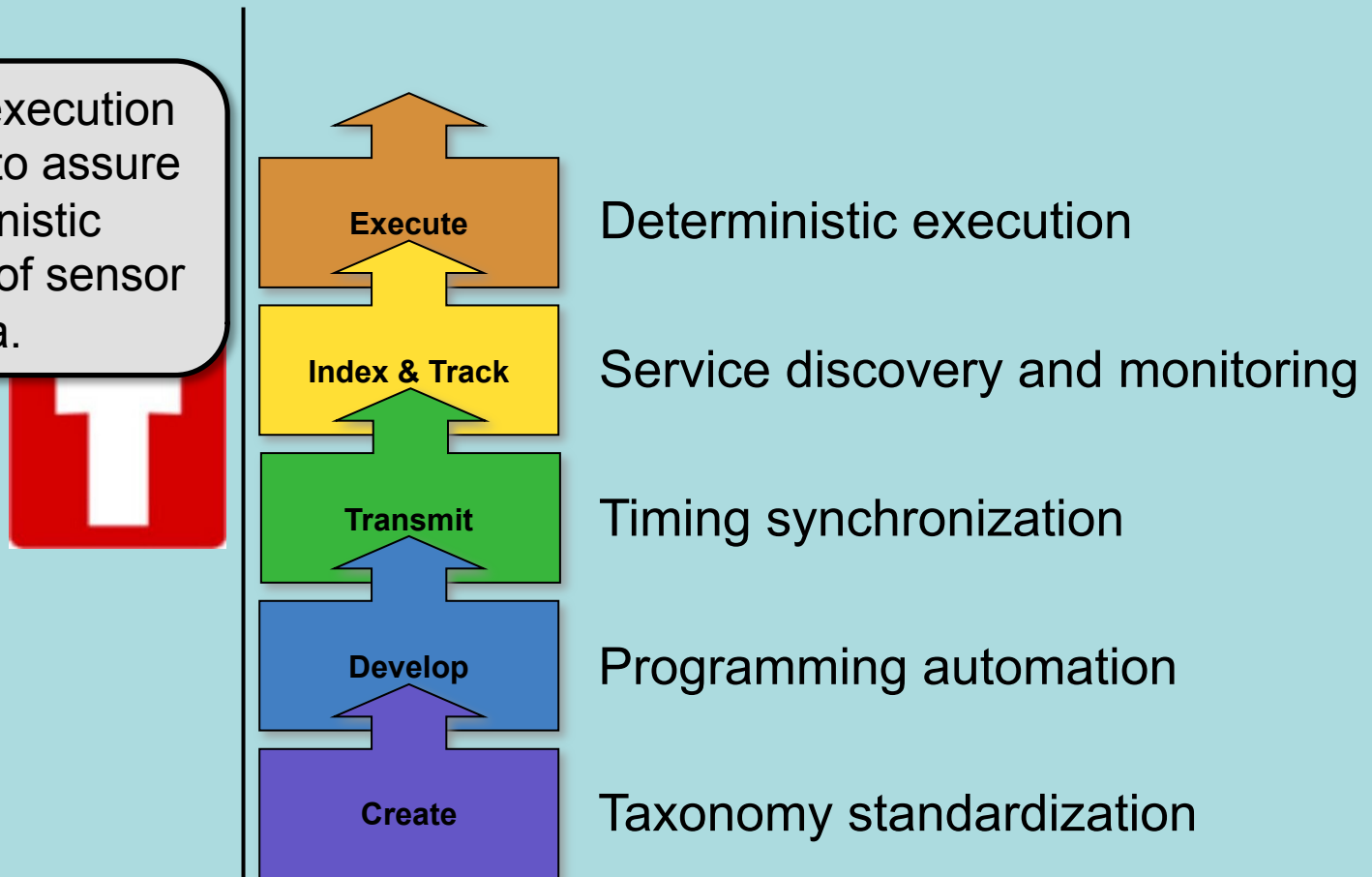
TSensor Software Requirements

Indexing is required for Sensor-as-a-Service discovery.
Tracking is required to monitor service consumption.



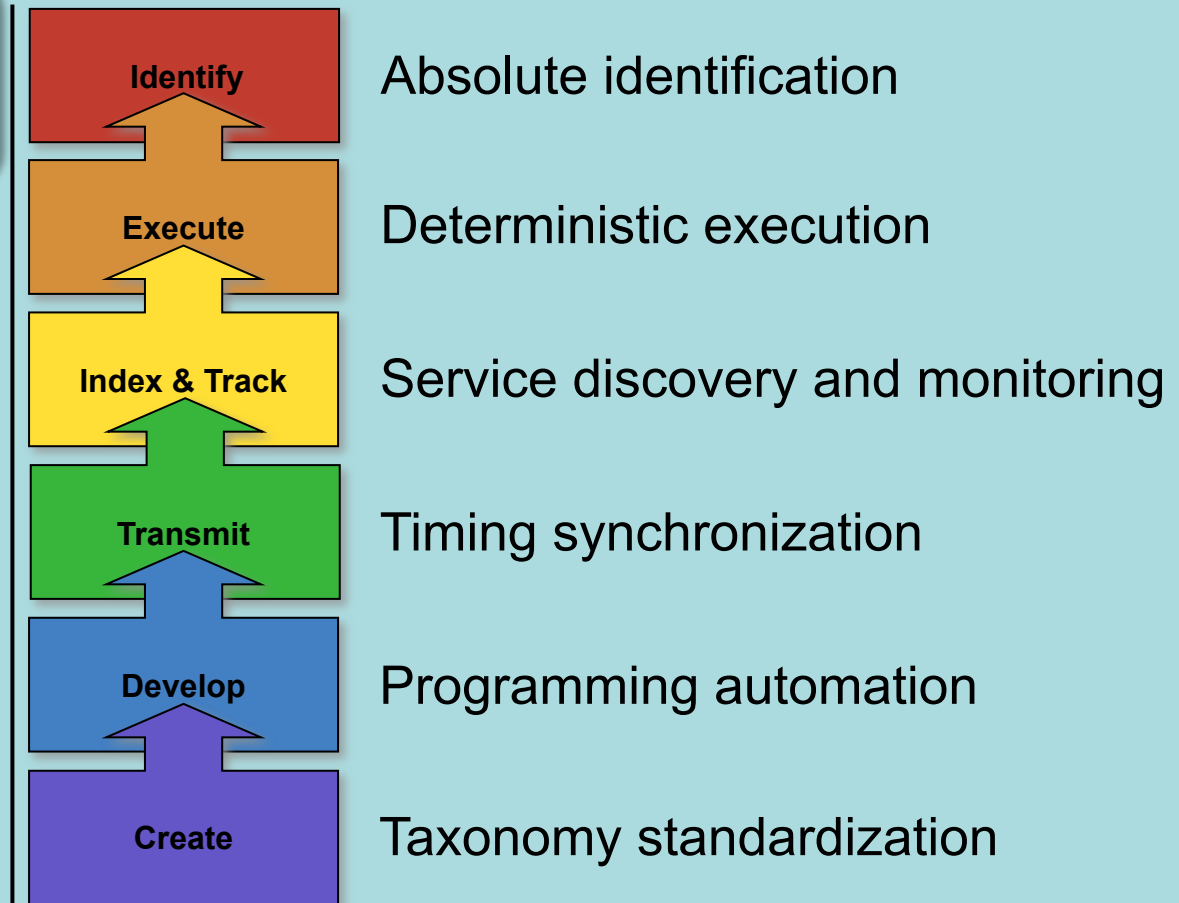
TSensor Software Requirements

Real-time execution is required to assure deterministic processing of sensor data.



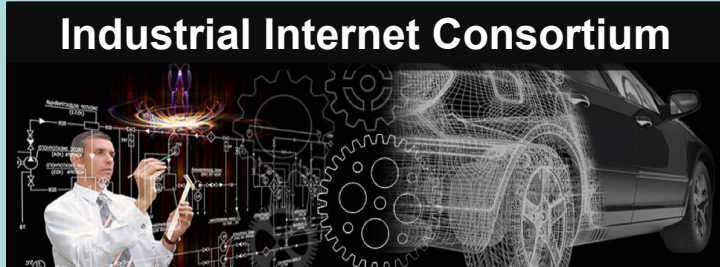
TSensor Software Requirements

Identity is required to secure and monetize sensor data.





