



Tom Perry

Business Thermodynamics: The Art and Science of
Creating Flow in Living Systems

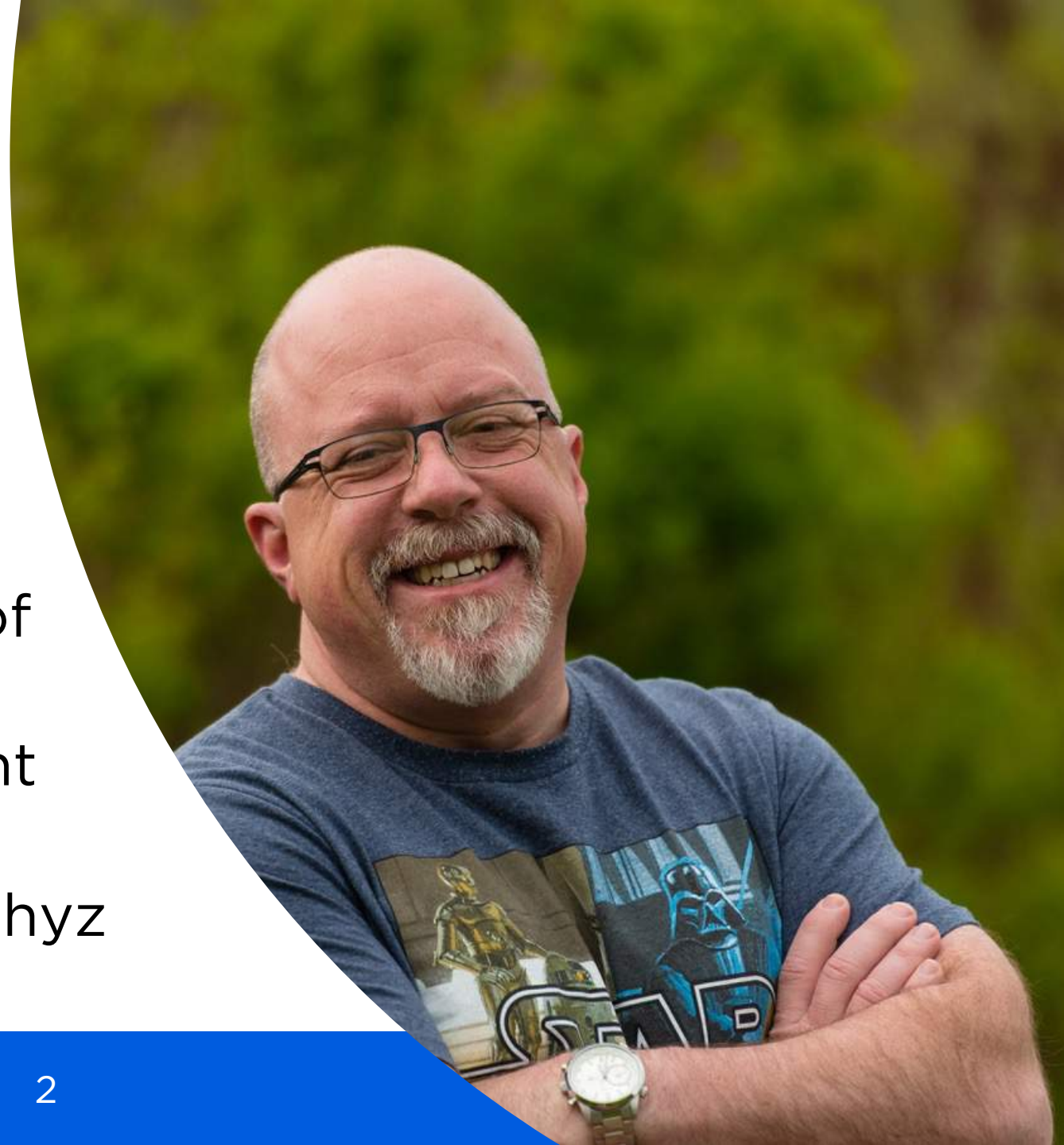
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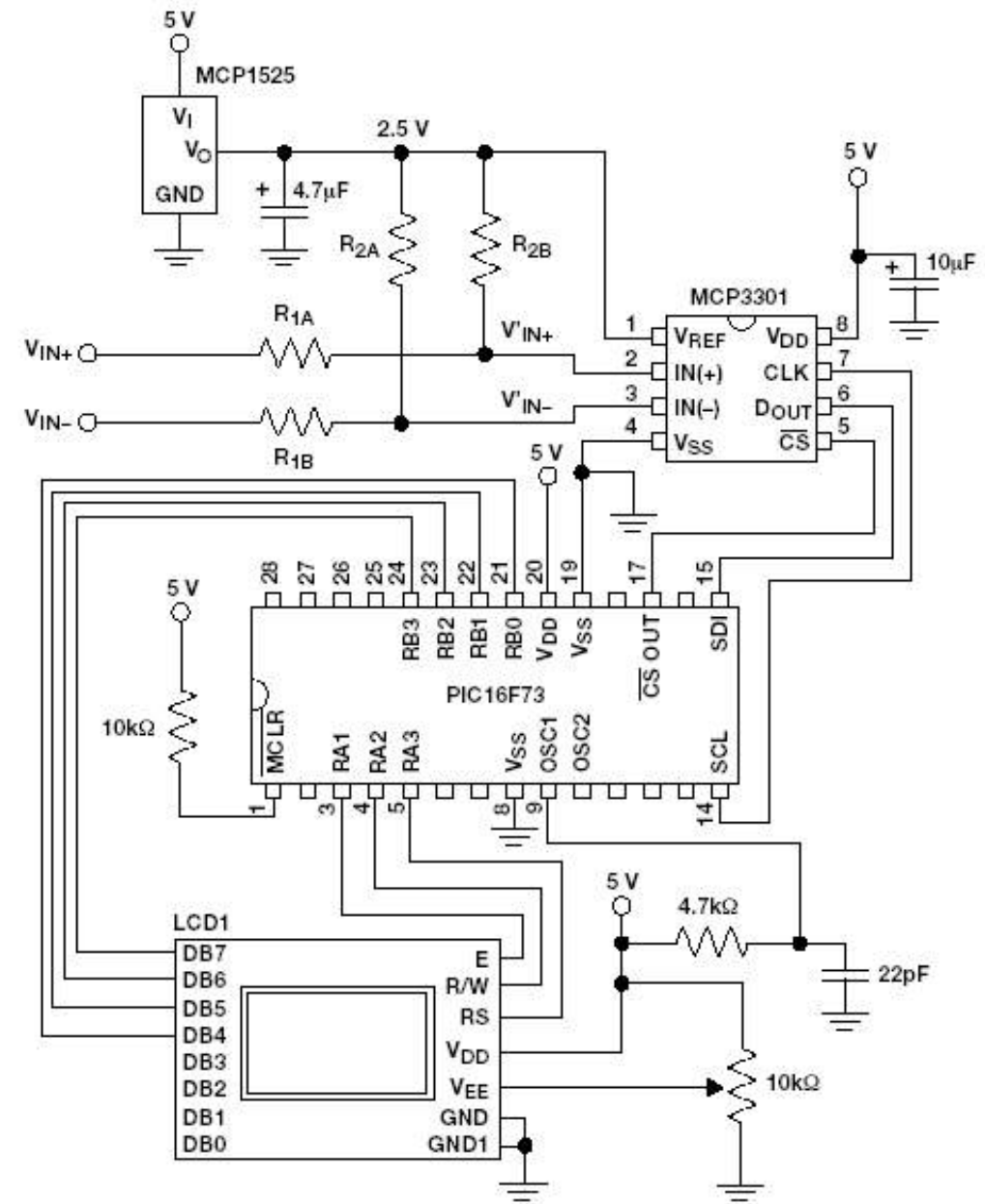


