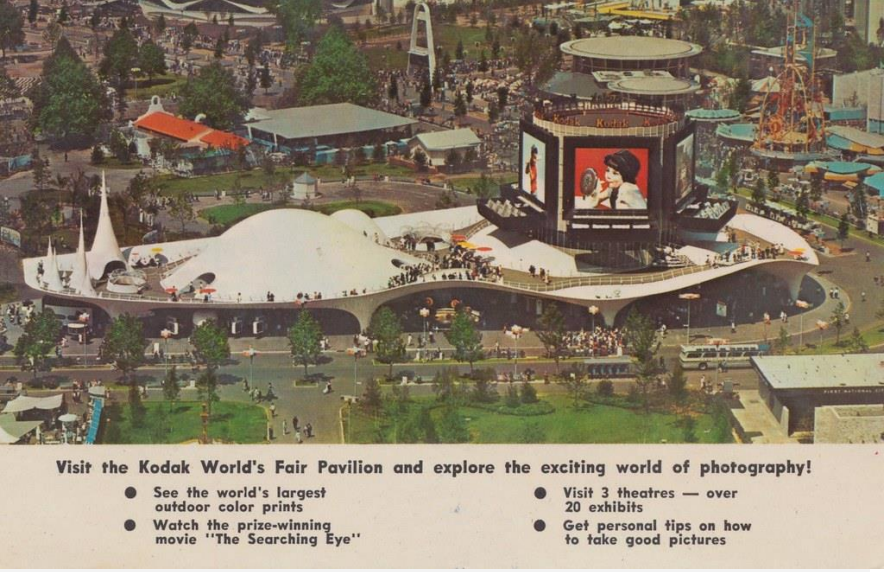
Thornton Tomasetti
CORE

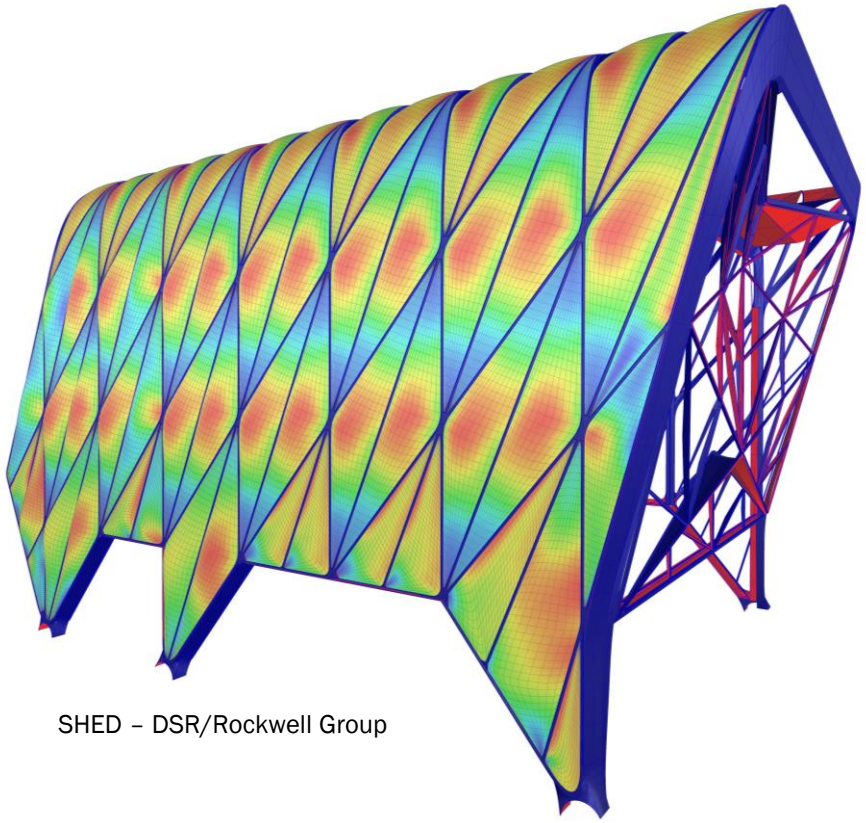
DISRUPTION

Robert Otani, PE
Chief Technology Officer

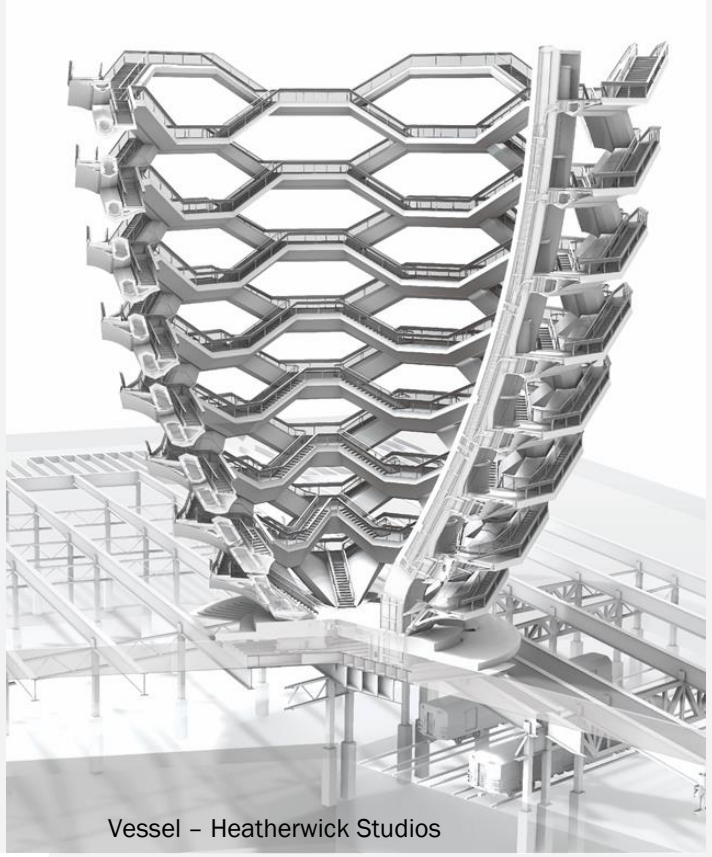
Thornton Tomasetti



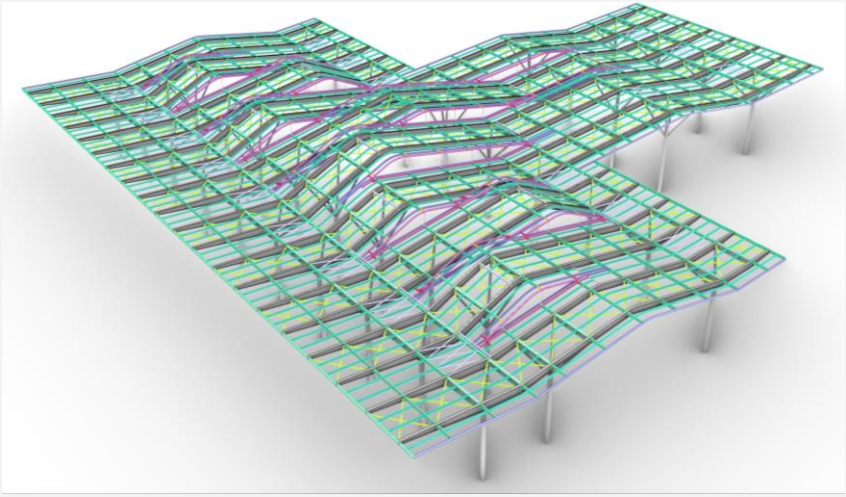
Kodak Pavilion – World's Fair



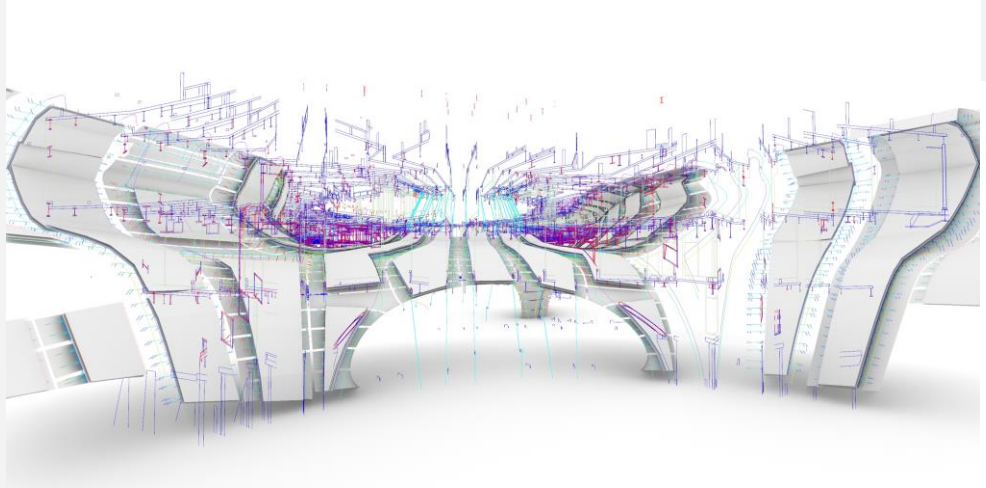
SHED – DSR/Rockwell Group

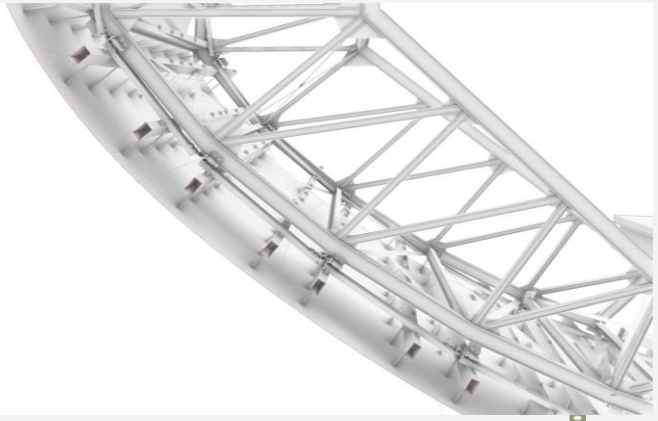


Vessel – Heatherwick Studios



Pittsburgh Airport - Luis Vidal + Architects & Gensler-





Confidential $1.5 billion project

Branch Technology

ONE City Bandshell

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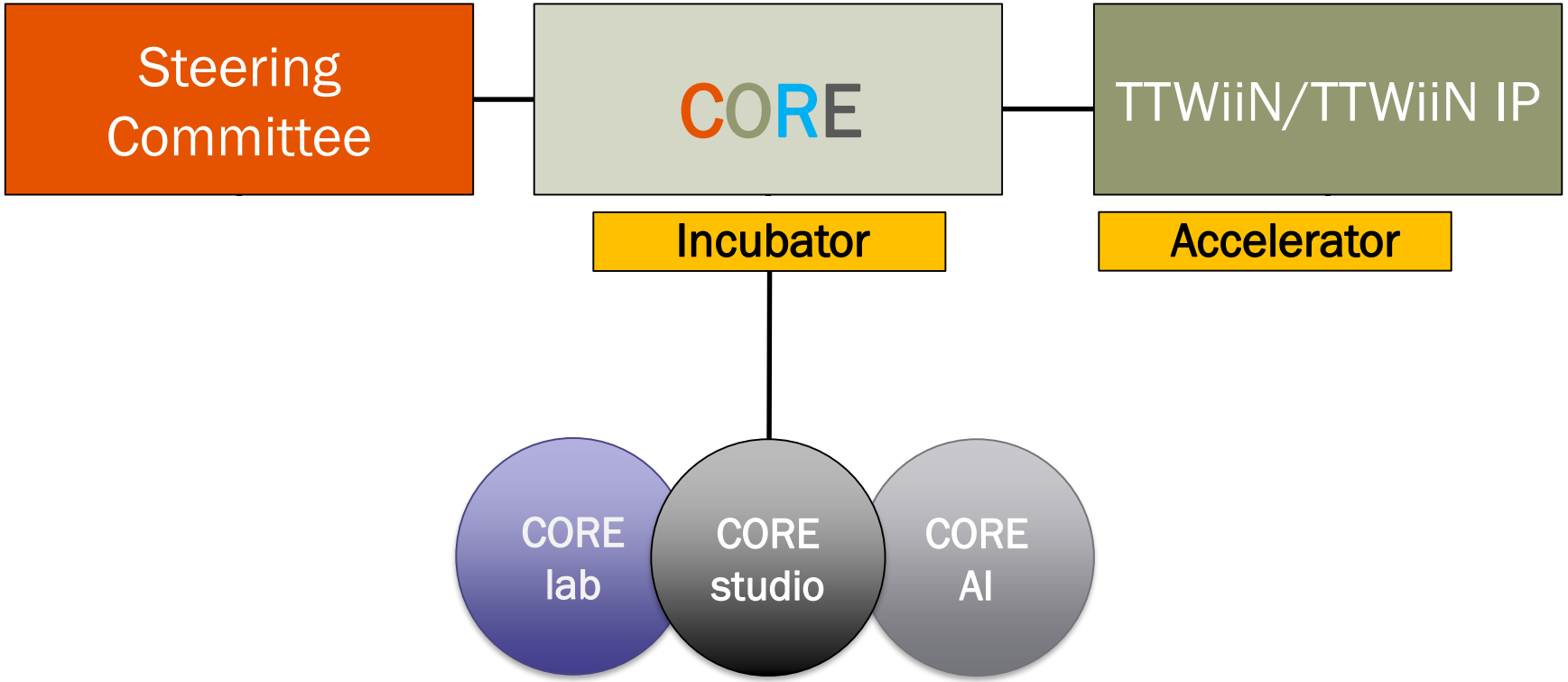
CORE Organization



Intellectual Property

General R&D
Adjacent to Transformational

Efficiencies

Applications Development
AEC R&D, CORE Modeling

Automation

Artificial Intelligence
Automation

Thornton Tomasetti

TTWiiN
Accelerator

THORNTON TOMASETTI + WEIDLINGER INNOVATION ACCELERATOR

TWiiN

onscale

Multi-Physics Solver

KONSTRU

BIM INTEROPERABLITY PLATFORM

HUMMINGBIRD kinetics

TUNED LIQUID DAMPER

PUMPKIN MOUNTS™

SHOCK AND VIBRATION MOUNTS

CORE is a FIRMWIDE ecosystem!