OBJECT MANAGEMENT GROUP



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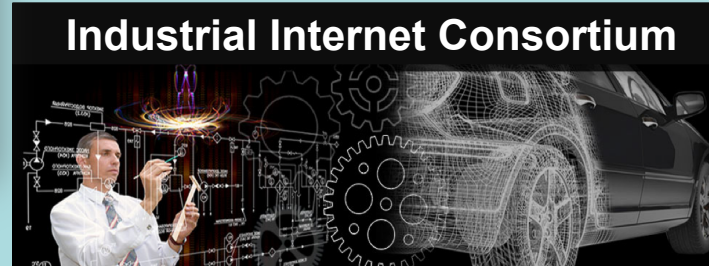
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Working Group



OBJECT MANAGEMENT GROUP



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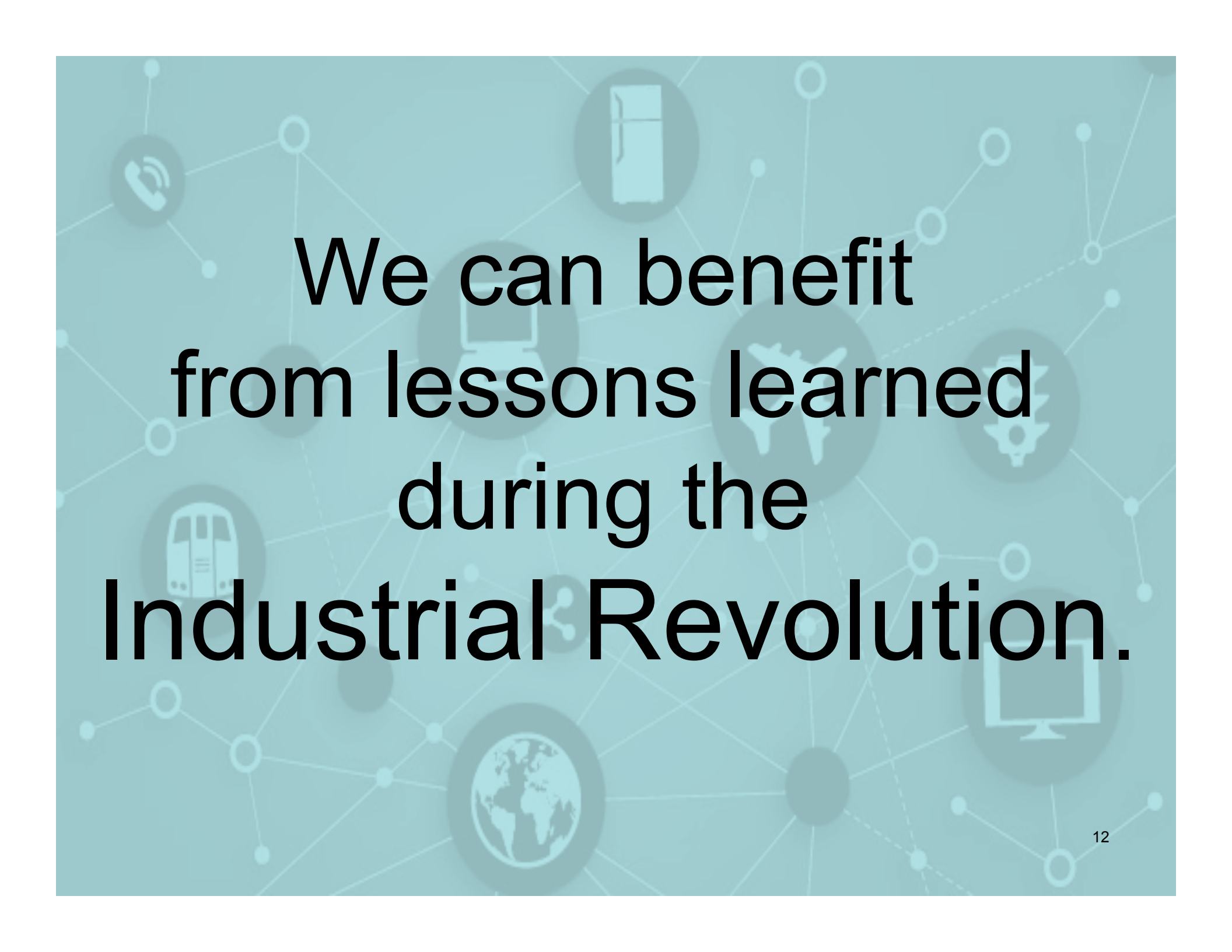
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Tyco
University of Pittsburgh
V2COM
Vanderbilt University
Water & Process Group (WPG)
Wyconn
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INTERNET OF THINGS

Industrial
Revolution + Internet
Revolution

Richard Soley
Chairman and CEO, OMG
Executive Director, IIC

The background is a light blue color with a network diagram consisting of white lines connecting various nodes. Some nodes are circles, some are squares, and some are hexagons. There are also several circular icons in a darker blue color, each containing a white symbol: a telephone handset, a refrigerator, a laptop, a world map, a gear, a train, a globe, and a computer monitor.