Agenda

- Introduction to Constructal Law
- Finding Flow
- Types of Flow
- Patterns of Flow
- Using Flow
- Q&A

Introduction to Constructal Law

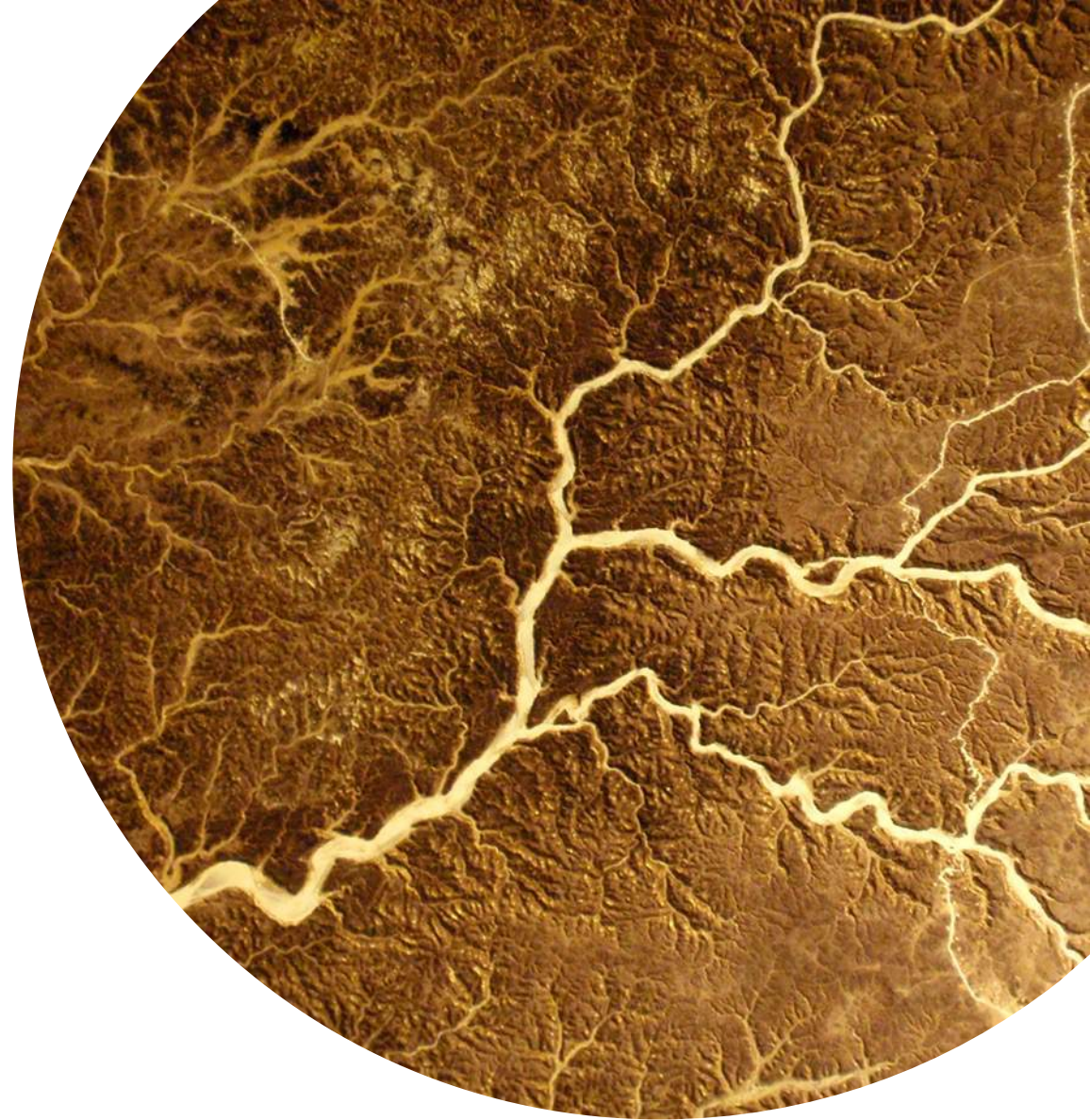
For those who don't know anything
About physics



The Constructal Law

“For a finite-size flow system to persist in time (to live), its configuration must evolve in such a way that provides easier access to the currents that flow through it.”