General R&D
Adjacent to Transformational

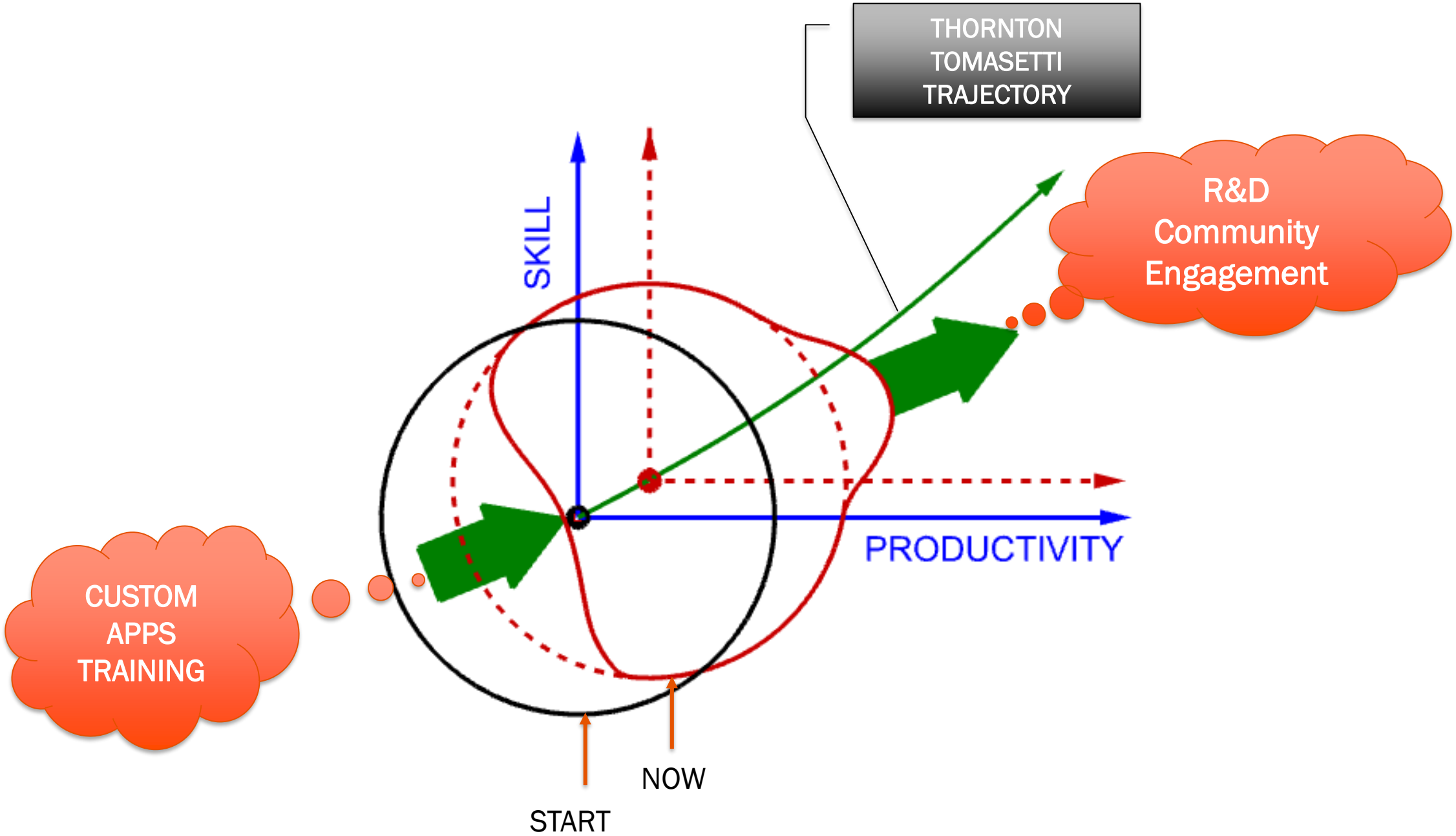
Artificial Intelligence
Automation

CORE = CORE studio + CORE Lab + CORE Reps + CORE.AI

CORE Modeling Service
Apps Dev
AEC R&D

Office by Office
Knowledge Transfer
Idea Generation

CORE STRATEGY



TEAM

CORE

Rob Otani
Nick Mundell
Ben Howes
Kenny Tam

Elcin Ertugrul
Daniel Segraves
Emil Poulsen

Shannon McMullan
Sergey Pigach
David Mans

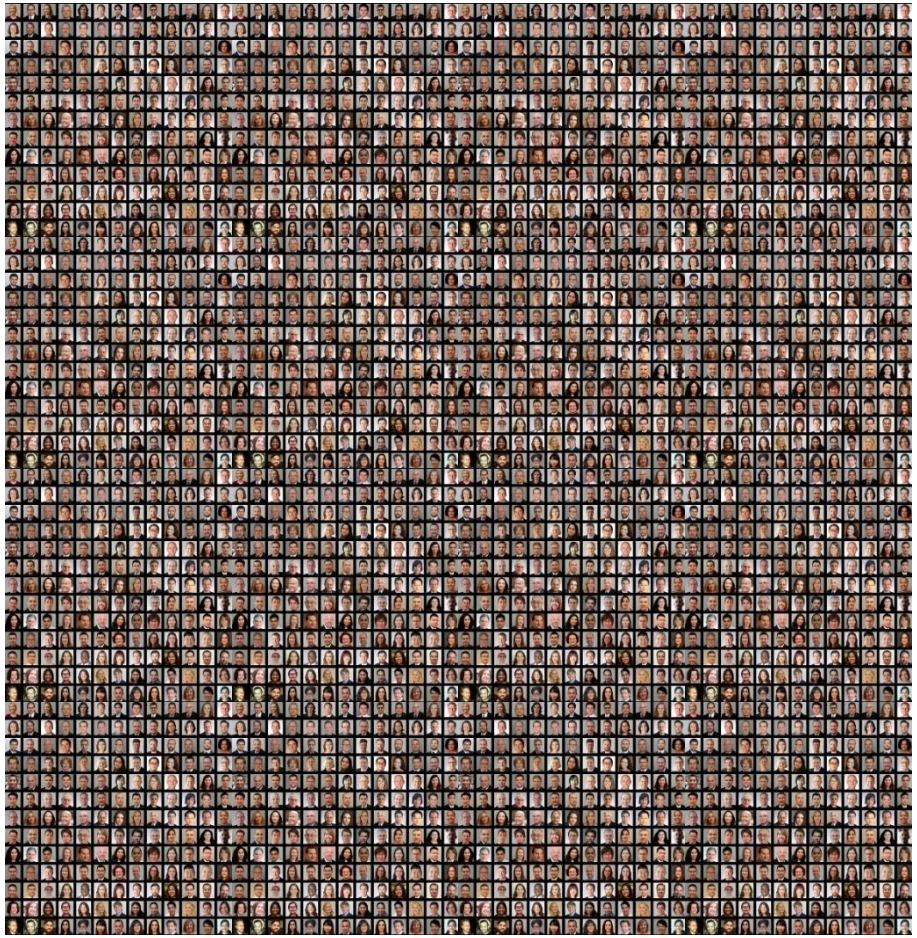
Hanshen Sun
Charlie Portelli
Abhishek Bawiskar

Badri Hiriyur
Sasha Geremia
Jonathan Cortes-Rodriguez

Norman Noe
Amit Nambiar
Litty Kunjukutty

Min Hwang
Jeroen Janssen

11/19



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AEC
Disruption

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tech disruption

ROBERT — looking ahead

... the industry is already disrupted...

ROBERT — looking ahead

docs → design

cost → profit

... CORE studio working to shift the time investment from documentation to design, from cost to profit...

ROBERT — looking ahead

R+D

...focuses on solving problems and finding better ways to improve the world...

HOW CAN WE BUILD IN RESILIANCY IN OUR BUSINESS?

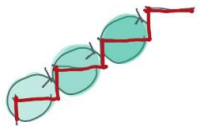
- Do we create artificial constraints?
- Are we attentive to changes in our business and world?
- Do we seek new methods and tools?
- Are we building fluency and capability in our staff?
- TRANSFER KNOWLEDGE

looking ahead

RECAP

5 Craft a culture that supports collaboration, knowledge sharing, curiosity and openness to change — engage all staff in a better understanding of the business and tools that support it.

NATE: — end note



... if you aren't creating a culture of continuous improvement, what are you creating...

MICHAEL — looking ahead

CRAFT

... even in a technologically saturated world, craft is still alive and well...

RECAP

3 Change is iterative — a series of steps informed by goals that support the common good and context, resiliant and tolerant of failure, improved by shared learning that comes from critical analysis.

NATE: — end note

... education that focuses on becoming better thinkers

... problem-solving talent is prime

... staff who are positive, fearless and able to provide critical feedback

CHRISTOPHER — looking ahead

... the recession created a huge knowledge gap in construction / detailing expertise — the challenge is in intrapersonal knowledge management...

RECAP

2 Our challenges extend beyond tools and technology, to the more universal roots of WHY — equity, health, privacy, dignity.

DAVE — looking ahead

KNOWLEDGE WITHOUT UNDERSTANDING...

... the number 1 challenge coming from current graduates is the understanding of how buildings go together...