**We can benefit
from lessons learned
during the
Industrial Revolution.**

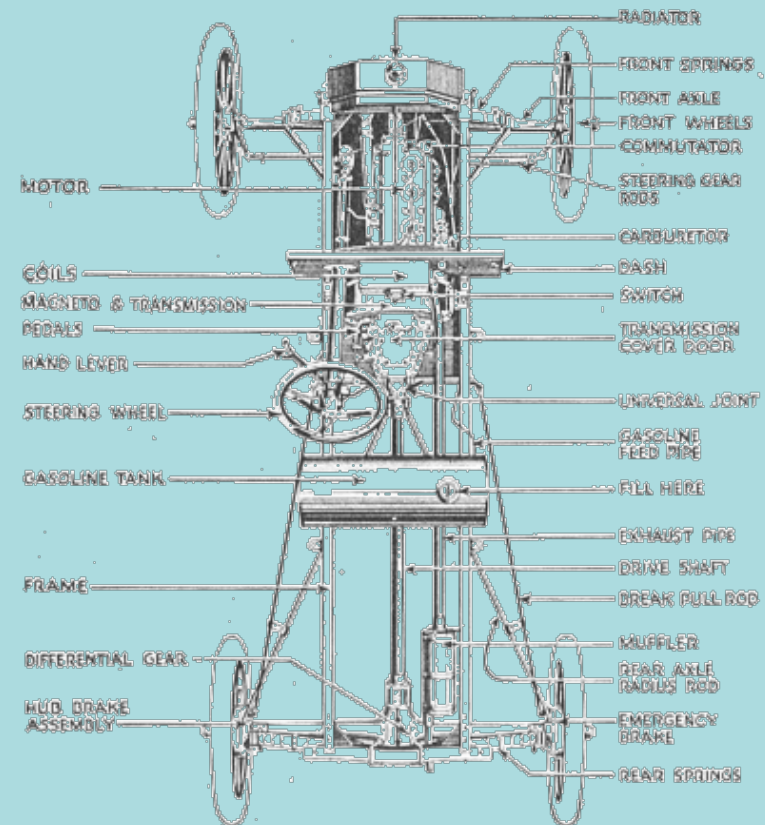
COMPONENTRY



INDUSTRIAL REVOLUTION Lesson #1

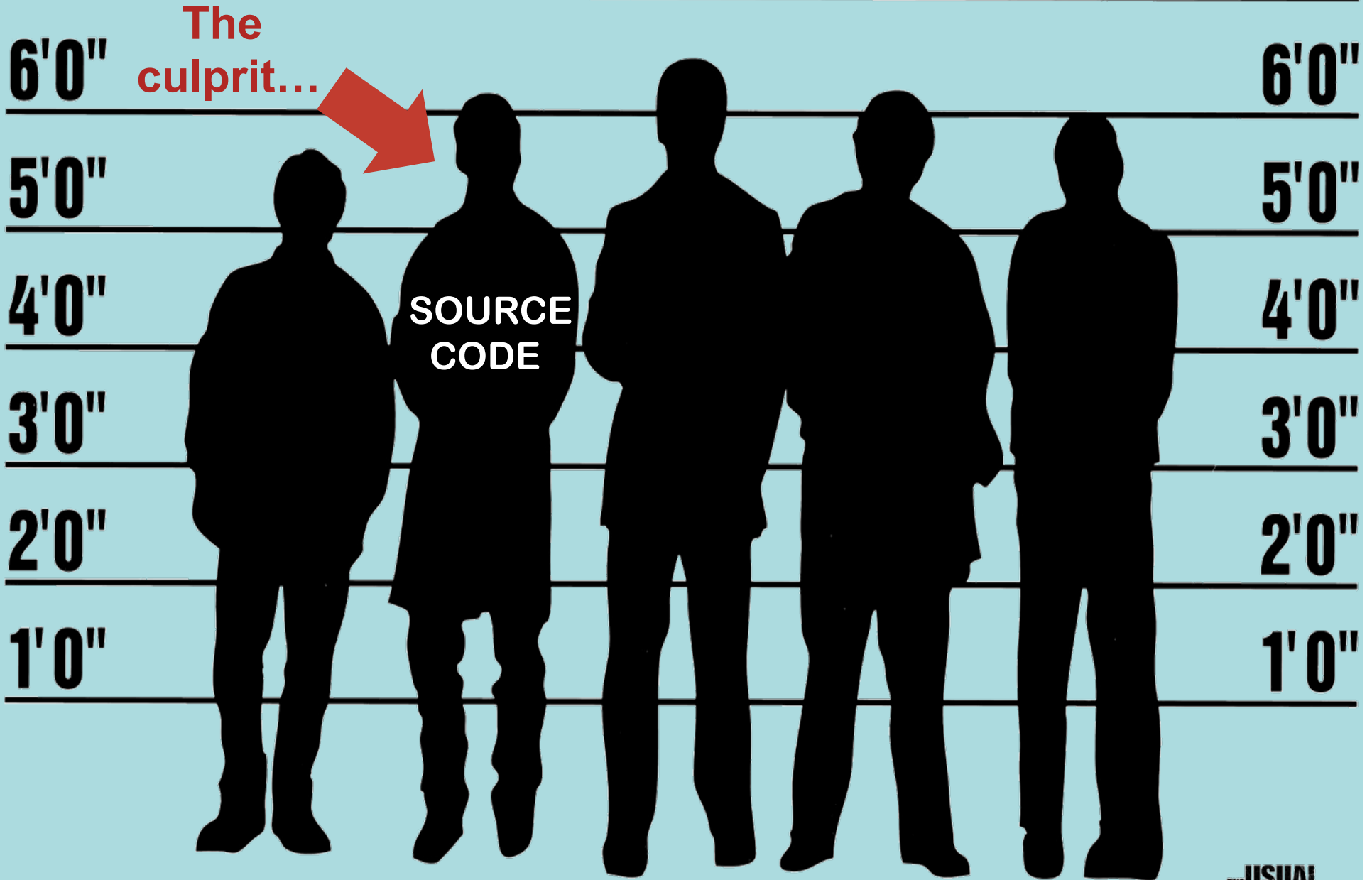
Componentry helped maximize...

- compatibility
- interoperability
- repeatability
- quality
- interchangeability



Ford's Model T Chassis

Where is componentry in software?



THE SOLUTION: Cubicon Component



Syntax
expressed in
graphics and
text

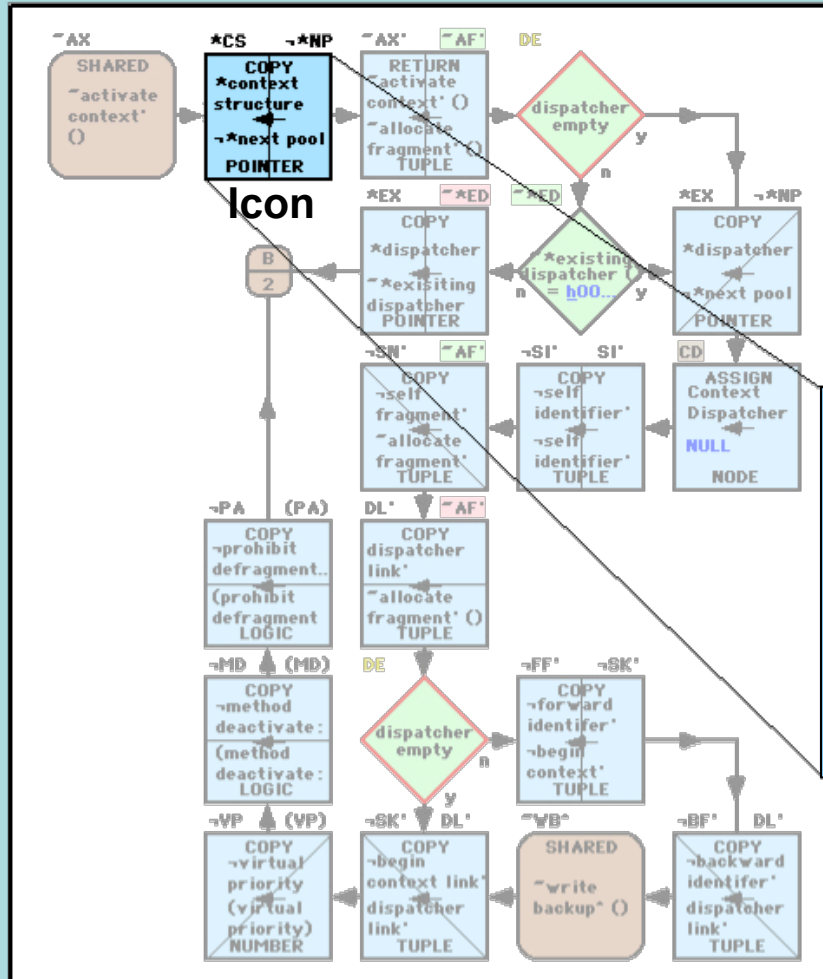


Semantics
represented in
binary

A component's expression and representation
are fused together like two sides of a coin