-Adrian Bejan, Design in Nature (p. 3)



Or in Layman's terms...

“Everything that moves, whether animate or inanimate, is a flow system. All flow systems generate shape and structure in time in order to facilitate this movement across a landscape filled with resistance (for example, friction).”

-Adrian Bejan, Design in Nature (p. 3)



The System

Must



Flow

8/8/19

9

Thomas Perry, LLC

Design Matters

“The configuration of a flow system is not a peripheral feature. It is the defining characteristic.”

-Adrian Behan, Design in Nature (p. 9)



An aerial photograph of a landscape, possibly a wetland or marsh, with a complex network of waterways and vegetation. The colors are vibrant, with greens, yellows, and purples. A large white circle is overlaid on the left side of the image, containing a zoomed-in view of a specific area of the landscape. The text "Constructal Vision" is centered within this circle.

Constructal Vision

Step 1: Motion is the cause of Every Life*

From this perspective of physics, any animate matter is “alive”

- A river is alive (yes, even without the fish)
- A thunderstorm is alive
- A volcano is alive
- A wave is alive
- Your company is alive

*Quote from Leonardo DaVinci





Step 2: All Flow Systems Have Design

Flow systems have:

- Architecture
- Geometry
- Shape
- Structure
- Rhythm

Step 3: Flow Systems Configure and Reconfigure themselves over Time

“This evolution occurs in one direction: Flow designs get measurably better, moving more easily and farther if possible. Of course, there will be bumps and mistakes: Every trial involves error. *But in broad terms, tomorrow’s system should flow better than today’s.*”



-Adrian Bejan, Design in Nature (p. 9)

What is Life?

“Life is movement and the constant morphing of the design of this movement. To be alive is to keep on flowing and morphing. When a system stops flowing and morphing, it is dead.”

-Adrian Bejan, Design in Nature (p. 6)





Constructal Law: Key Takeaways

- All flow systems have a design
- Your company is not a machine. It's alive.
- Our processes (flow) must change
- Our configuration (design) reflects our flow

Finding Flow

Checking for a Pulse

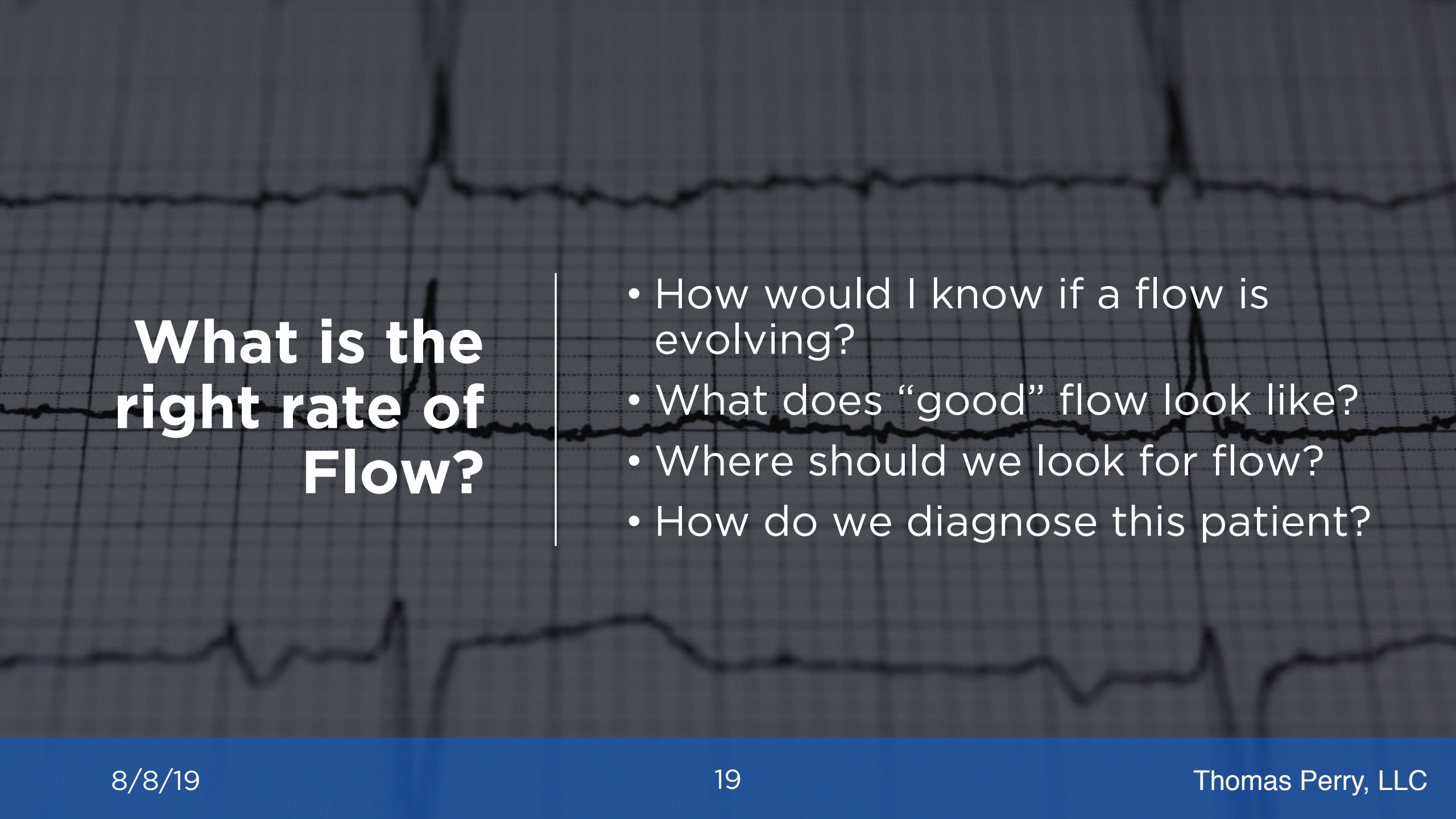
What is your BP (Business Pressure)?