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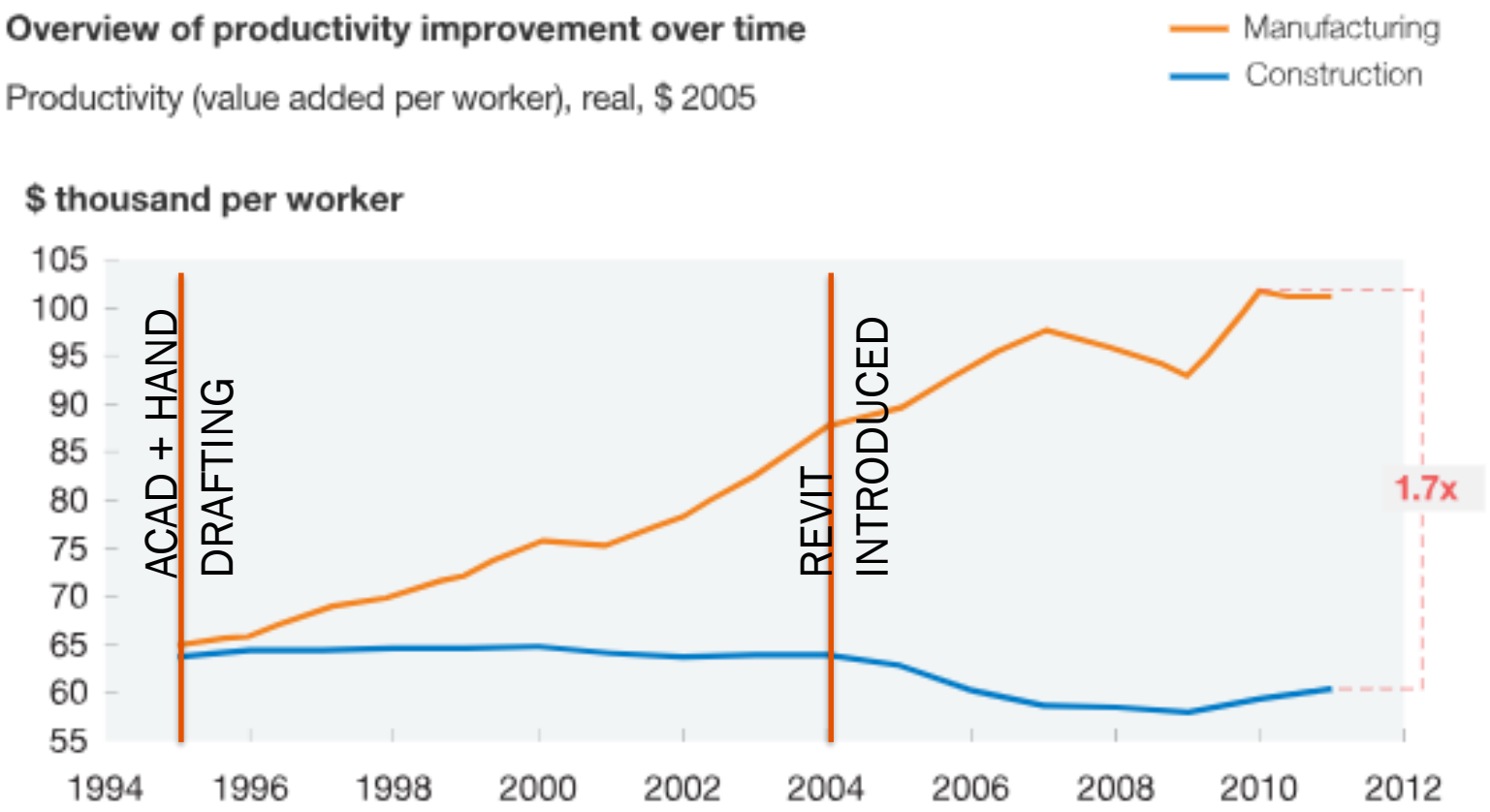
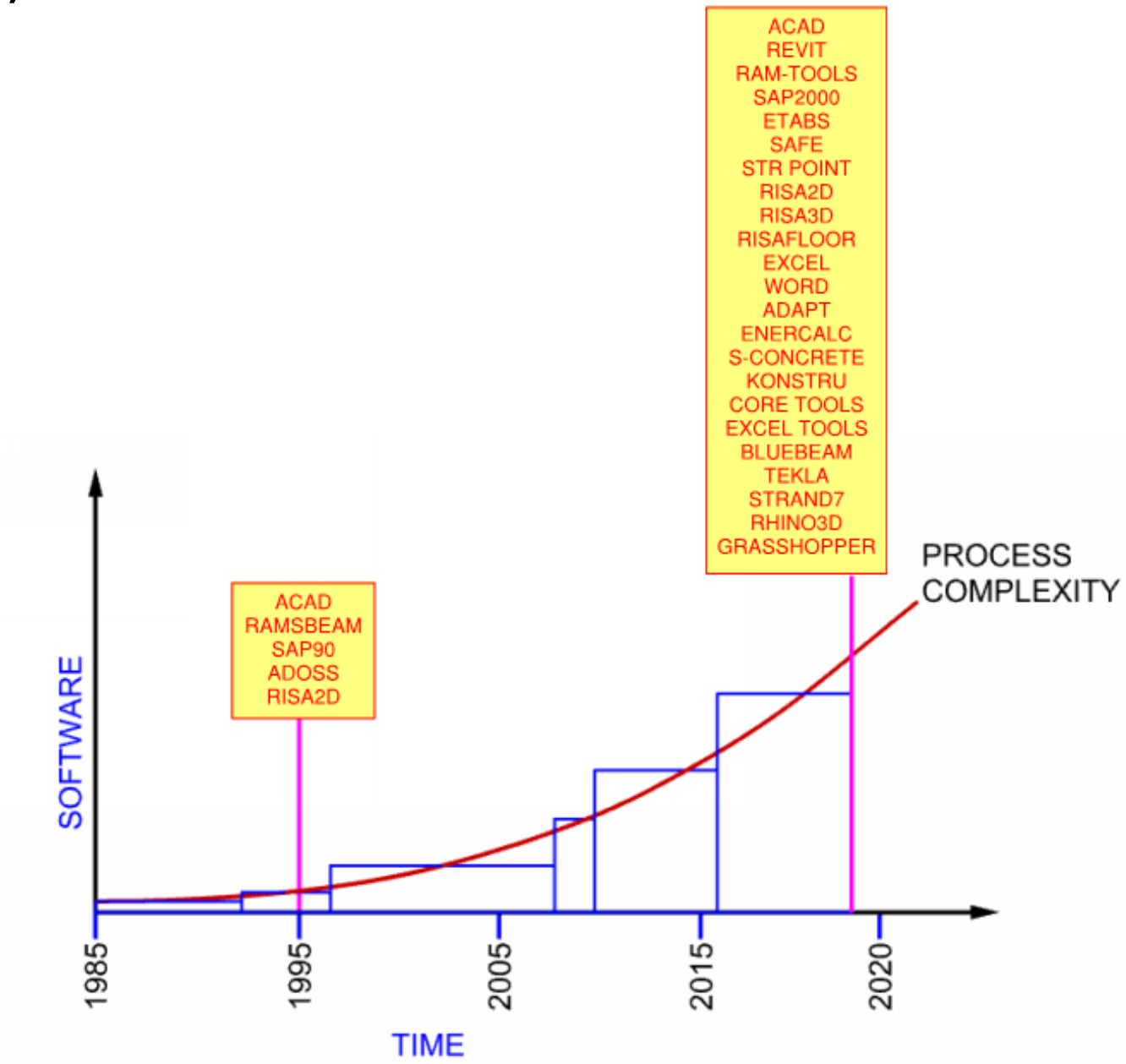
WHY CHANGE IS NECESSARY...TECHNOLOGY HAS NOT BEEN KIND TO AEC



Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

TOOLS, TOOLS, AND MORE TOOLS



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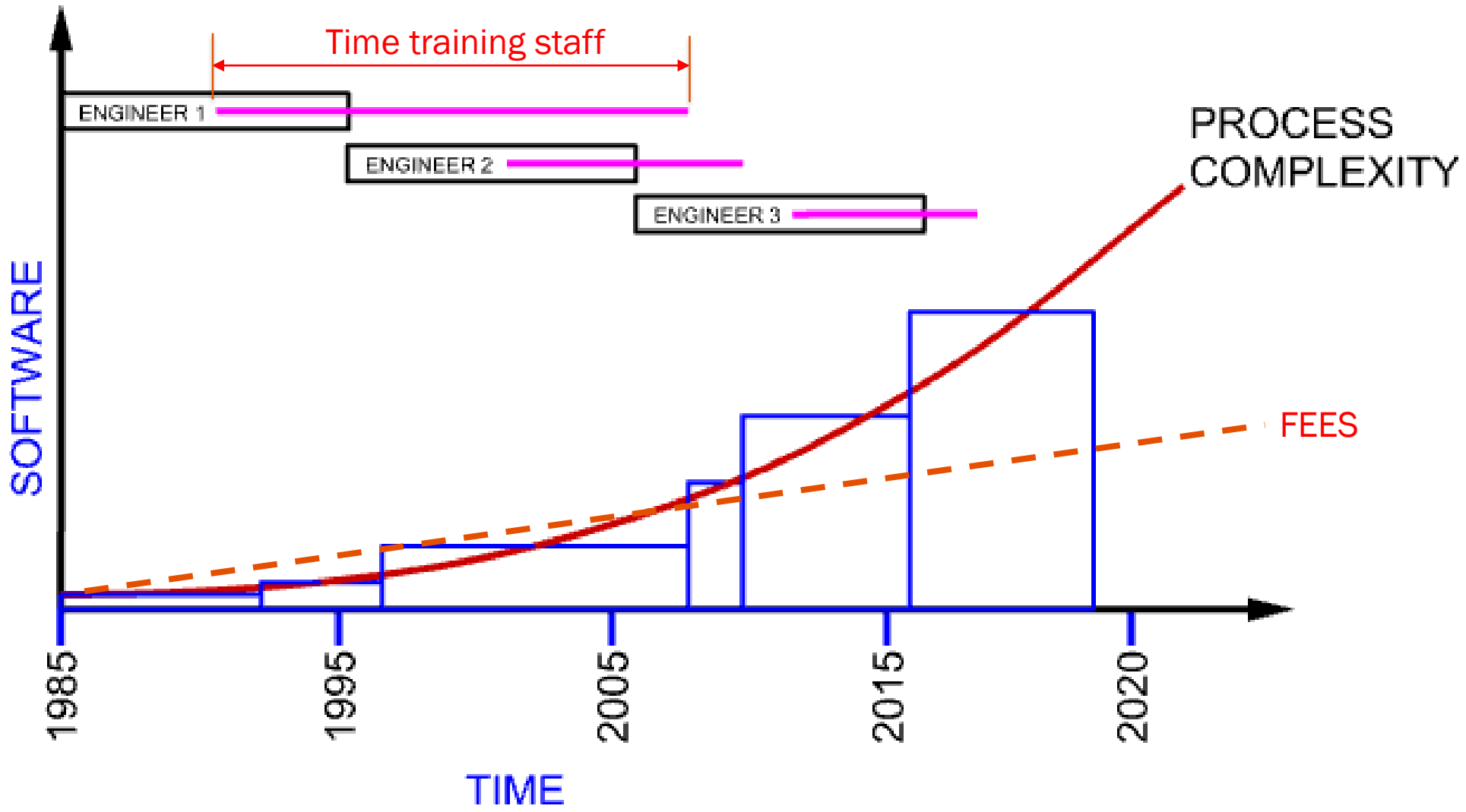
PROJECT MANAGER'S "SHELF LIFE" OF PROCESS IS SHORTENING



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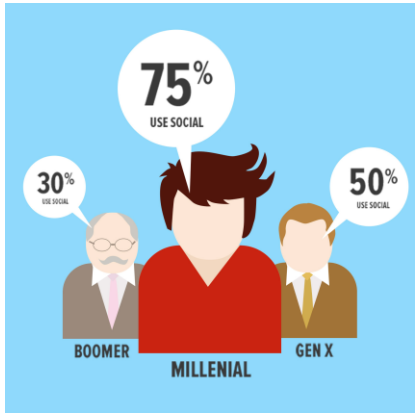
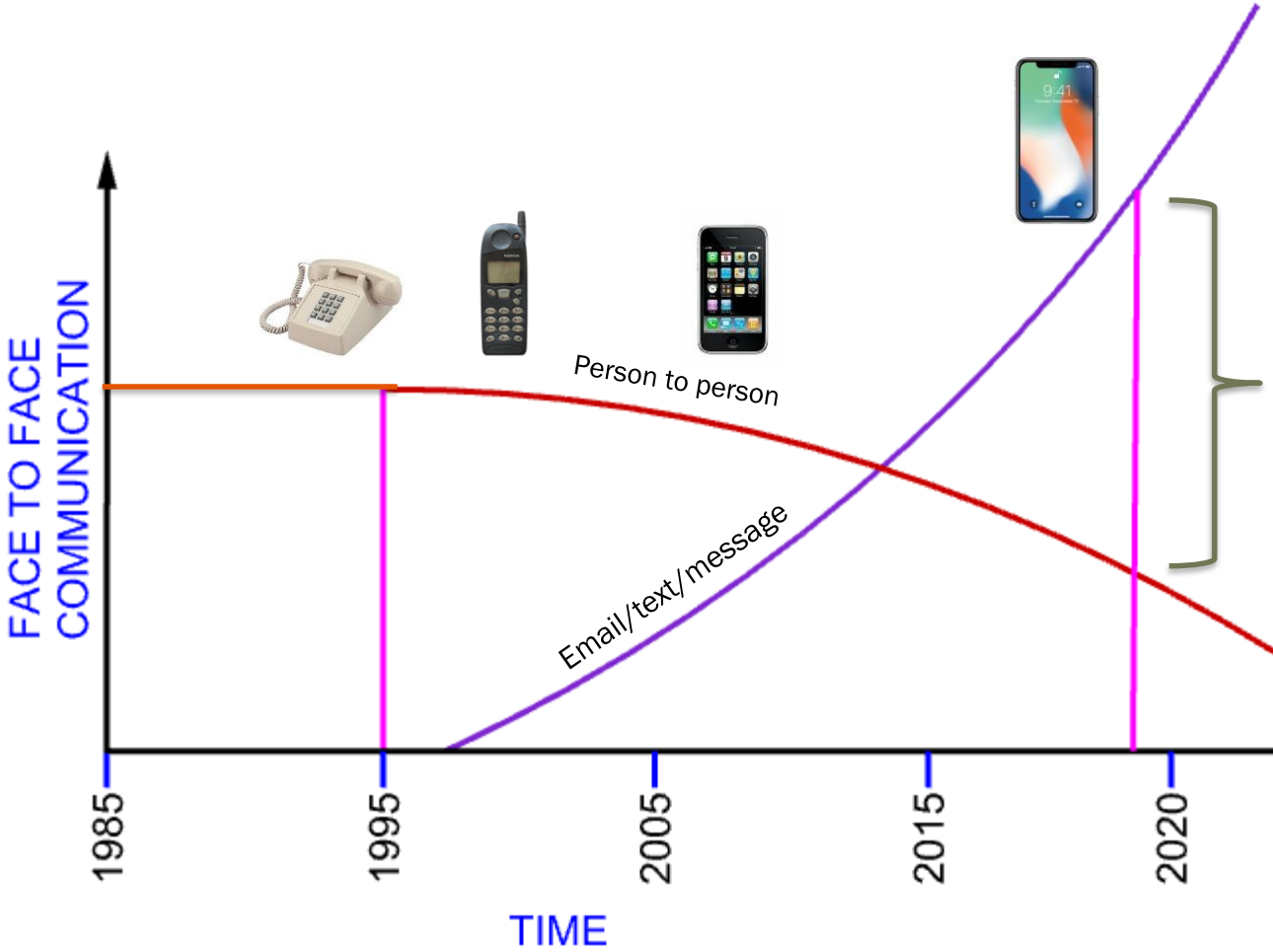
TECHNOLOGY HAS “DISRUPTED” COMMUNICATON