Cubicon Component

Syntax -
Human develops

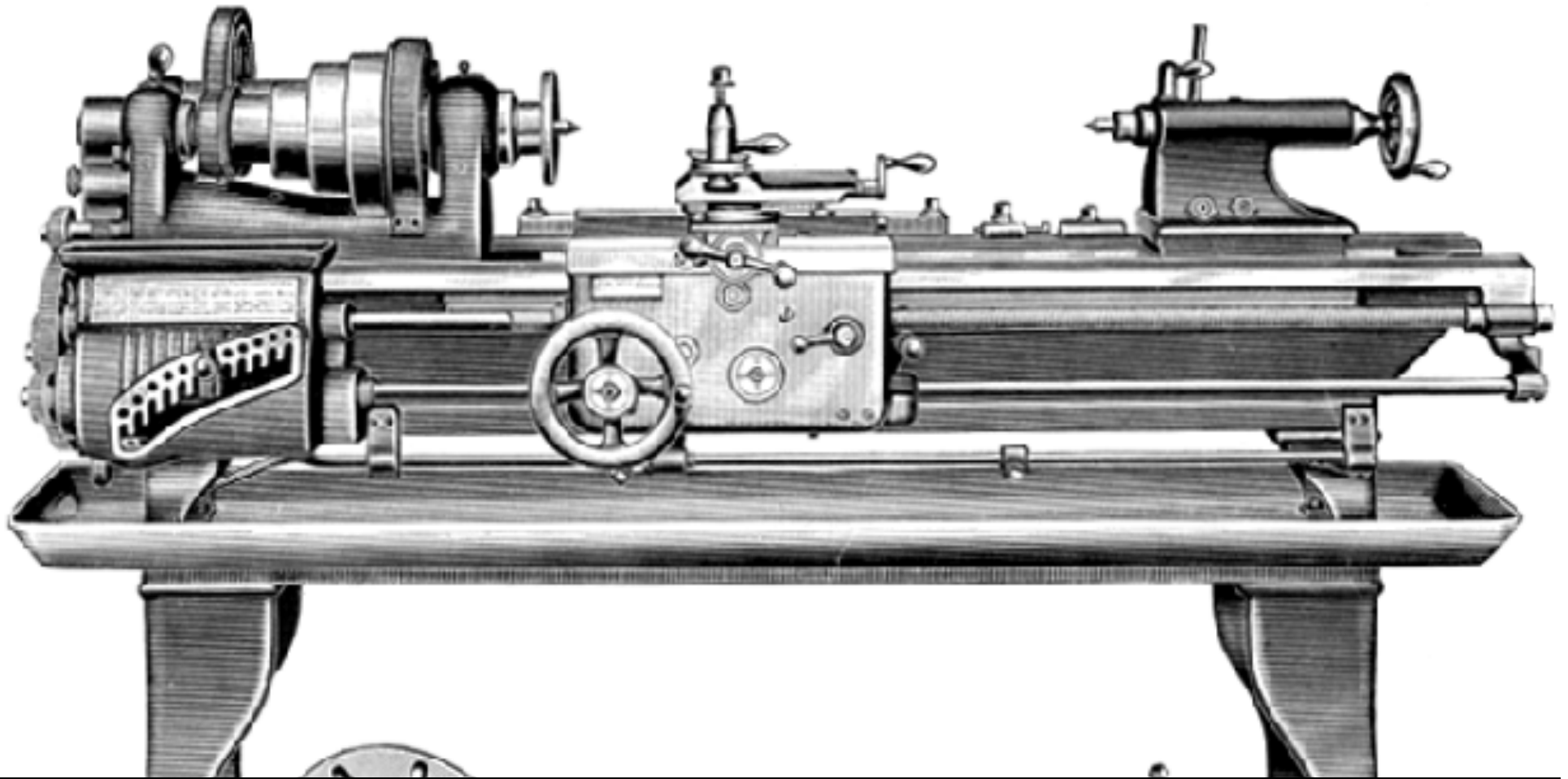


Semantics -
Machine executes

Operation	Value	Default
AS	access set status	CLOSED
BC	block collection/widget	VAC/STRUCT
BF	block form	VACUOUS
CR	circular reference	UNSET
CL	closure	WID/xIID
CC	closure call out link	UNSET
CC	collection cardinality	ALWAYS ONE
CL	Collection Label	EMPTY
CG	column grid view	4
CB	component byte size	0
CS	composition slot form	ROOT 0
CF	complex form	ATTRIBUTE
DE	dependency	NONE
FA	facet	NID
LT	link transfer: include#exclude	UNSET

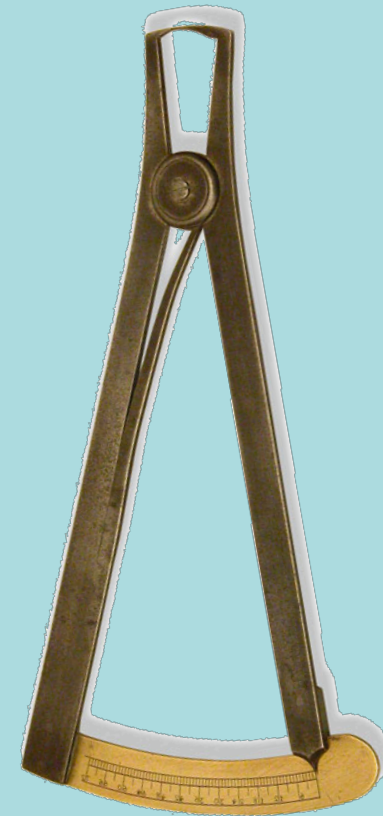
Meta-object slots -
represents characteristics of an icon

MACHINE TOOLS



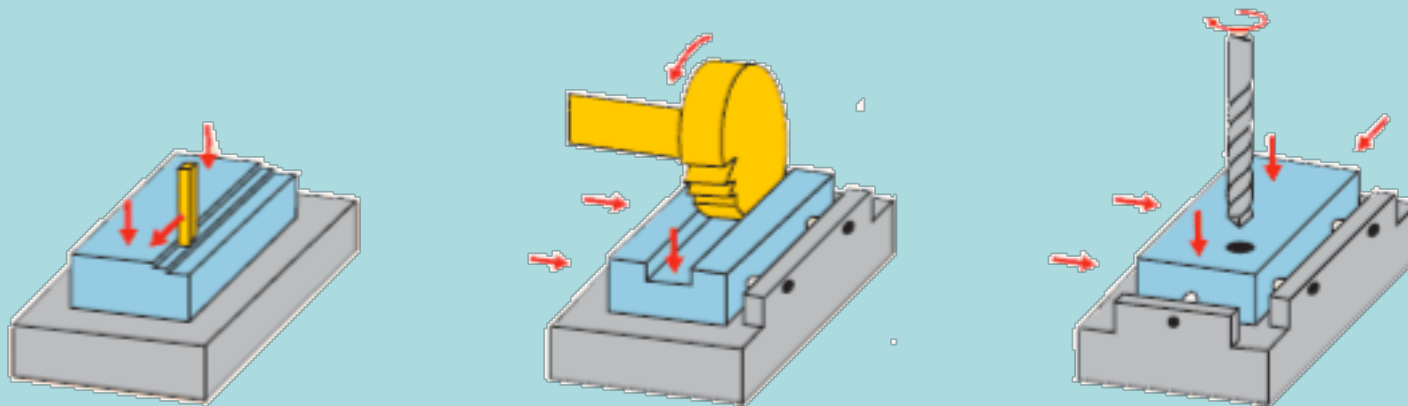
INDUSTRIAL REVOLUTION
Lesson #2

With their inherent precision, machine tools enabled the economical production of interchangeable parts.

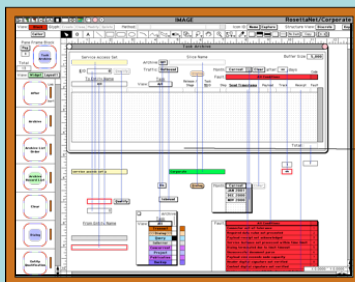
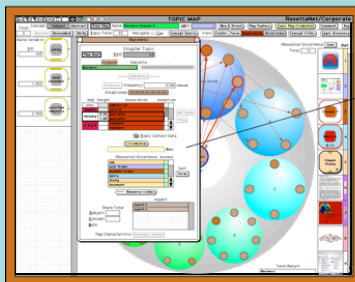
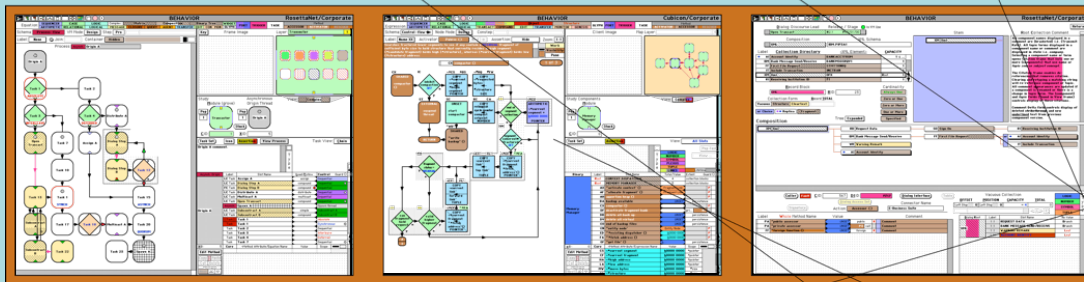
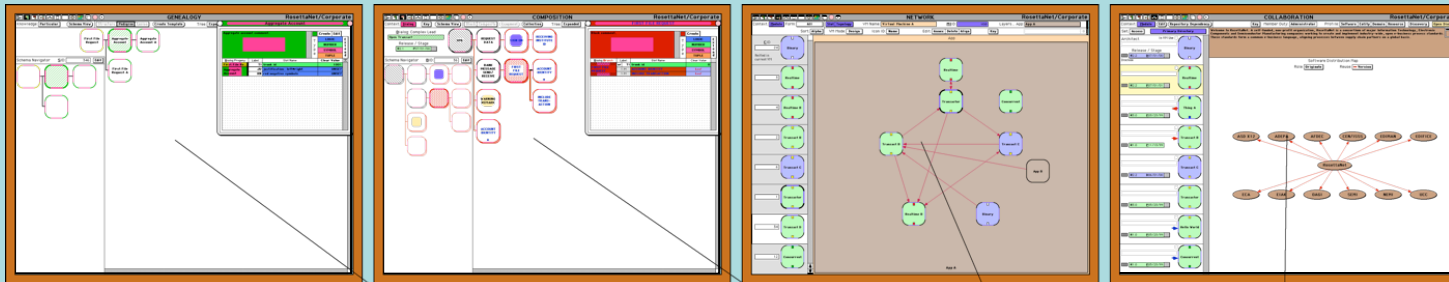


Calipers

All machine tools have some means of constraining the work piece and provide a guided movement of the parts of the machine.