Where Would You Look for Flow in a Person?

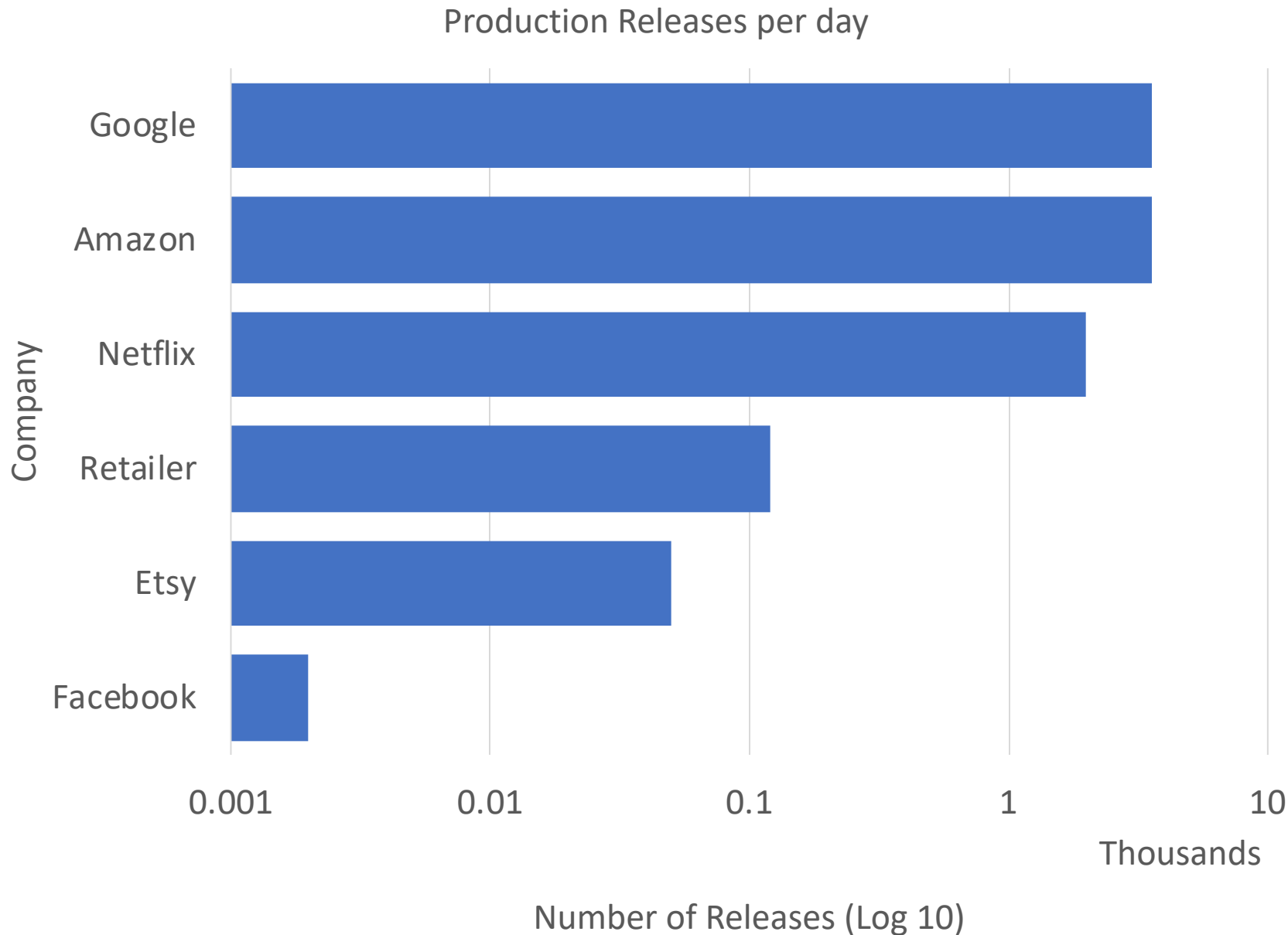
- Pulse
- Pressure
- Motion
- Communication (face to face)
- Emotion

The background of the slide is a dark gray grid with a white ECG (heart rate) line. The line shows several distinct peaks and troughs, typical of a heart rate monitor. The text is overlaid on this background.

What is the right rate of Flow?

- How would I know if a flow is evolving?
- What does “good” flow look like?
- Where should we look for flow?
- How do we diagnose this patient?