COMMUNICATION IS LEARNING





Time consuming, misleading, not very effective, not personal

GENERATIONAL TECHNOLOGIES HAS “DISRUPTED” COMMUNICATON

COMMUNICATION IS LEARNING

Problem #1: Conflicts Over Channels of Communication

Have you had trouble reaching a Millennial coworker? Turn to the web. Millennials, as a rule, are almost always online. Oddly enough, their comfort with technology itself can be a barrier to communicating. They can be awkward with direct personal communication because of it.

Experts say you need to take care with the words you use, in person or electronically when communicating with Millennials. What you say and how you say it are important. Millennials tend to be idealistic, requiring prompt feedback and meaningful interaction.[2] Conversely, Gen Xers tend to be blunt and direct, talking in short sound bites.

It's easy to see the trouble here. Say a Gen X employee keeps leaving voicemails for a Millennial coworker. And the Millennial responds only by text. The inability to have a verbal conversation irritates the Gen Xer. And repeated voicemails that a short text could address frustrate the Millennial, causing frustration out of cultural preferences.

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« Theme Intercultural Management

Ricardo Nugent

Mind the Gap: Millennials vs Generation X and Baby Boomers

March 8, 2019

Millennials, together with generation X, are quickly becoming the largest working demographic globally, nearly on par with baby boomers, and in many parts of the world, already outnumbering them. Gaps in communication and suboptimal working relationships can be avoided by bridging the generations proactively.

A Different Focus

Millennials tend to be short-term focused, seeking immediate rewards and generally expecting fast promotions. They tend to care about protecting the natural world, seek a healthy work environment and demand much more attention and recognition, alongside more flexibility and a more favorable work-life balance than previous generations. They also demand a different quality of relationship with managers and want training and professional development opportunities while demanding to be challenged.

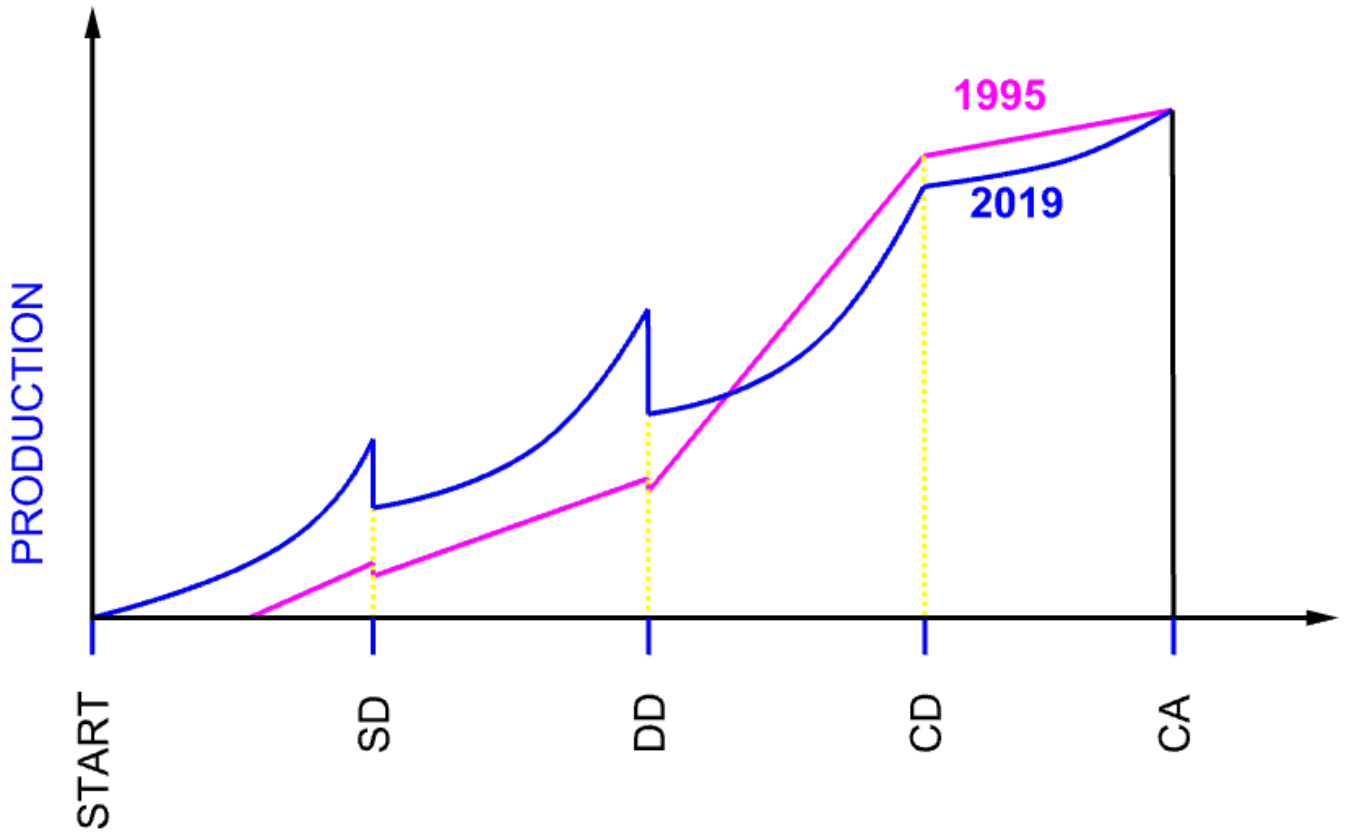
Baby Boomers, on the other hand, are more traditional in their approach to work. They tend to be more dedicated to their jobs, with ambitious, clear goals and are less sensitive to life balance issues, waiting longer for promotions without requiring constant feedback.

These different perspectives create potential risks to a productive work environment as job expectations and parameters can collide.

TECHNOLOGY HAS "DISRUPTED" HOW WE PRODUCE DOCUMENTION

WHY? **BECAUSE THE TOOLS ALLOW IT, IT'S COOL, LOOK HOW SMART I AM!**

NET EFFECT? **LESS THINKING, WASTED TIME/MONEY, TOO FAR IN FRONT OF THE ARCHITECT**



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BUILDING TECHNOLOGY HAS "DISRUPTED" OUR SCOPE

2005 – RESIDENTIAL HIGH RISE 20 STORIES

- SYSTEM = CONCRETE

2019 – RESIDENTIAL HIGH RISE 20 STORIES

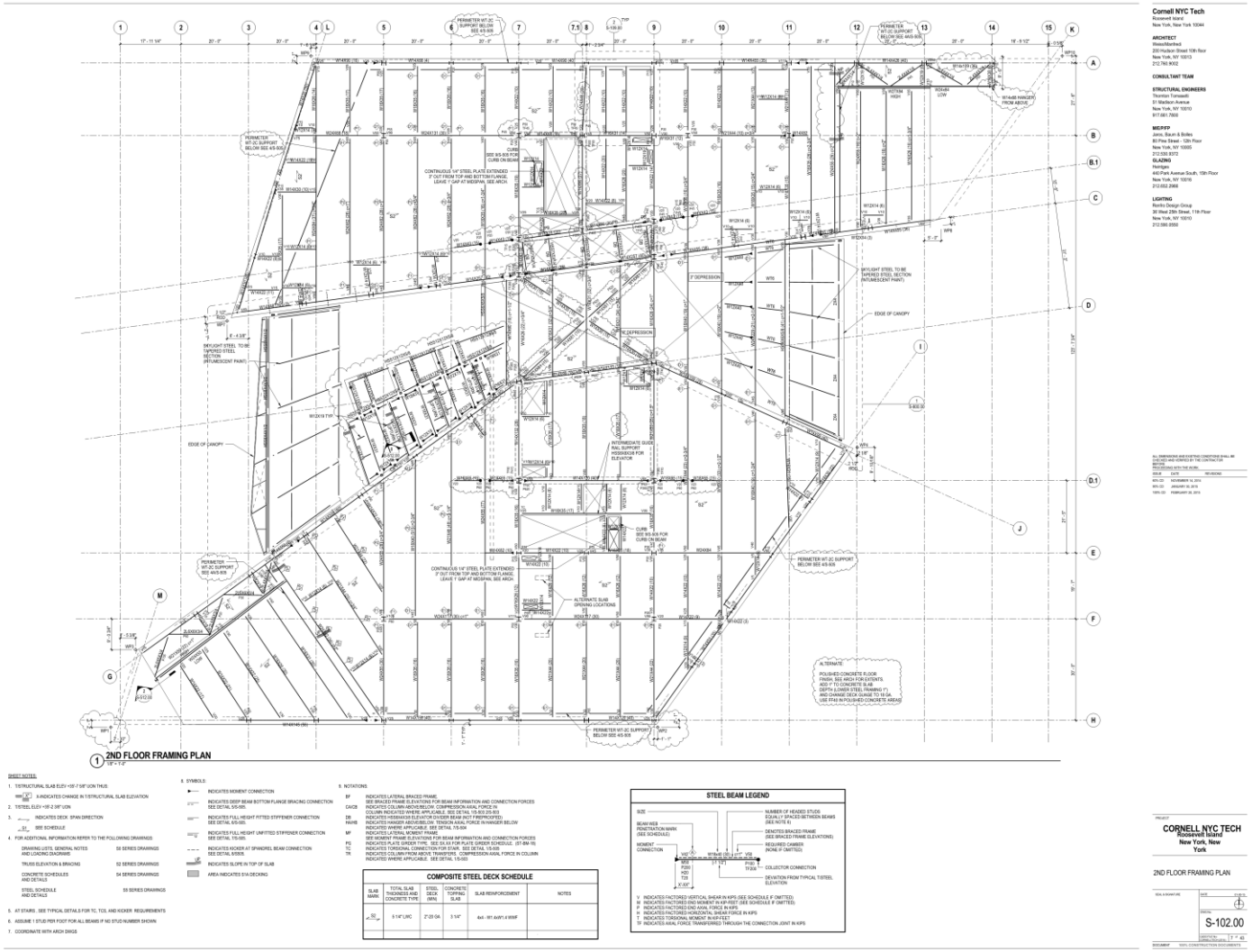
- SYSTEM = CONCRETE, STEEL, HYBRID, LIFT, TIMBER, DIVERSAKORE, PRECAST/STEEL, GIRDER SLAB?