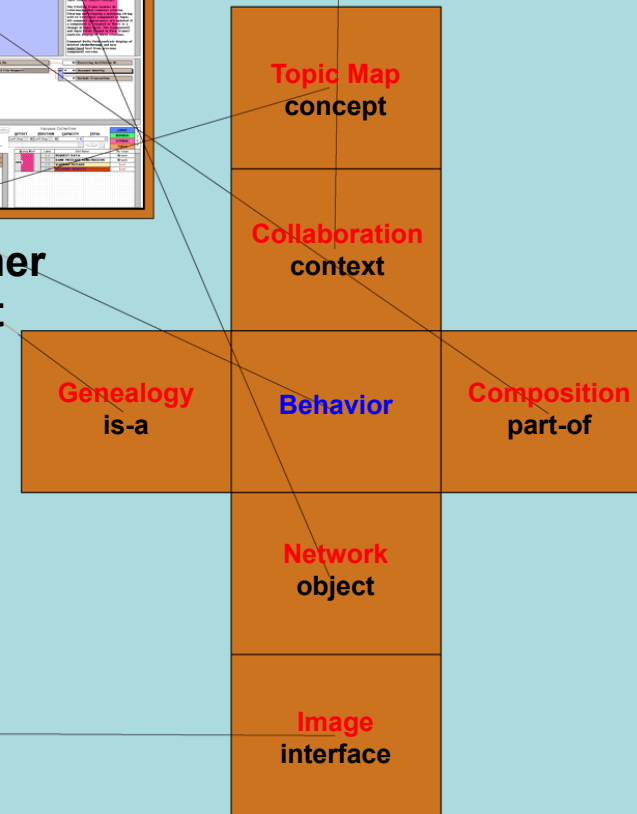


System Cube Model



Windows in the CubeDesigner development environment

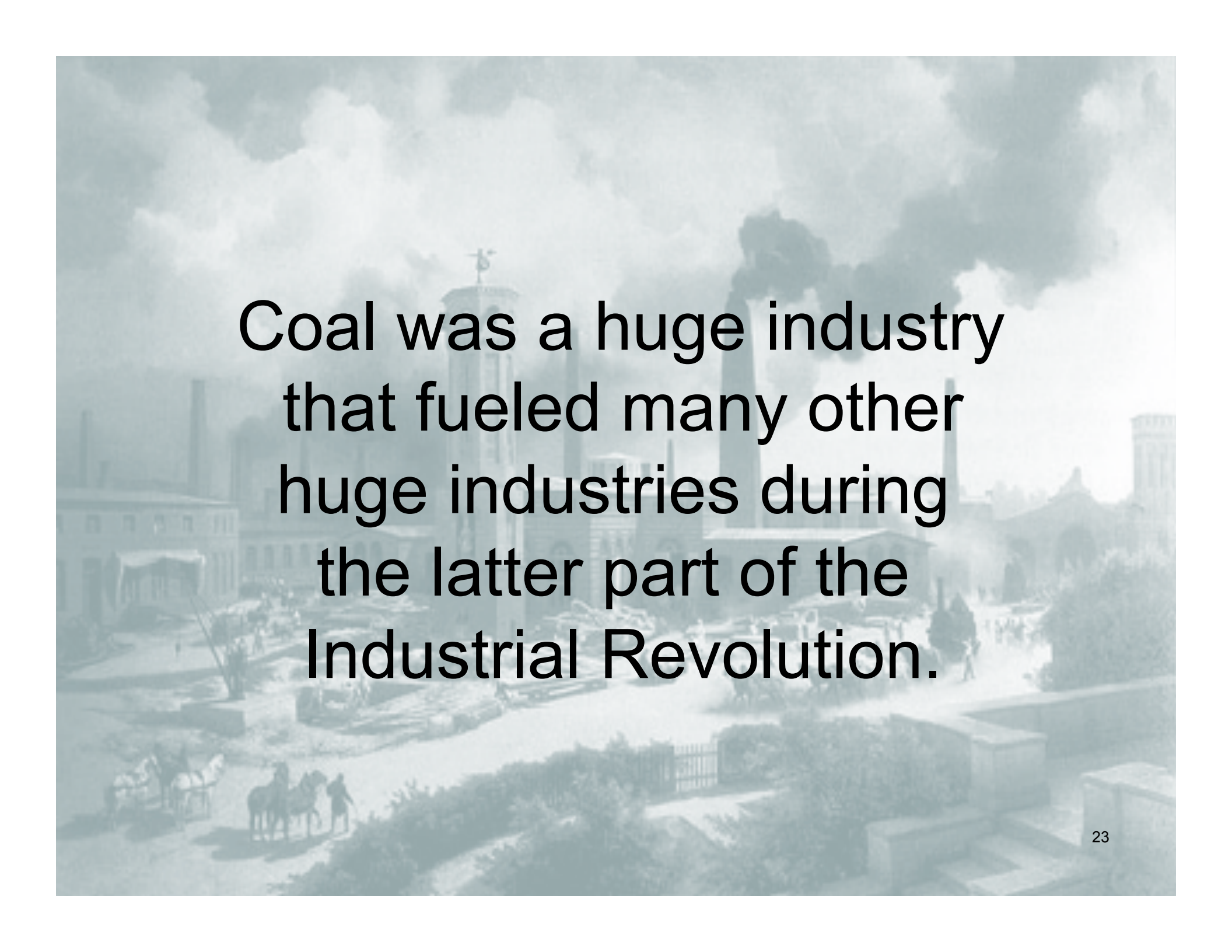
The model is used to constrain the software development lifecycle.



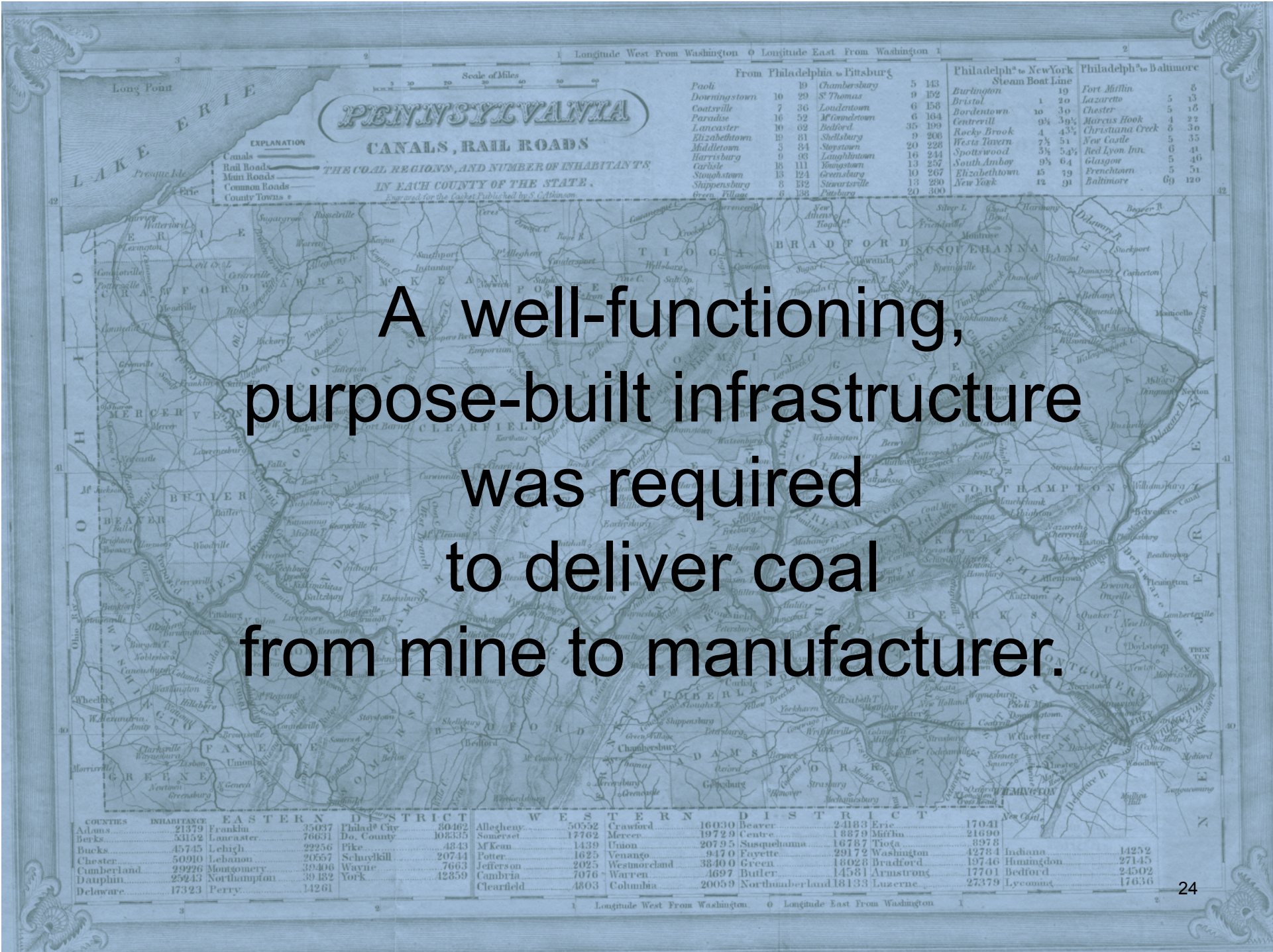
INFRASTRUCTURE



INDUSTRIAL REVOLUTION Lesson #3

A faded, historical illustration of an industrial city during the Industrial Revolution. The scene shows a river winding through the city, with numerous factories and buildings lining the banks. Thick smoke rises from several tall chimneys, filling the sky. In the foreground, there are horse-drawn carriages and people walking along the riverbank. The overall atmosphere is one of a busy, industrialized urban environment.