**Checking
for a
Pulse**



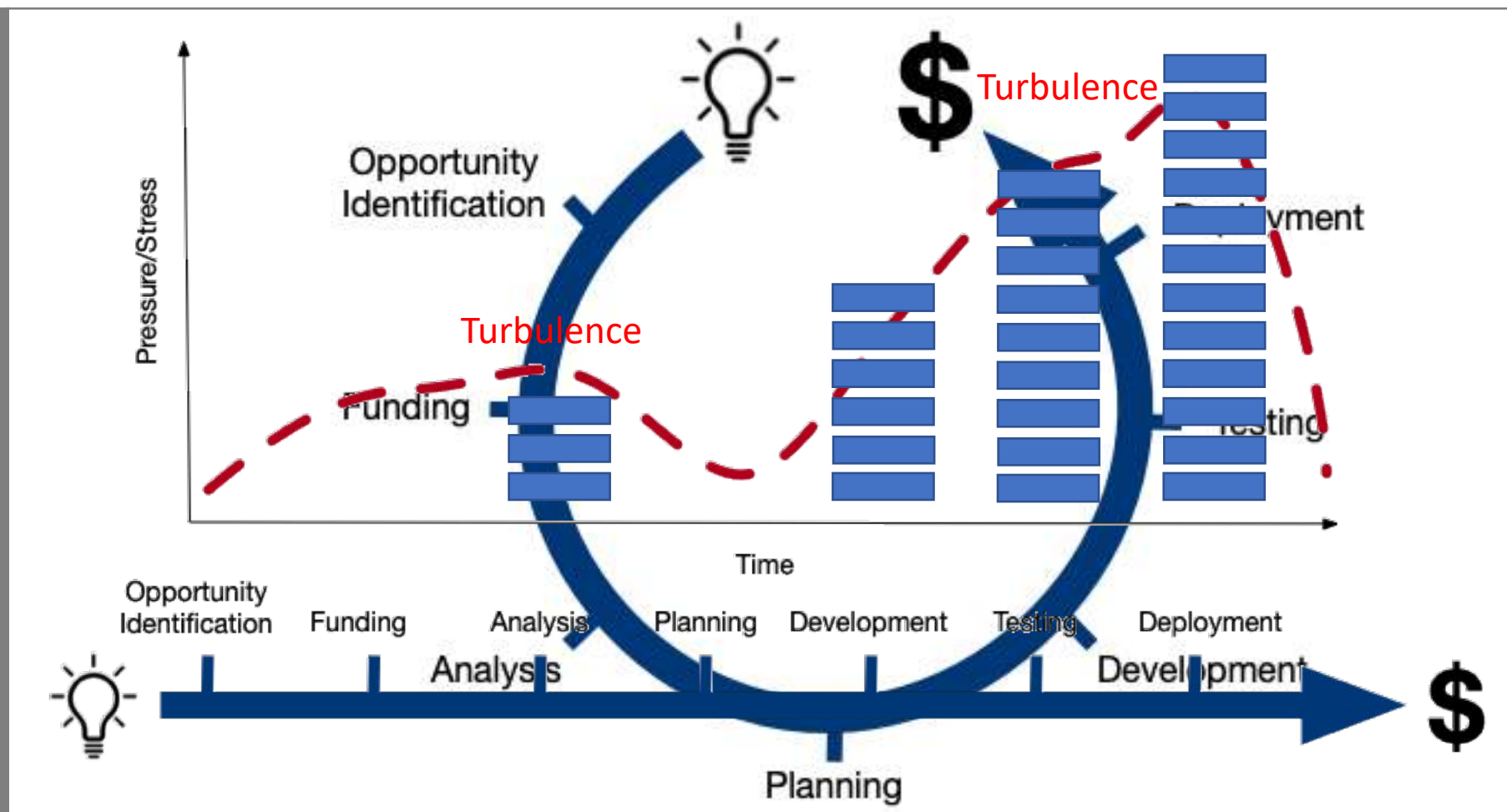
What is your BP (Business Pressure)?



Pressure & Flow

Attributes of Pressure:

- Turbulence is a reflection of impediments to the flow
- Backlogs store potential work in the system like a dam
- Backlog size = pressure





Finding Flow: Key Takeaways

- Organizations, like people, have pulse and a pressure
- Pulse and pressure reflect information about the system
- Pulse and pressure are objective measures of the health of a system



Types of Flow

Work

Finance

Emotions

Information

Work

- Requirements
- Code
- Tests
- Ideas



Finance

- Paychecks
- Funding
- Frequently the only objective measure of performance
- Doesn't map well to knowledge work



Emotions

- Passion
- Fear
- Attraction



Information

- Authorship
- Patents
- Knowledge distribution





Types of Flow: Key Takeaways

- We are surrounded by different kinds of flow
- Each flow has its own configuration or design
- Optimize for the whole, not simply design for a single type of flow