THE STANDARD OF CARE OF OUR DELIVERY HAS NOT CHANGED BUT OUR PROCESS TO THE STANDARD OF CARE HAS CHANGED RADICALLY

- DELIVERY = 2D
- PRACTICE = 2D AND 3D

BIM HAS ALLOWED ARCHITECTS TO CHANGE INDISCRIMINATELY BECAUSE BIM MODELS CHANGE/UPDATE AUTOMATICALLY....BUT ENGINEERING ANALYSIS DOESN'T

THE PROMISE OF BIM WILL NEVER BE REALIZED WHEN THE STANDARD OF CARE IS ARCHAIC



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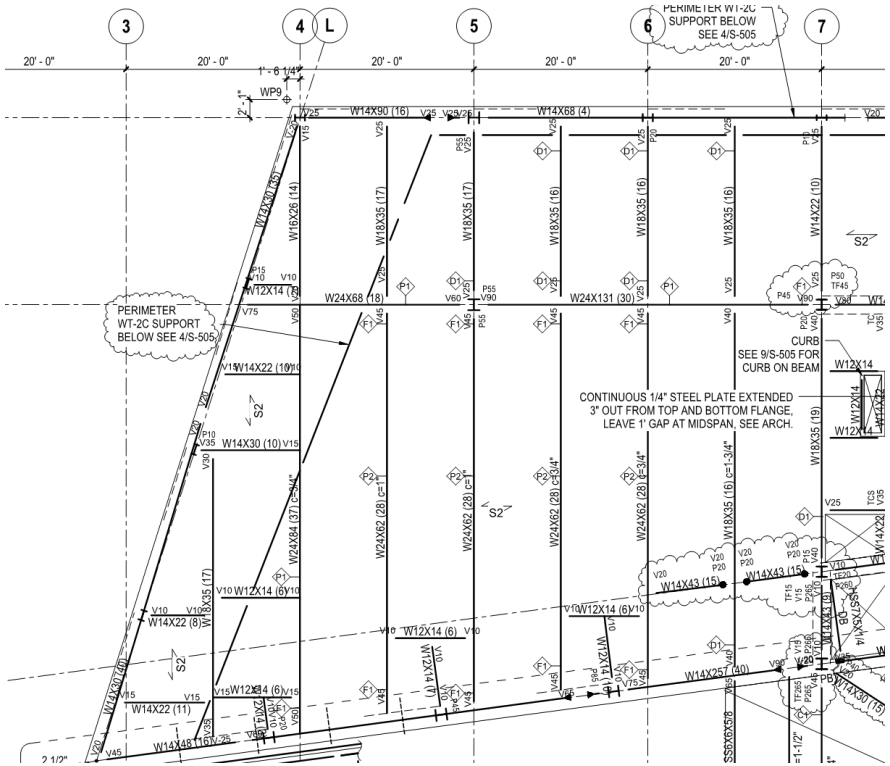
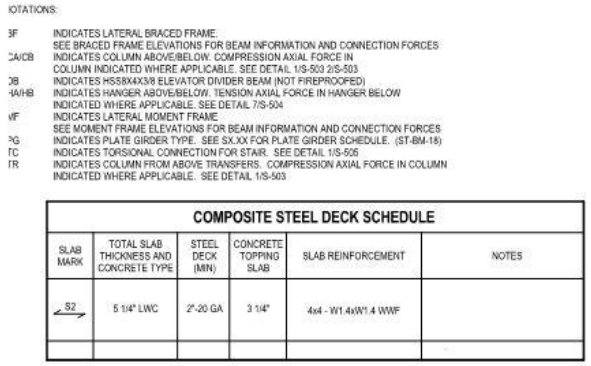
2D DRAWINGS ARE REPRESENTATIONS OF THE 3D OBJECTS USING SYMBOLOGIES TO INTERPRET 2D TO 3D



2ND FLOOR PART PLAN

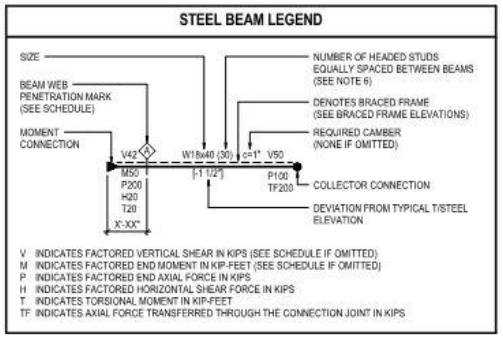


IOTATIONS:

BF	INDICATES LATERAL BRACED FRAME. SEE BRACED FRAME ELEVATIONS FOR BEAM INFORMATION AND CONNECTION FORCES
CA/CB	INDICATES COLUMN ABOVE/BELOW. COMPRESSION AXIAL FORCE IN COLUMN INDICATED WHERE APPLICABLE. SEE DETAIL 1/S-503 2/S-503
DB	INDICATES HSS8X4X3/8 ELEVATOR DIVIDER BEAM (NOT FIREPROOFED)
HA/HB	INDICATES HANGER ABOVE/BELOW. TENSION AXIAL FORCE IN HANGER BELOW INDICATED WHERE APPLICABLE. SEE DETAIL 7/S-504
MF	INDICATES LATERAL MOMENT FRAME SEE MOMENT FRAME ELEVATIONS FOR BEAM INFORMATION AND CONNECTION FORCES
PG	INDICATES PLATE GIRDER TYPE. SEE SX.XX FOR PLATE GIRDER SCHEDULE. (ST-BM-18)
TC	INDICATES TORSIONAL CONNECTION FOR STAIR. SEE DETAIL 1/S-505
TR	INDICATES COLUMN FROM ABOVE TRANSFERS. COMPRESSION AXIAL FORCE IN COLUMN INDICATED WHERE APPLICABLE. SEE DETAIL 1/S-503

COMPOSITE STEEL DECK SCHEDULE

SLAB MARK	TOTAL SLAB THICKNESS AND CONCRETE TYPE	STEEL DECK (MIN)	CONCRETE TOPPING SLAB	SLAB REINFORCEMENT	NOTES
S2	5 1/4" LWC	2"-20 GA	3 1/4"	4x4 - W1.4xW1.4 WWF	



WITH SYMBOLS AND NOTES TO INTERPRET LINES AND ANNOTATIONS TO CONSTRUCTION OBJECTS

PLANS SHOW SIZES, DIMENSION, MATERIALS, FORCES, METADATA, ETC

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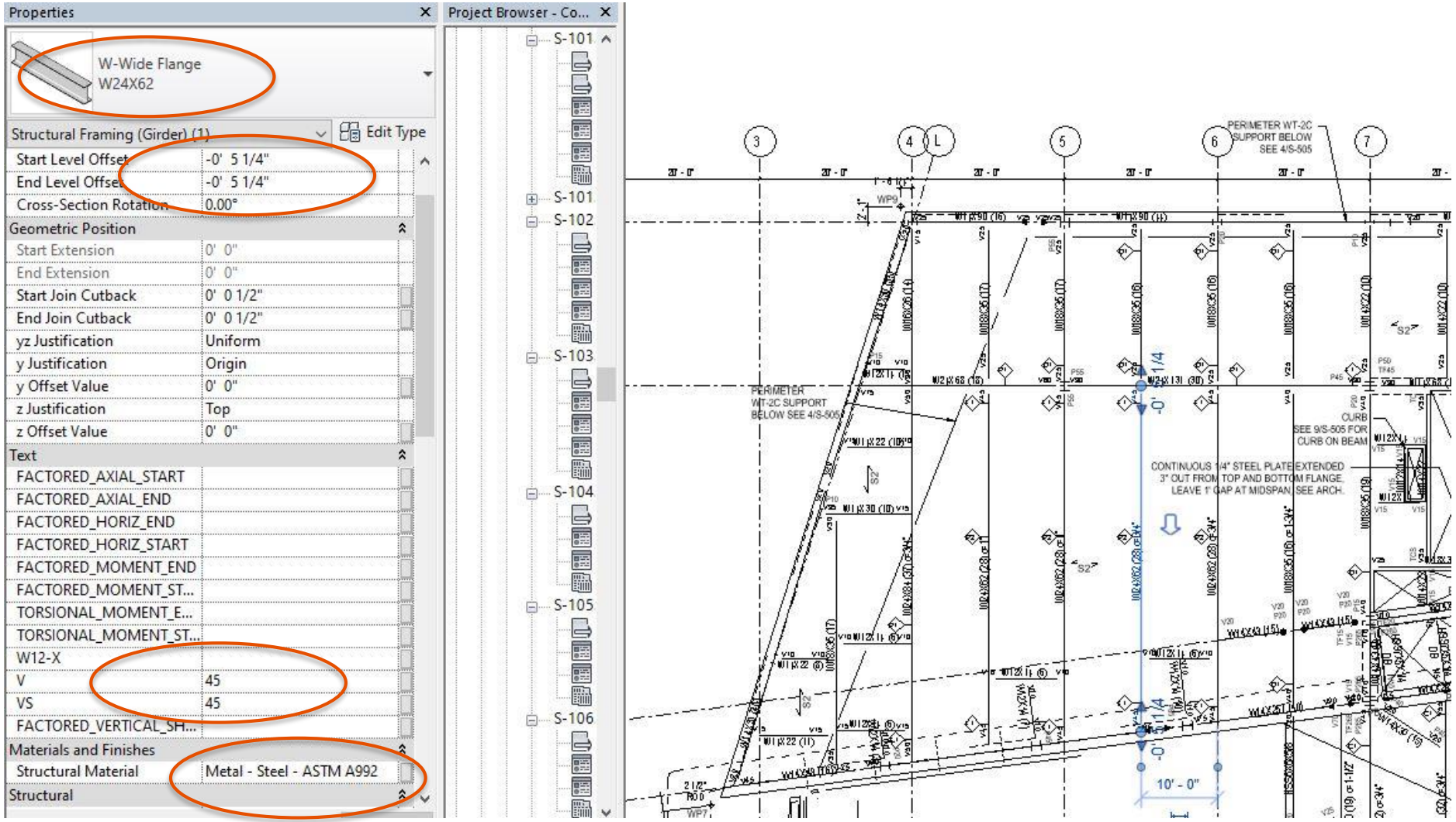
BUT WAIT, WE ALREADY HAVE ALL THAT INTELLIGENT INFORMATION EMBEDDED IN THE 3D BIM MODEL



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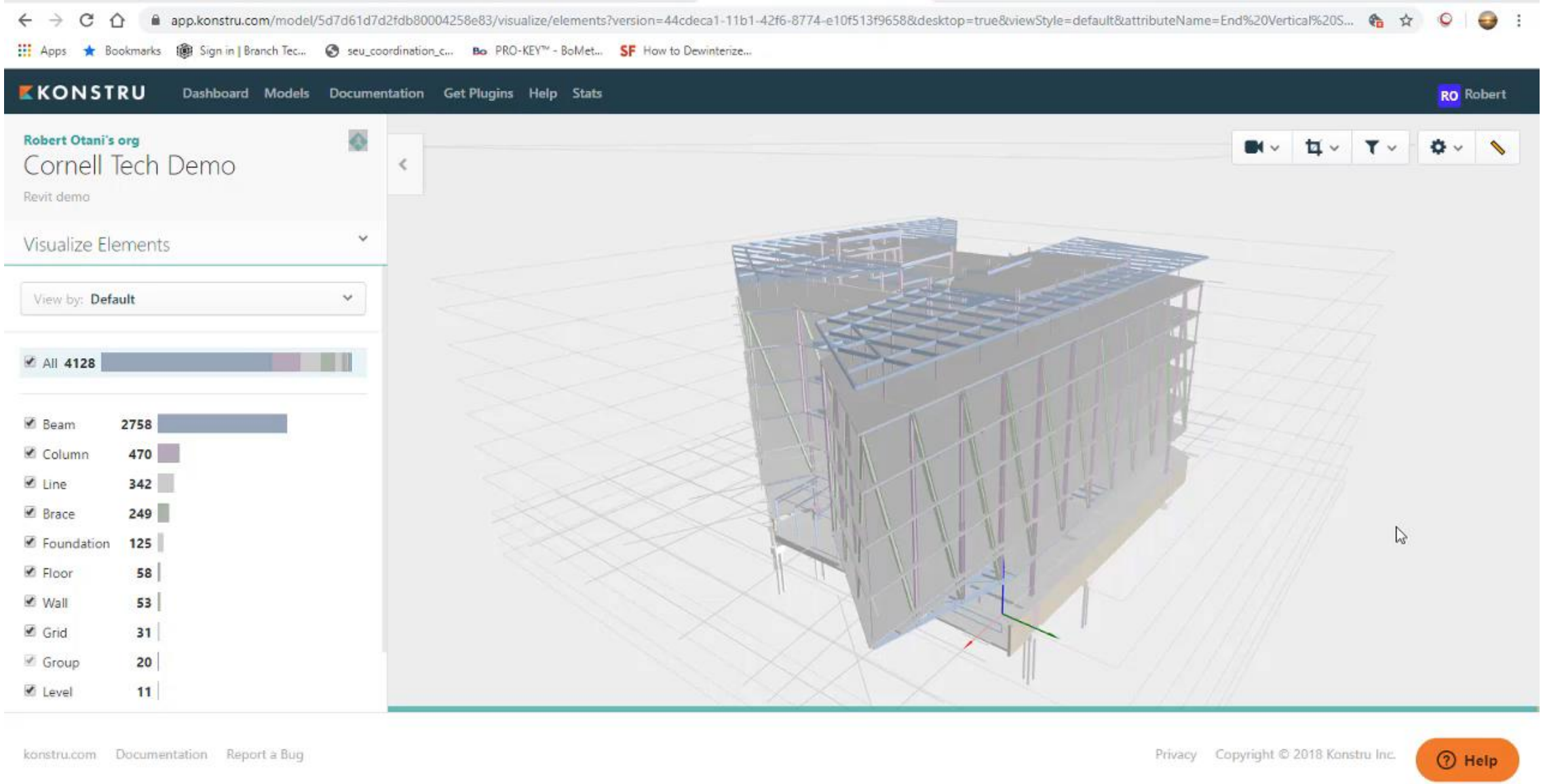
AND WE CAN SEAMLESSLY SHARE THE MODEL TO ANY COLLABORATOR IN A DATA CENTRIC WAY