**Coal was a huge industry
that fueled many other
huge industries during
the latter part of the
Industrial Revolution.**



PENNSYLVANIA

CANALS, RAIL ROADS
 THE COAL REGIONS, AND NUMBER OF INHABITANTS
 IN EACH COUNTY OF THE STATE.
 Prepared for the Gazette Published by S. Collinson

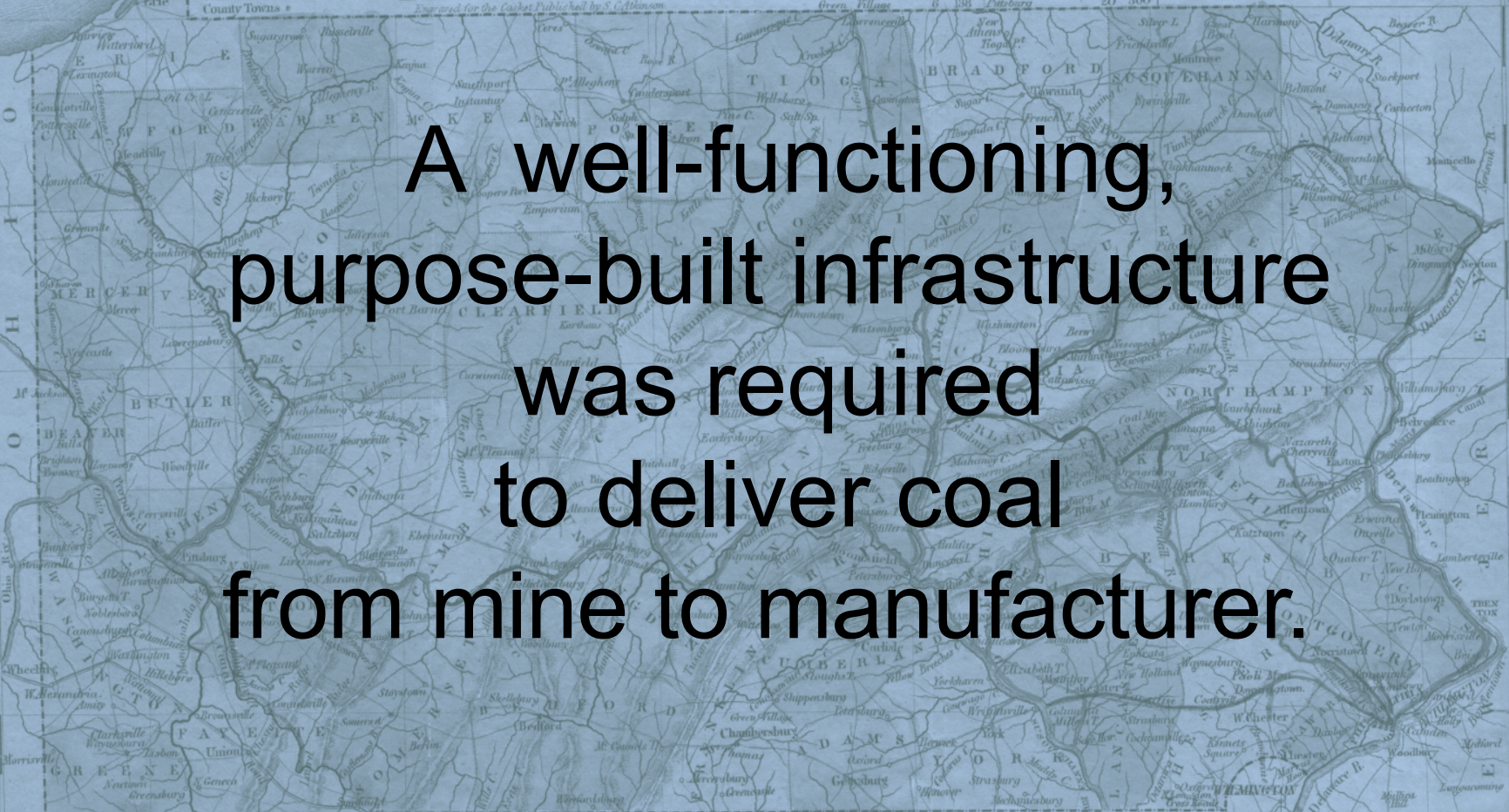
A well-functioning,
 purpose-built infrastructure
 was required
 to deliver coal
 from mine to manufacturer.

From Philadelphia to Pittsburgh

Paoli	19	Chambersburg	5	143
Downingtown	10	St Thomas	9	152
Coatsville	7	Ladestown	6	158
Paradise	16	M'Connellstown	6	164
Lancaster	10	Bedford	35	199
Elizabethtown	19	81 Shellsburg	9	206
Middletown	3	84 Stoystown	20	228
Harrisburg	9	93 Loughintown	16	244
Carlisle	13	111 Youngstown	13	257
Stoughstown	13	124 Greensburg	10	267
Shippersburg	8	132 Steubenville	13	280
Green Village	6	138 Pittsburg	20	300

Philadelphia to New York
 Steam Boat Line

Burlington	19	Fort Mifflin	5	6
Bristol	1	Lazaretto	5	13
Bordentown	10	Chester	5	16
Centreville	9 1/2	Marcus Hook	6	30
Rocky Brook	4	Christiana Creek	5	35
West's Tavern	7 1/2	New Castle	6	41
Spottswood	3 1/2	Red Lyon Inn	5	40
South Amboy	9 1/2	Glasgow	5	51
Elizabethtown	15	Frenchtown	5	51
New York	12	Baltimore	6 1/2	120