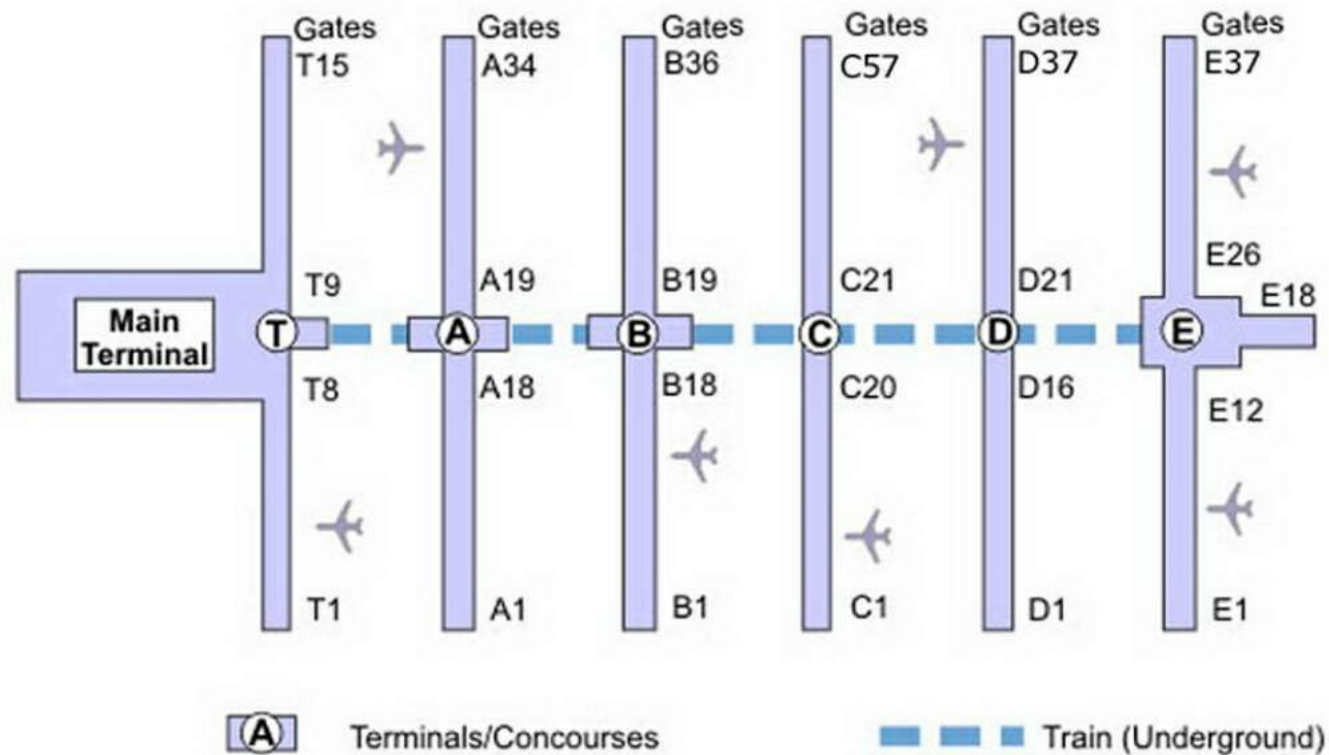
Patterns of Flow

Fast & Long and Short & Slow

Few Large & Many Small



Moving Fast & Long vs Slow & Short



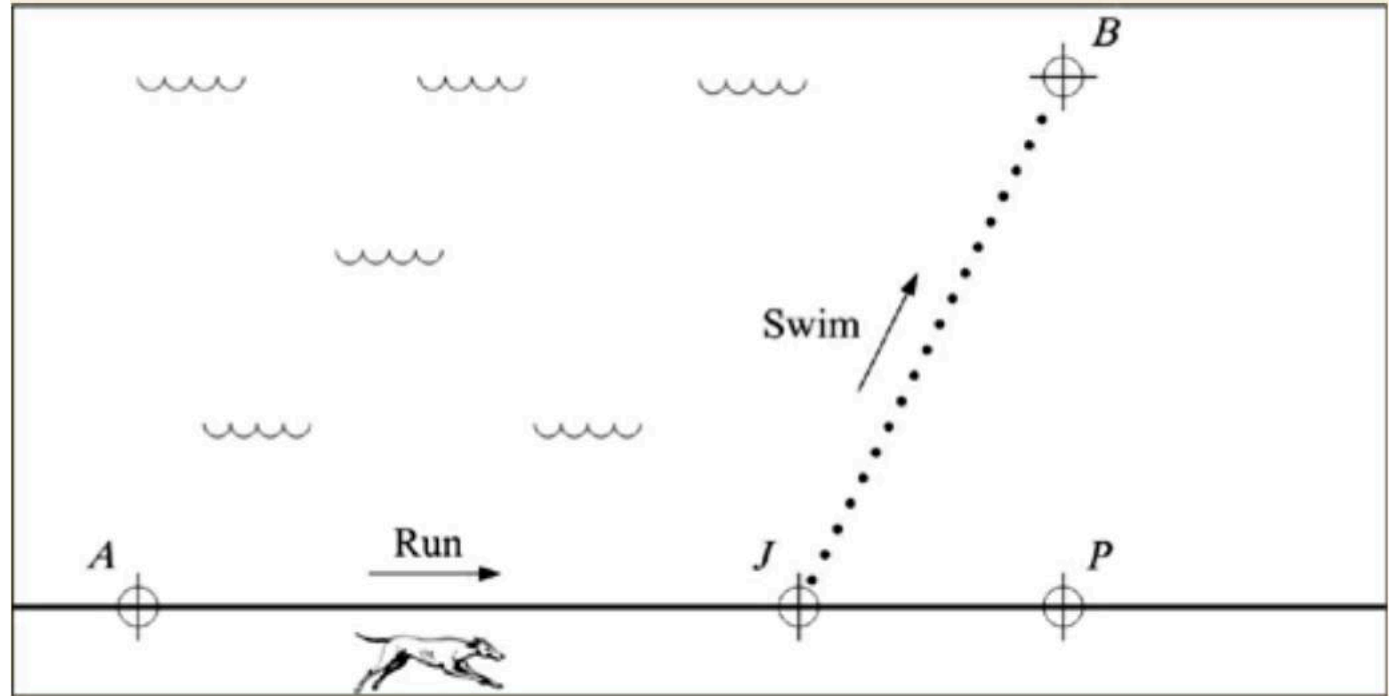
“The time to move fast and long should be roughly equal to the time to move slow and short”

-Adrian Bejan, Design in Nature (p. 177)