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KONSTRU

one platform to accelerate BIM

Weiss Manfredi

TATA Innovation Center

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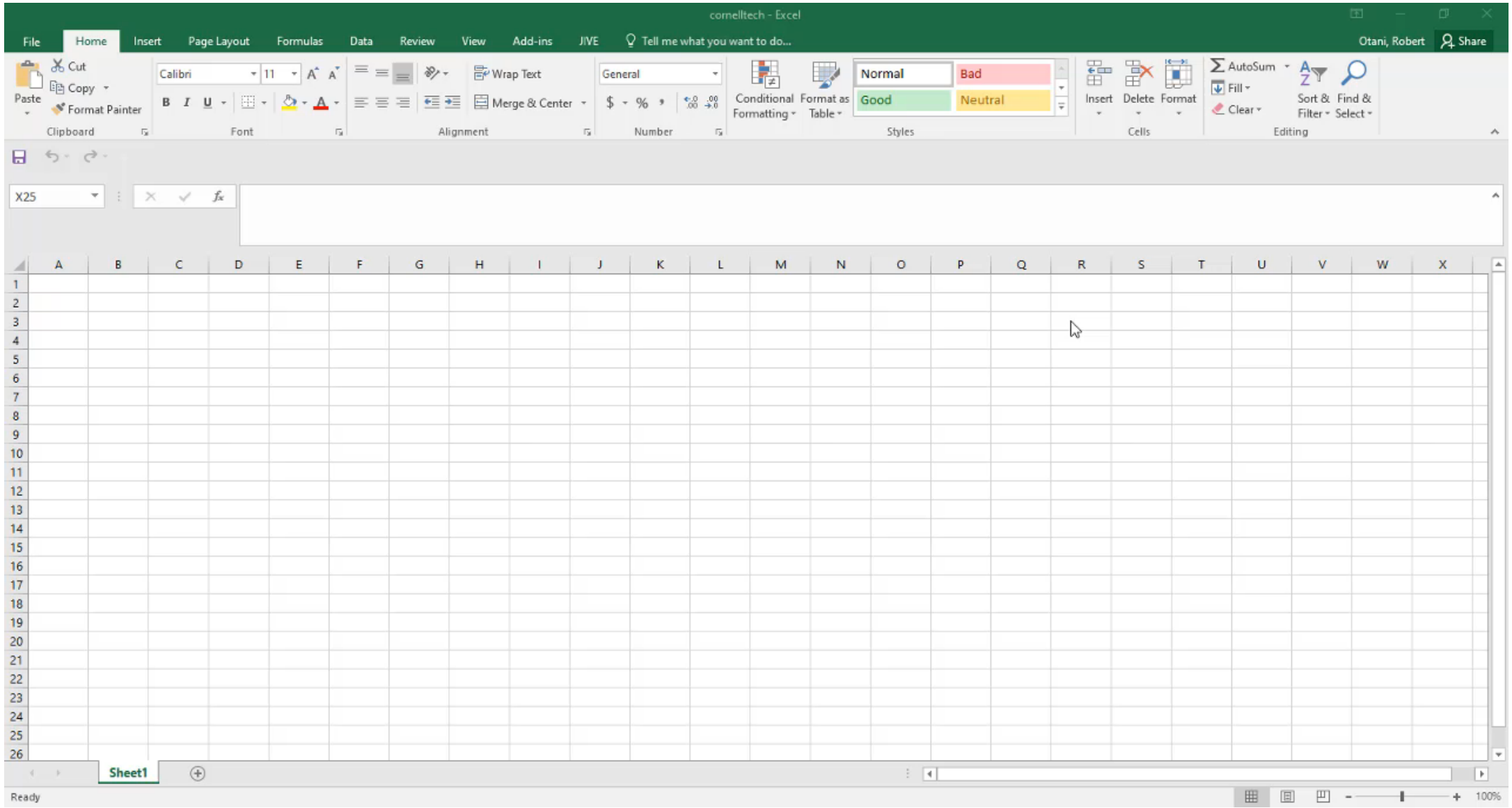
WE CAN SEAMLESSLY SHARE THE 3D MODEL IN A DATA CENTRIC WAY



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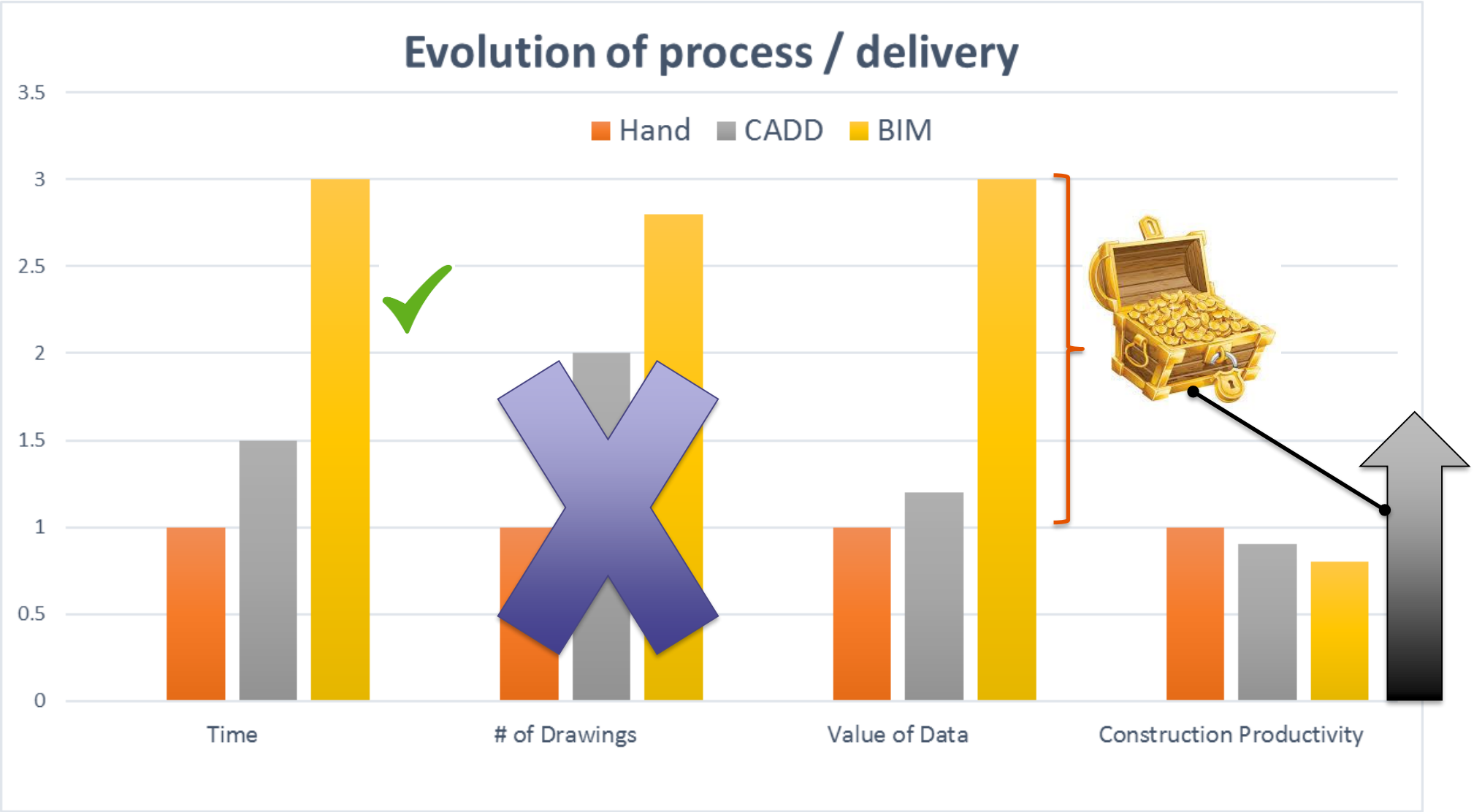
VIP ROUNDTABLE

DIGITIZATION OF DELIVERABLES

CORE studio
Chris Sharples – SHoP
Tim Logan – HKS Line
Murali Selvaraj – P+W
Michael Hodge – TVS Design
Kare Poulsgaard – 3XN
Alexandra Pollack – FXCollaborative
Pierce Reynoldson – WeWork
Cliff Goldsmith – Suffolk Construction
Zak Kostura – ARUP
Scott Allen – Seven Valleys
Islay Burgess – Gensler
James Wynn – Gensler
Brian Gillespie – Robert McNeel
Nicholas Cameron – P+W
Gus Sirakas – NYCDOB
Marios Tsiliakos – Foster & Partners
Byron Mardas – Foster & Partners
Dennis Shelden – Georgia Tech
Scott Lomax – Thornton Tomasetti

TECH DISRUPTION SNUCK UP ON US



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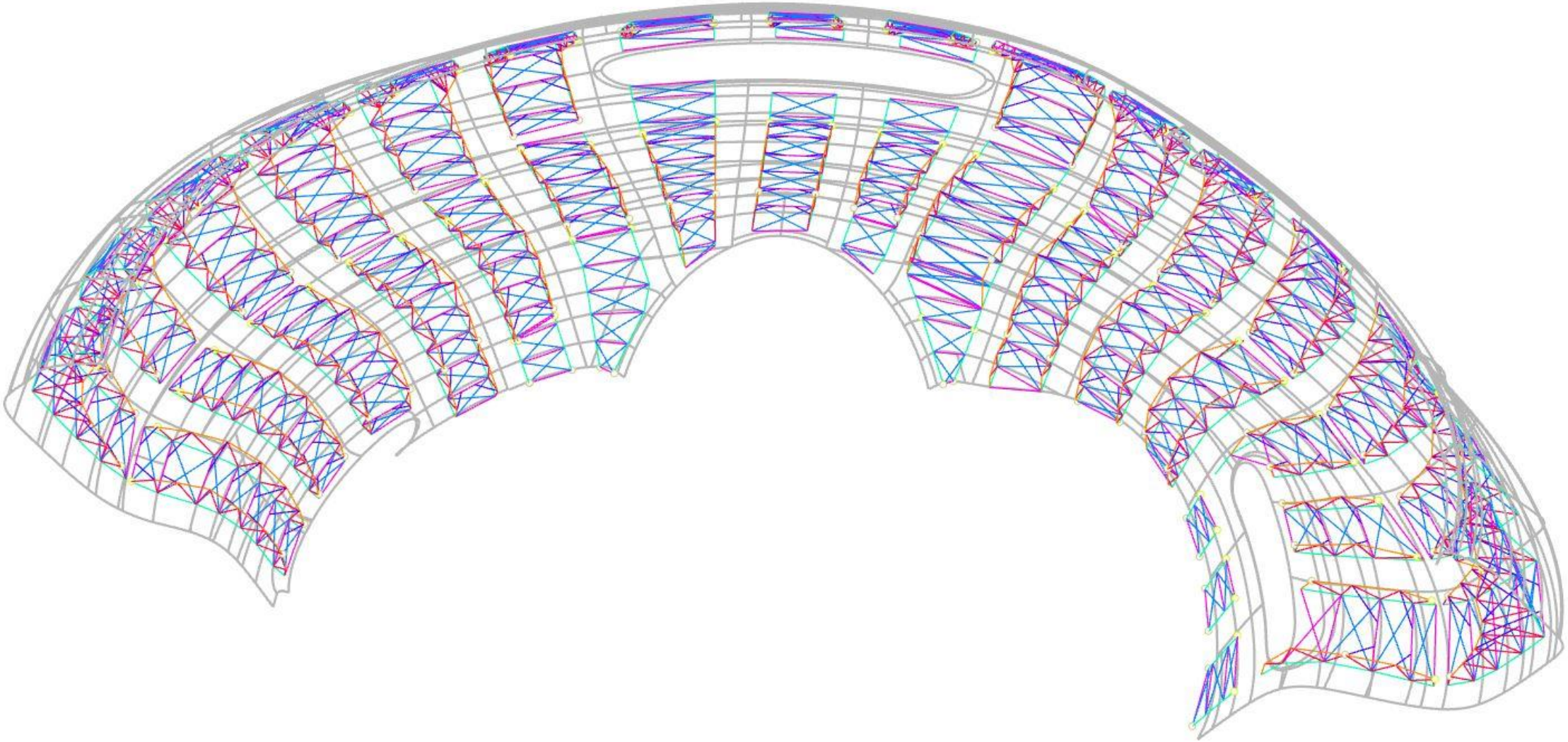
BIM
Power