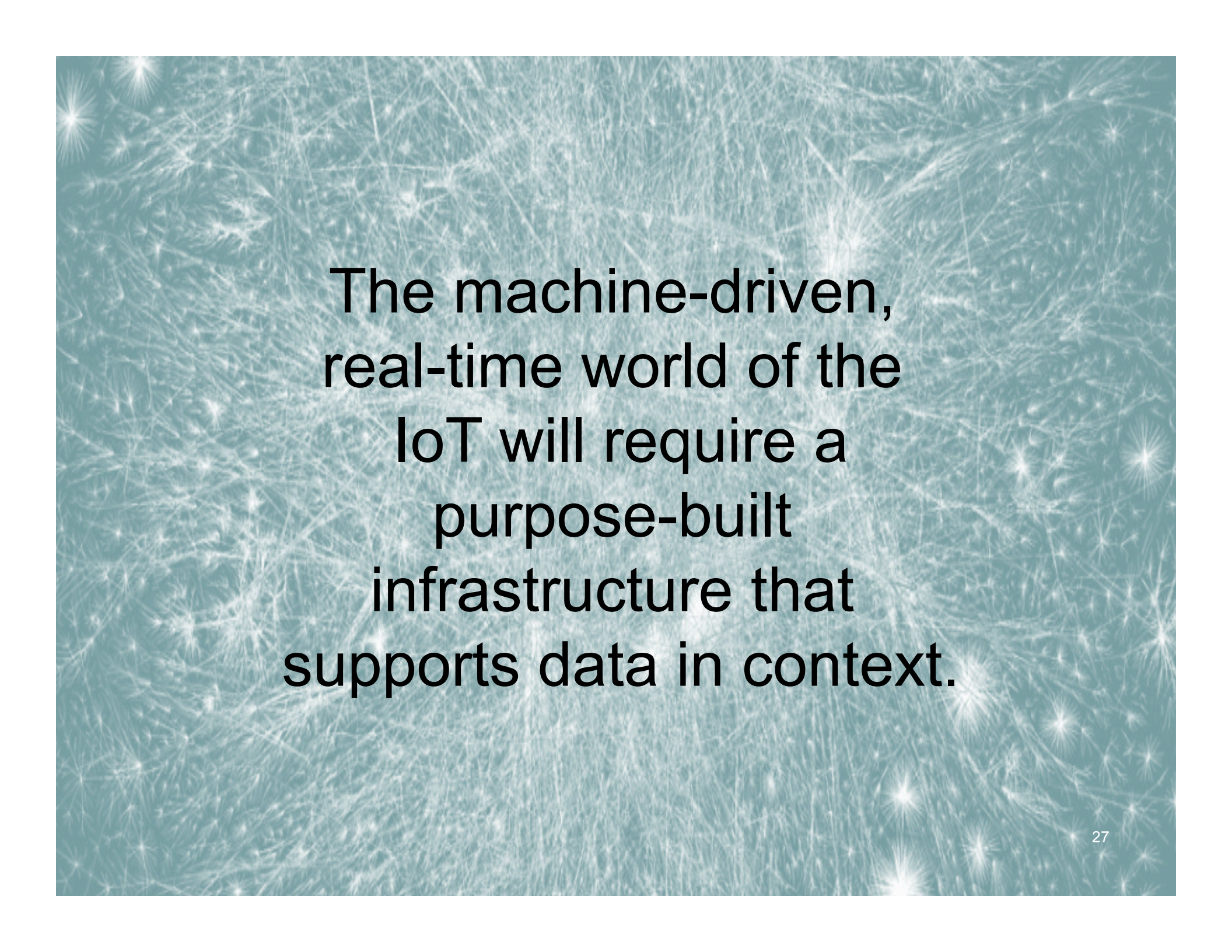
COUNTIES			EASTERN DISTRICT			WESTERN DISTRICT									
Adams	21379	Franklin	80462	Allegheny	50552	Crawford	16030	Beaver	24183	Eric	17041				
Berks	53152	Lancaster	76631	Do. County	108335	Somerset	17762	Mercer	19729	Centre	18879	Mifflin	21690		
Bucks	45745	Lehigh	22256	Pike	4843	M'Keen	1439	Union	20795	Susquehanna	16787	Tioga	3978		
Chester	50910	Lebanon	20557	Schuylkill	20744	Potter	1625	Venango	9470	Fayette	29172	Washington	42784	Indiana	14252
Cumberland	29226	Montgomery	39406	Wayne	7663	Jefferson	2025	Westmoreland	38400	Green	18028	Bradford	19746	Huntingdon	27145
Dauphin	25243	Northampton	39432	York	42859	Cambria	7076	Warren	4697	Butler	14581	Armstrong	17701	Bedford	24502
Delaware	17323	Perry	14261			Clearfield	4803	Columbia	20059	Northumberland	18133	Luzerne	27379	Lycum	17636



In the IoT,
data
is the new coal.



Sensors mine their environment for raw data.



The machine-driven,
real-time world of the
IoT will require a
purpose-built
infrastructure that
supports data in context.



Context

makes raw data
actionable. Valuable.

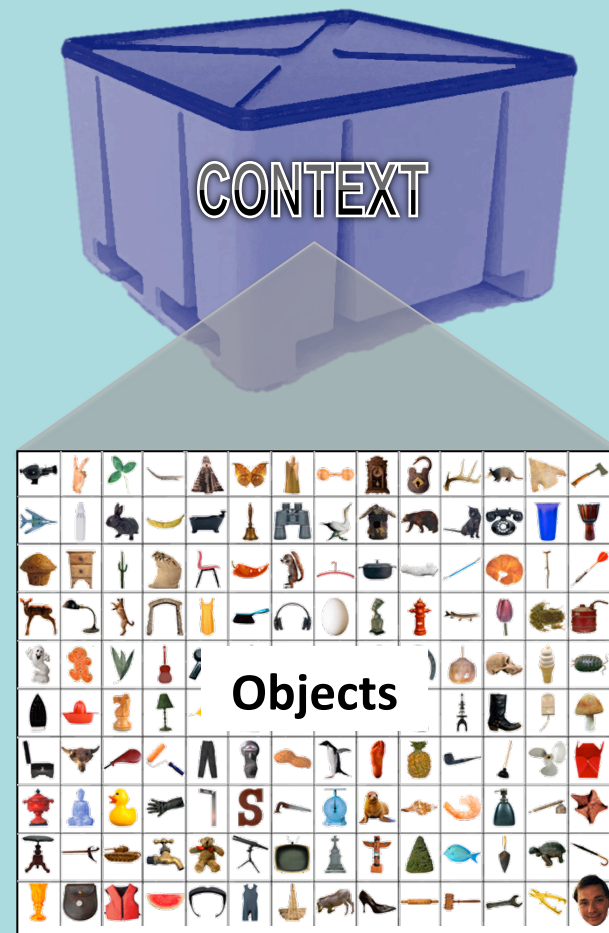
Context as a Container

Think of Context like a container that securely holds the meaning (semantics) of data for processing across disparate devices and things

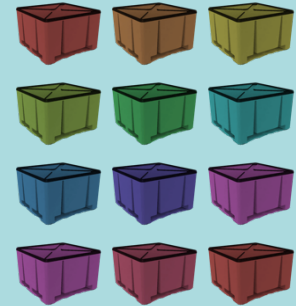
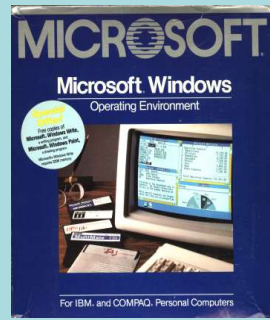
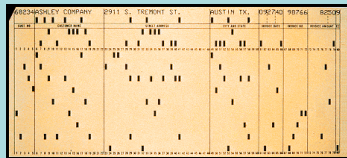


Context as a Container

Think of Context like a container that securely holds the meaning (semantics) of data for processing across disparate devices and things