The Dog on the Beach

The time spent going fast (running) and slow (swimming) is roughly equal

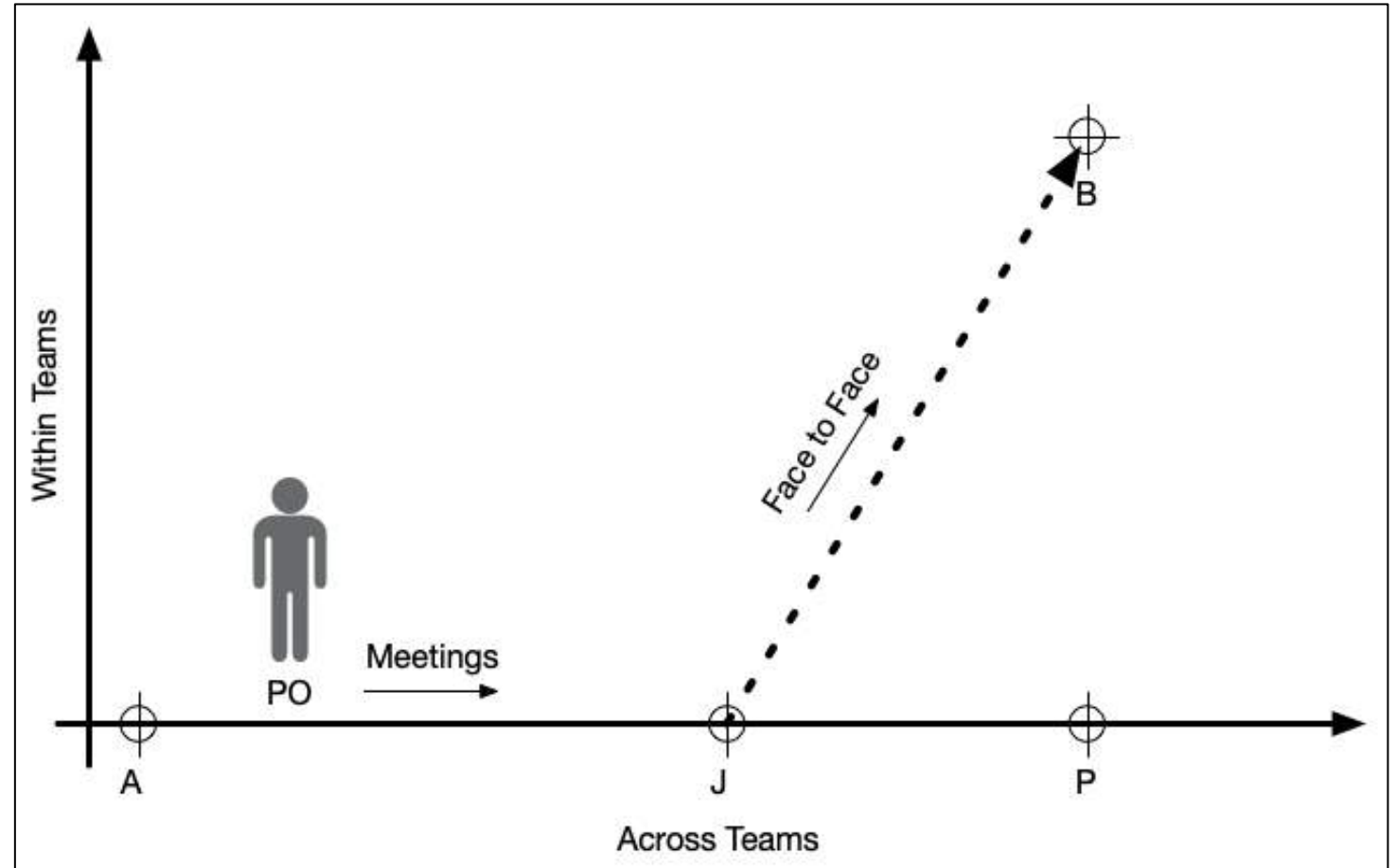
$$AJ \cong JB$$



The PO on the Move

Time spent going fast
(in meetings) and
slow (swimming) is
roughly equal

$$AJ \cong JB$$



Scaling Agile: Fast & Long

Release Train Level

- Big Room Planning Prep 45 days
- Big Room (PI) Planning 2 days
- System Demos 3 days
- Scrum of Scrums 3 days
- I&A Workshop 1 day

Total 54 days

Scaling Agile: Short & Slow

Team Level

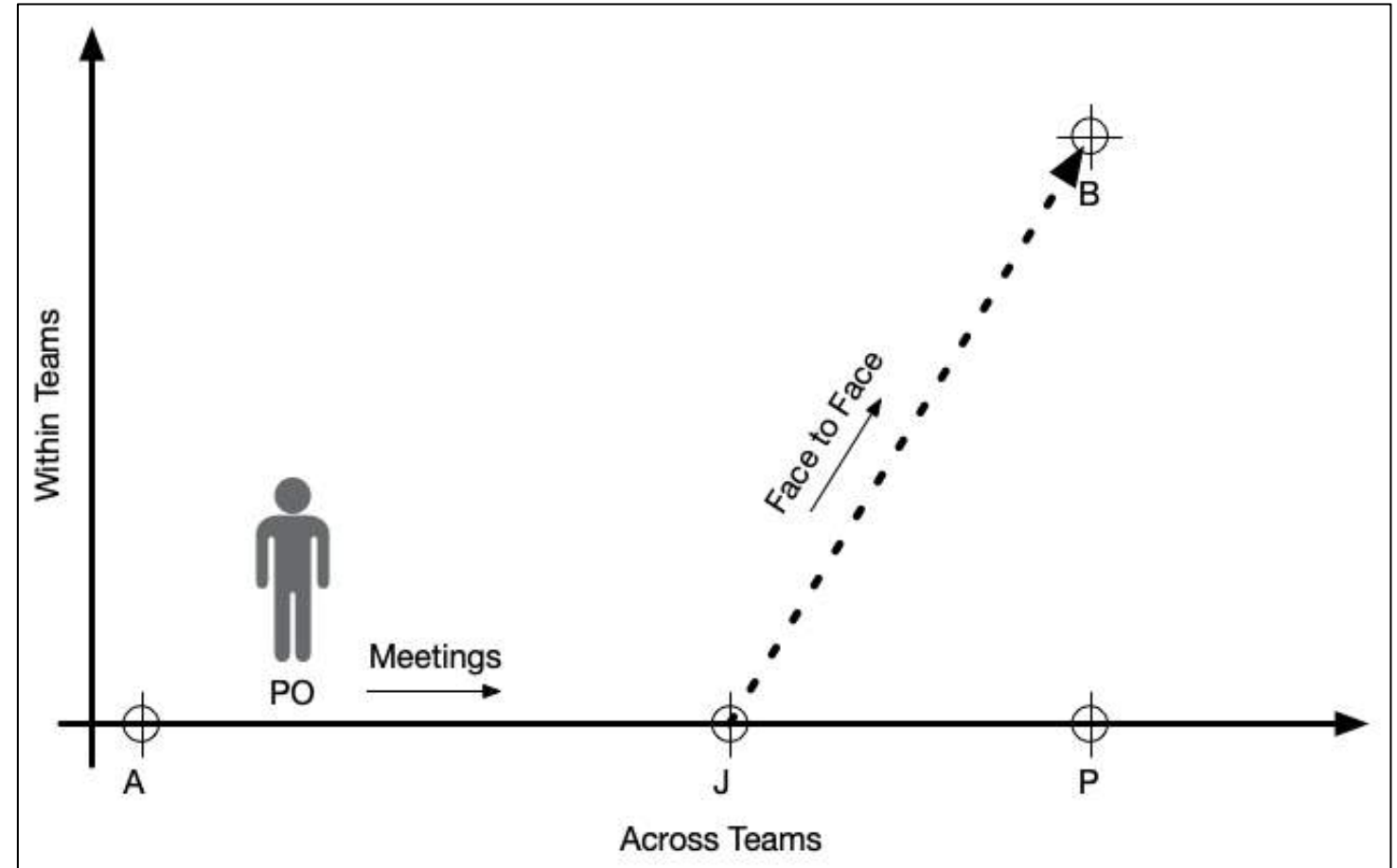
- | | |
|-------------------|--------|
| • Sprint Planning | 6 days |
| • Standups | 6 days |
| • Demo | 3 days |
| • Retrospective | 3 days |
| • Refinement | 3 days |