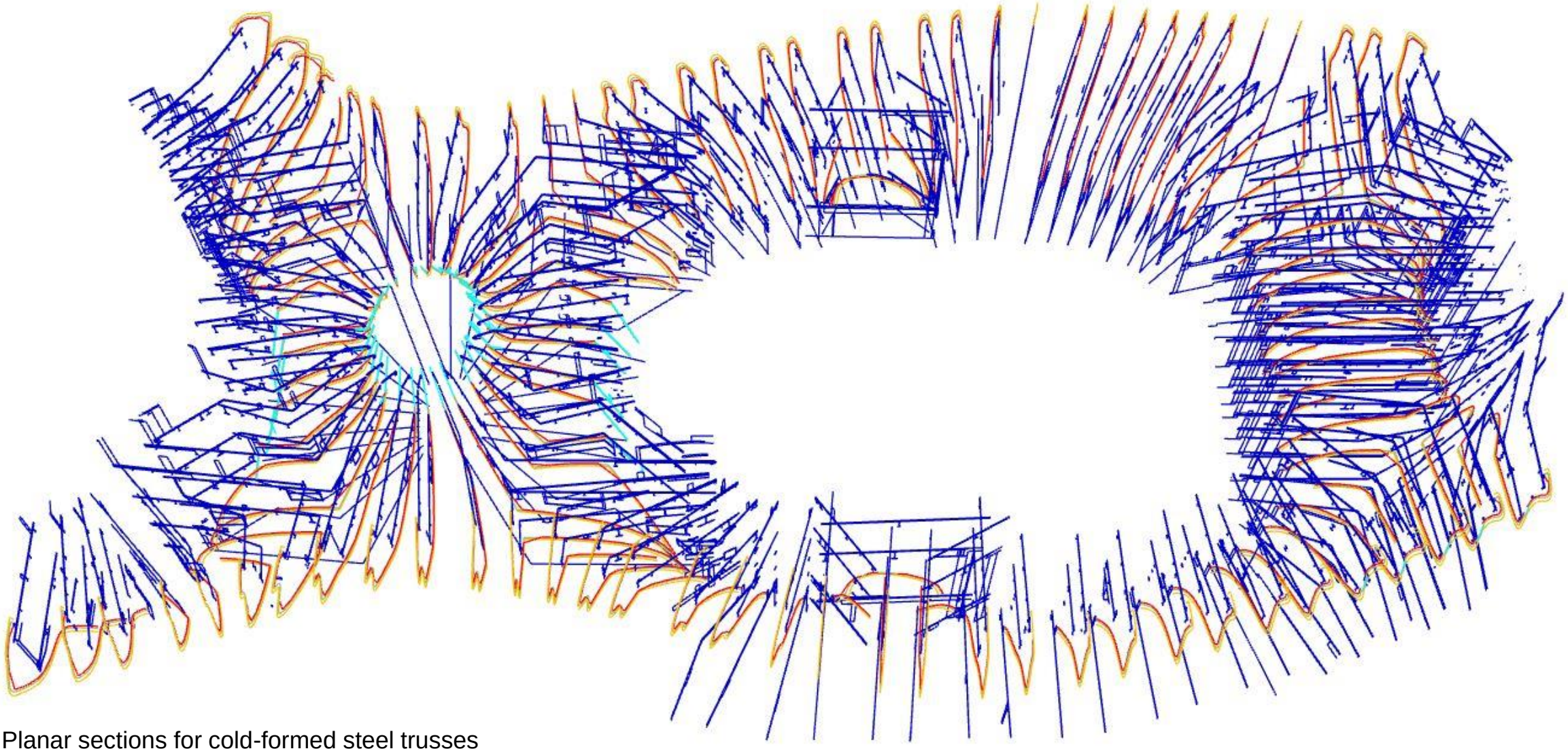
THE POWER OF BIM AND AUTOMATION IS IMMENSE



Rhino Modeling

CORE modeling

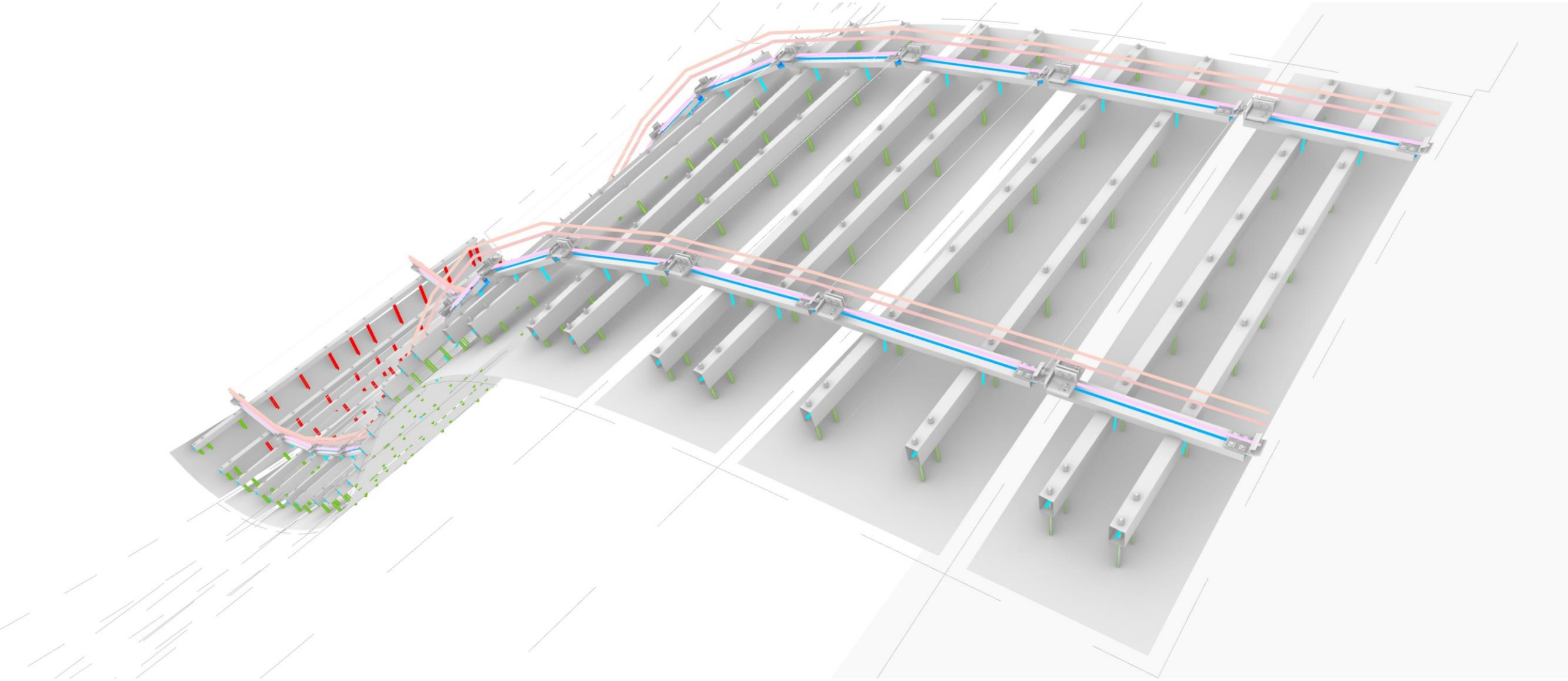
THE POWER OF BIM AND AUTOMATION IS IMMENSE