Evolution of Software Packaging



Punch card → Program → Application → App → Context

Cubicon Infrastructure Elements

Internet Layer

CubeWeb - Store, index, track, associate context

Domain
Repositories

Context
Registry

Software
Emporium

Software
Repositories

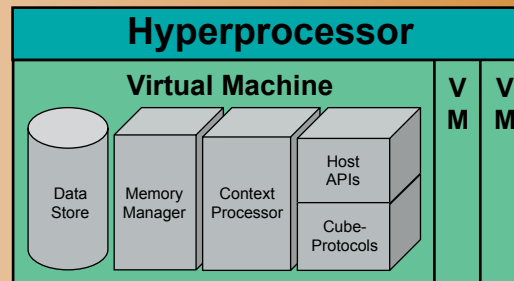
CubeEngine
Registry

Service
Emporium



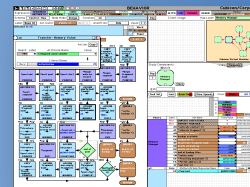
Execution Environment

CubeEngine - execute context



Development Environment

CubeDesigner - develop context

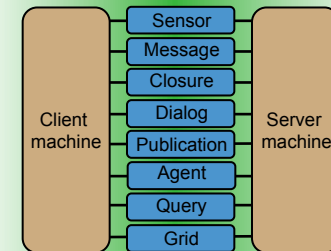


Systems Language

Cubicon - create context



Protocols
CubeProtocols
- transmit context



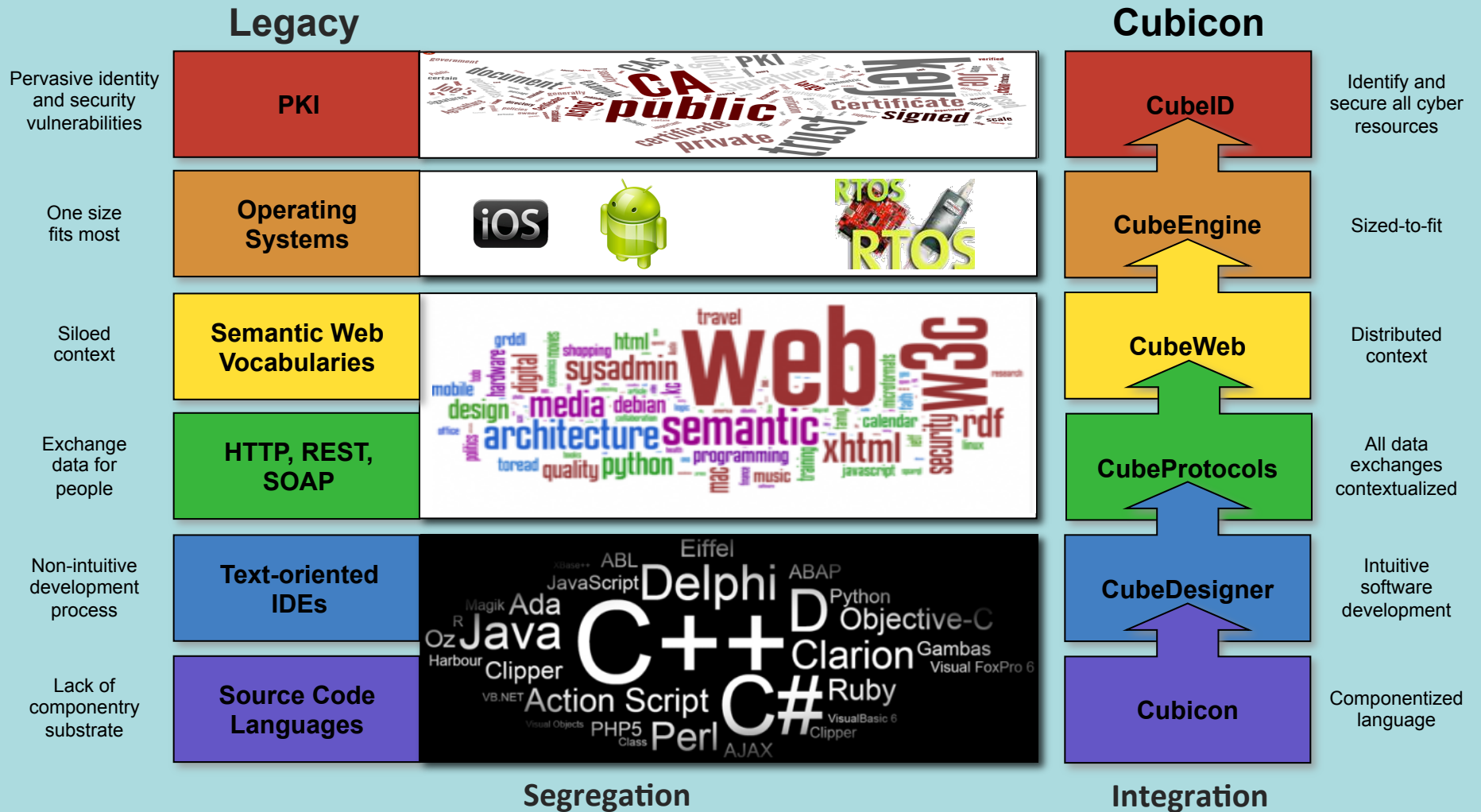
Web

Provenance
CubelD

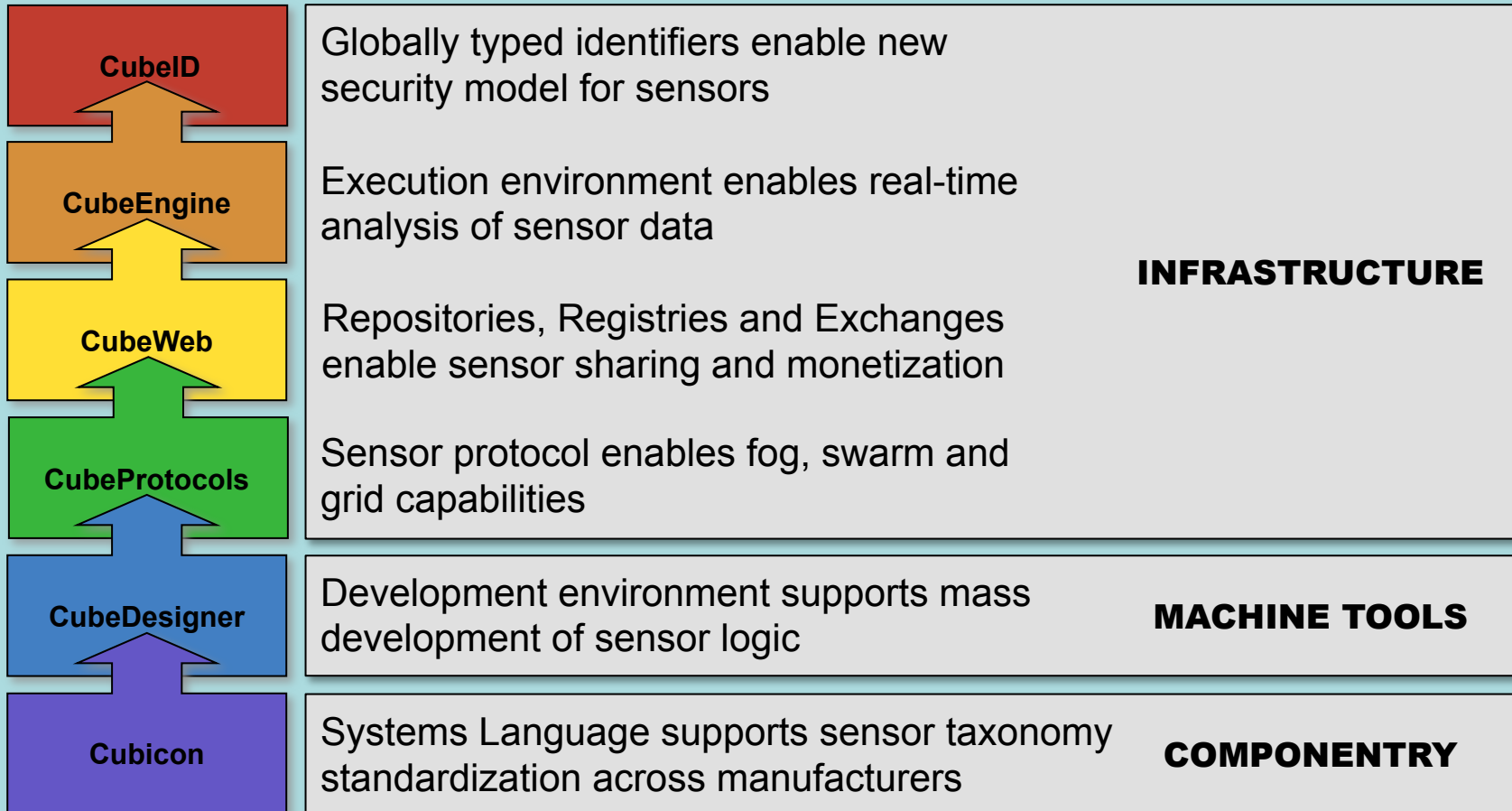
- identify context



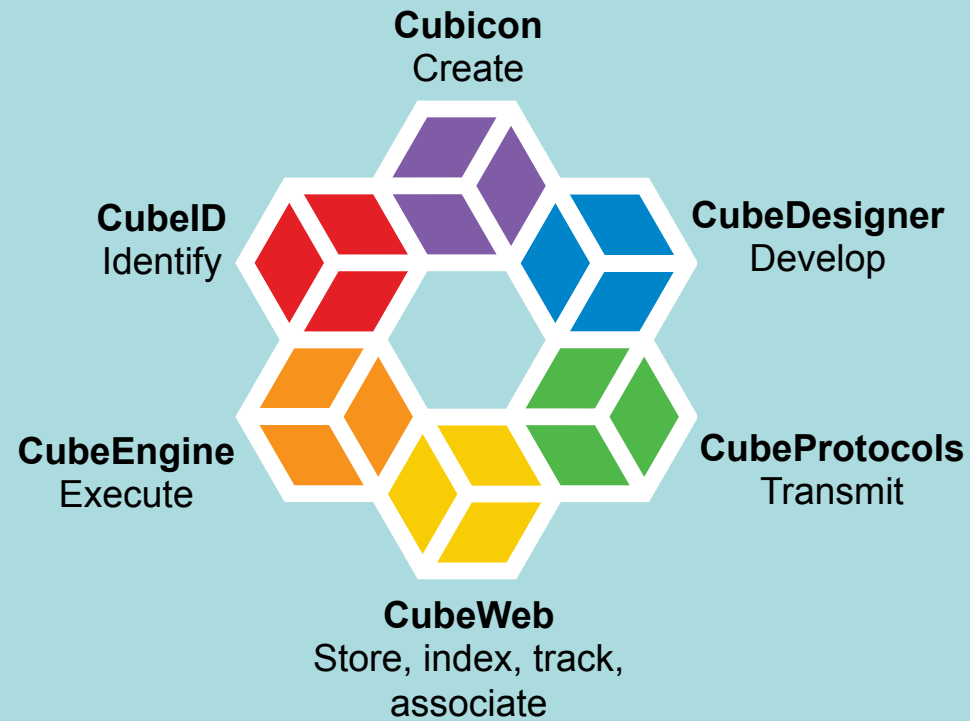
Functional Segregation vs. Integration



Cubicon Enables TSensors



Thank you!



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