Planar sections for cold-formed steel trusses

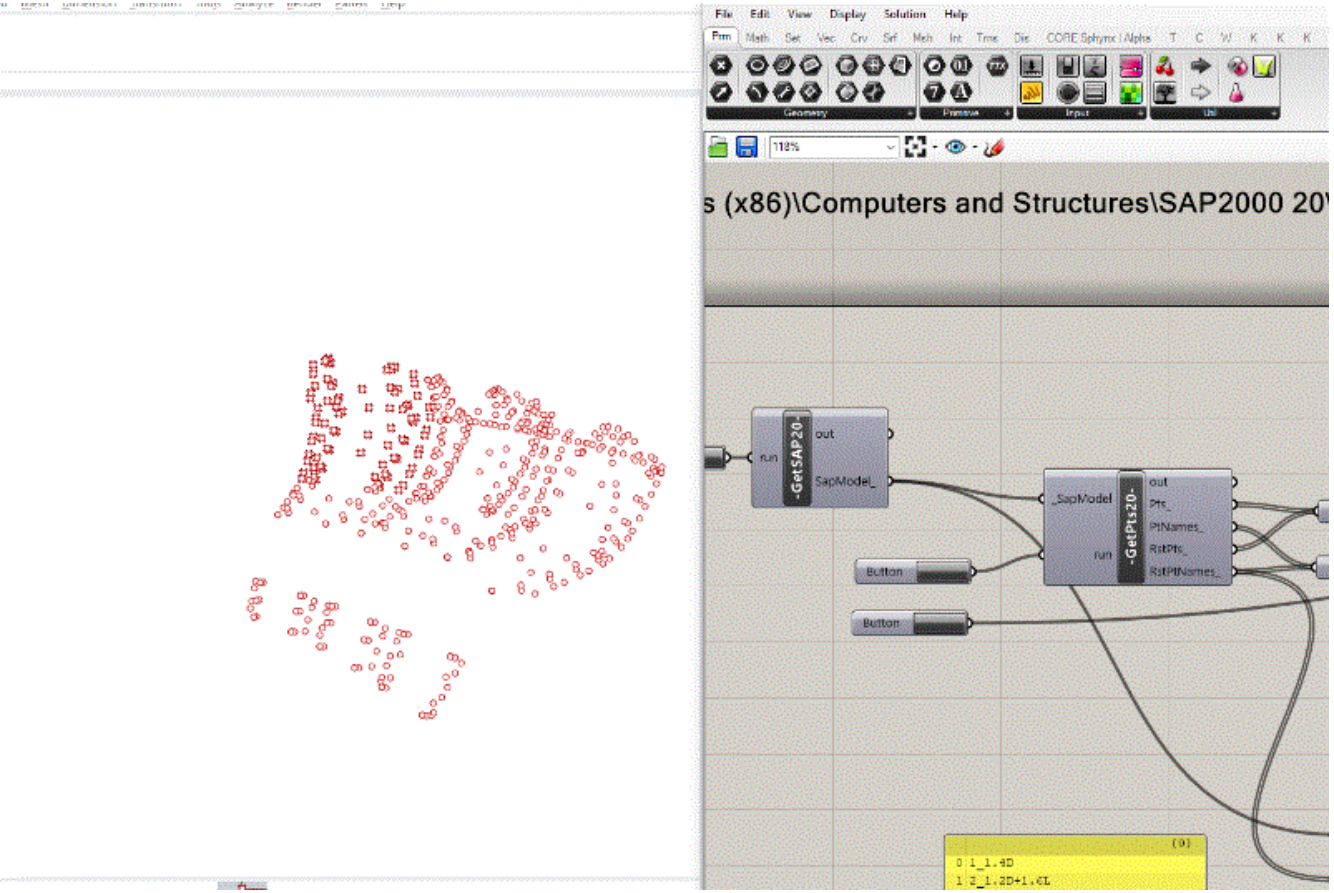
CORE modeling

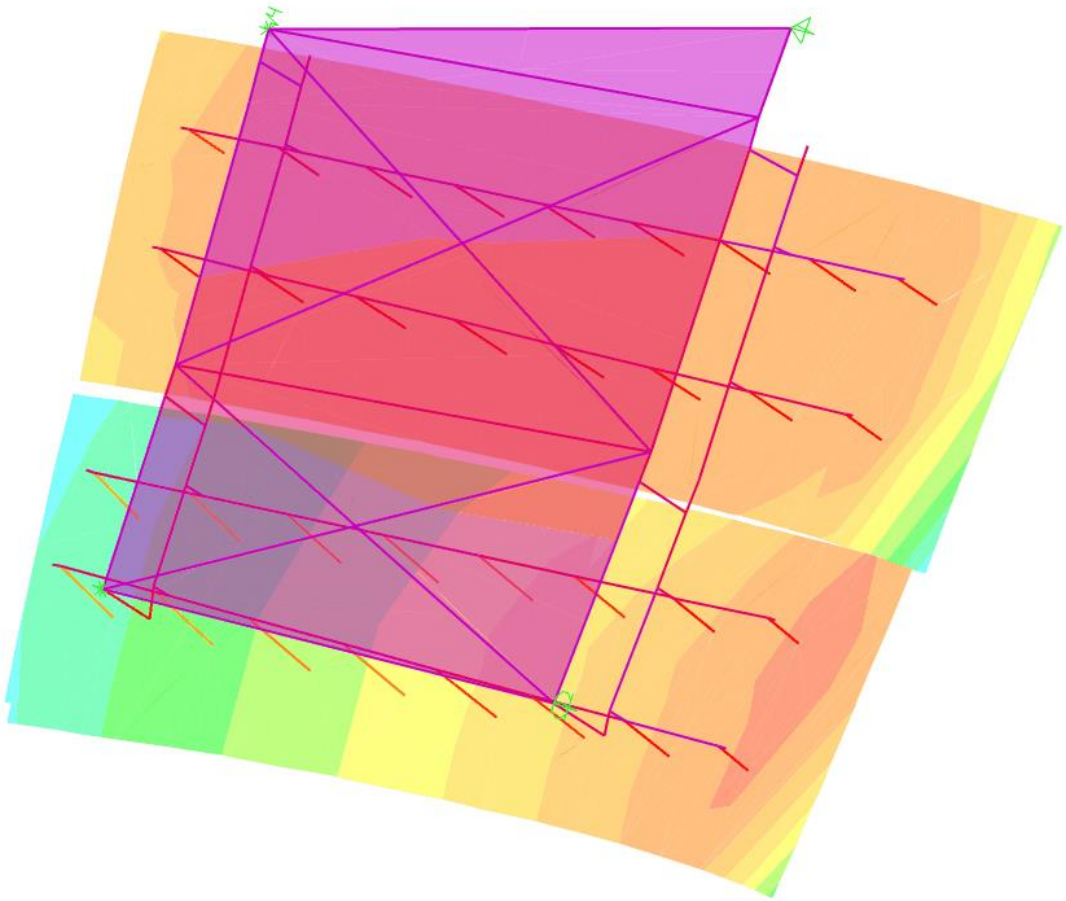
THE POWER OF BIM AND AUTOMATION IS IMMENSE



CORE modeling

THE POWER OF BIM AND AUTOMATION IS IMMENSE





CORE modeling

THE PROMISE OF BIM WILL NEVER BE REALIZED WHEN THE STANDARD OF CARE IS ARCHAIC

2019 MODEL

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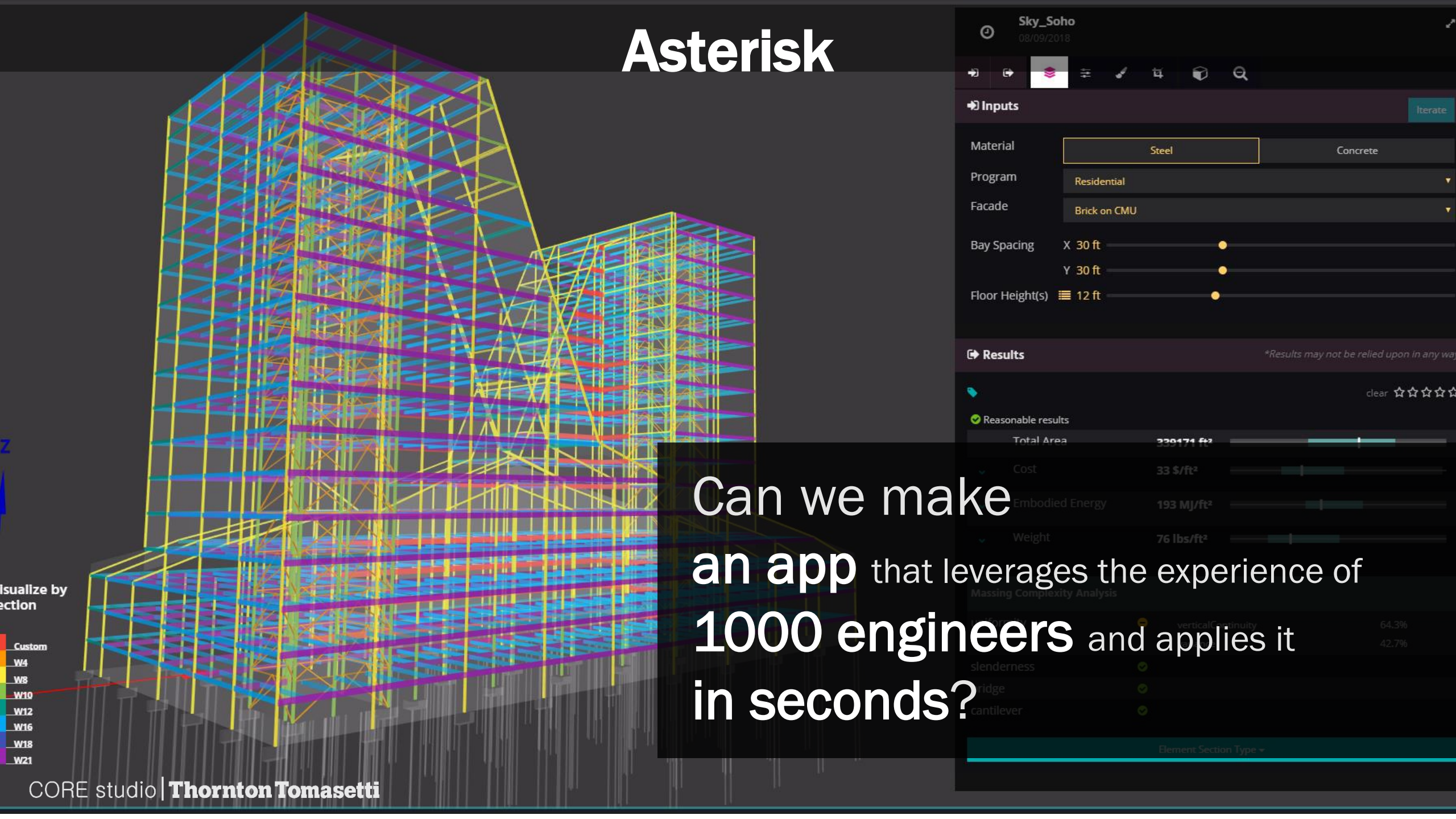
CORE.AI

ASTERISK

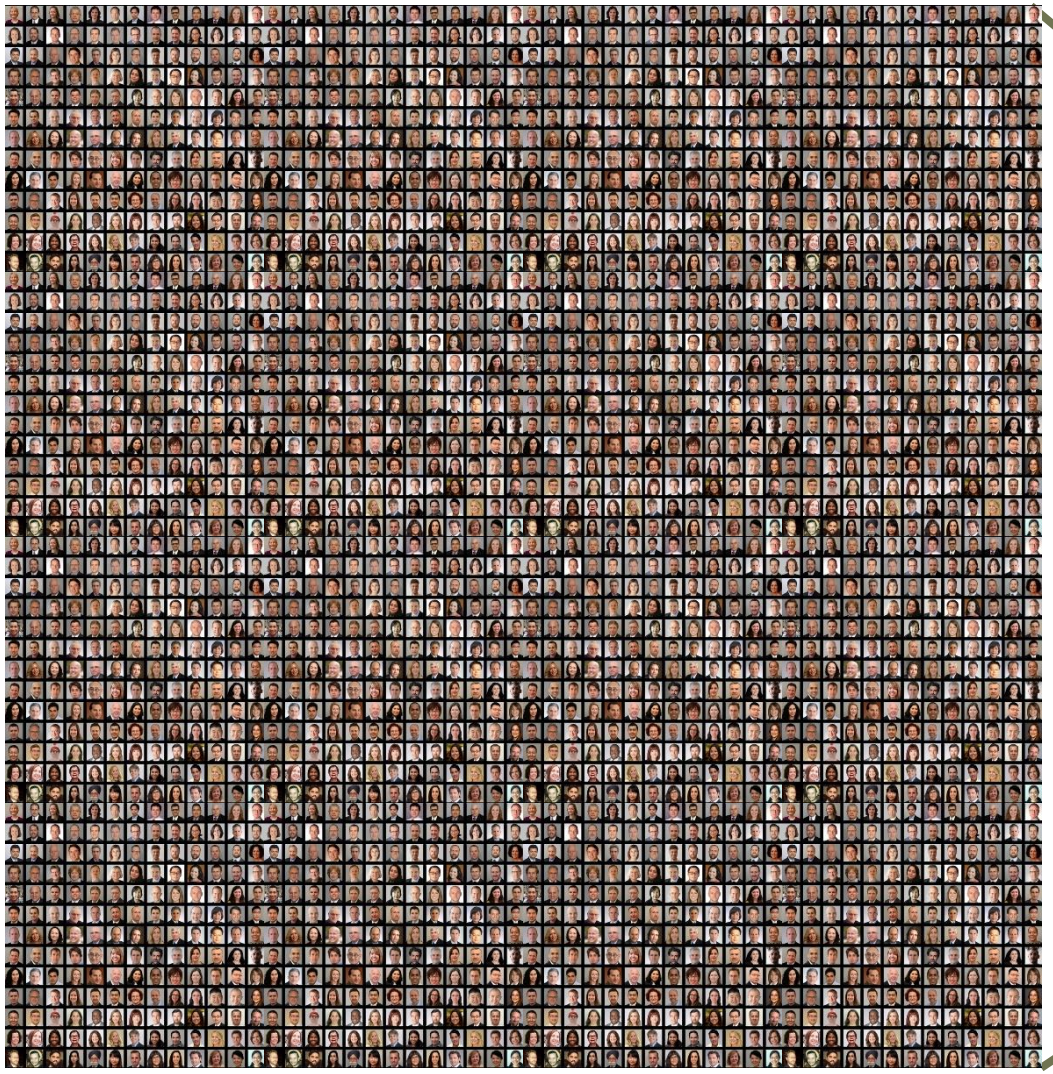
Asterisk

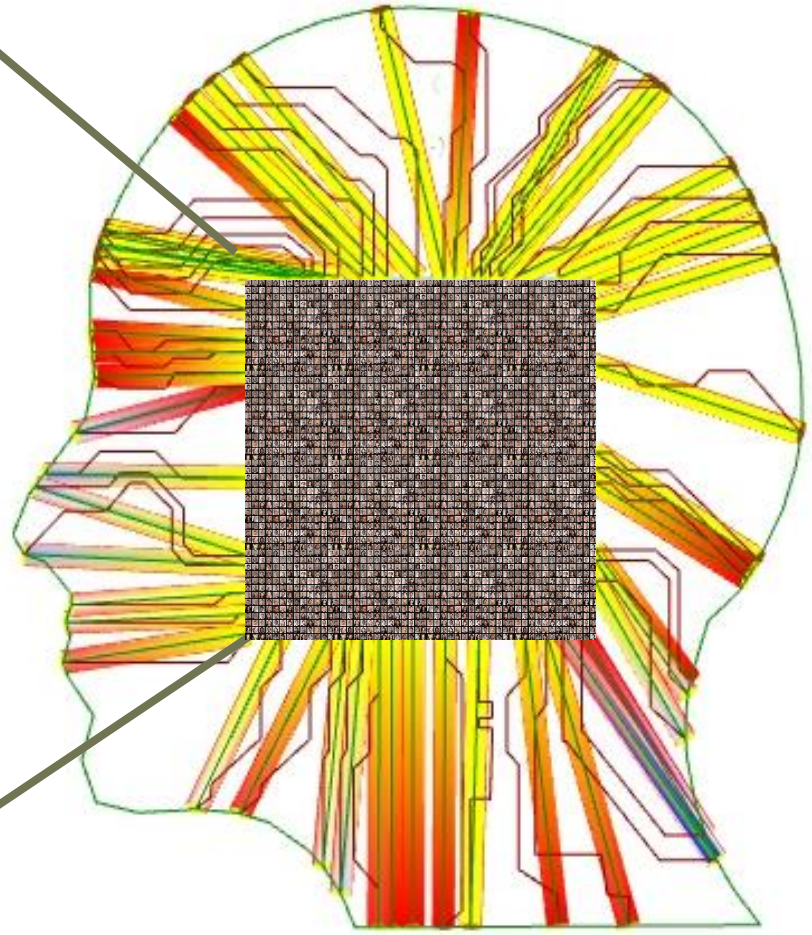


Can we make **an app** that leverages the experience of **1000 engineers** and applies it **in seconds?**

CORE studio | **Thornton Tomasetti**

What if the entirety of your firms' knowledge was accessible to every employee in an app?





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Thanks