Total	21 days
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Scaling Agile: Summary

Observations:

- $AJ \cong JB$
- 54 days vs 21 days
- That's an unbalanced flow



Examples

- Communication
- Work Management
- Finances
- Workspace Design

This works in cases where there are multiple modalities involved

Implications

We can look for this pattern in:

- Large scale work
- Organizational evolution
- Constraints, impediments and defects

“All vascular flow systems generate multiscale channels because this is a good design for spreading a current from a point to an area or an area to a point.”

-Adrian Bejan, Design in Nature (p. 177)

Few Large & Many Small

”To the extent that people behave to maximize their benefits, they will construct and gravitate toward social networks that exhibit, or are believed to exhibit, efficiency.”

-Adrian Bejan, Design in Nature (p. 152)



Hierarchy and Flow

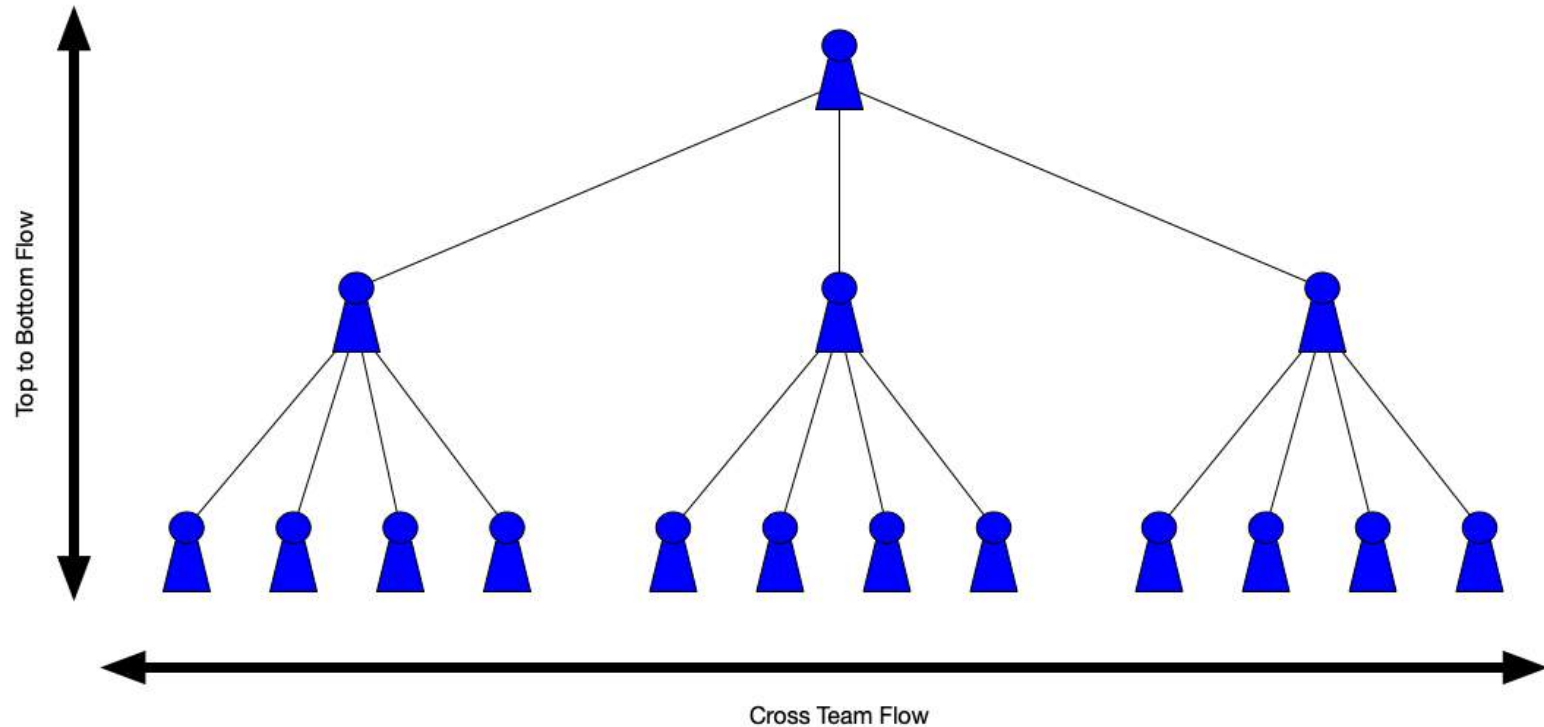
“What our history makes clear is that human organizations are evolving like other flow designs because they are not separate from nature but a part of it.

[...] a corporation must deliver goods and services to its customers. All generate vascular designs with hierarchy, all go with the flow.”

-Adrian Bejan. Design in Nature (p. 174)

Different Flows in Hierarchy

- Cross Team Flow (n = number of teams)
- Top to Bottom Flow (n = number of levels)





Patterns of Flow: Key Takeaways

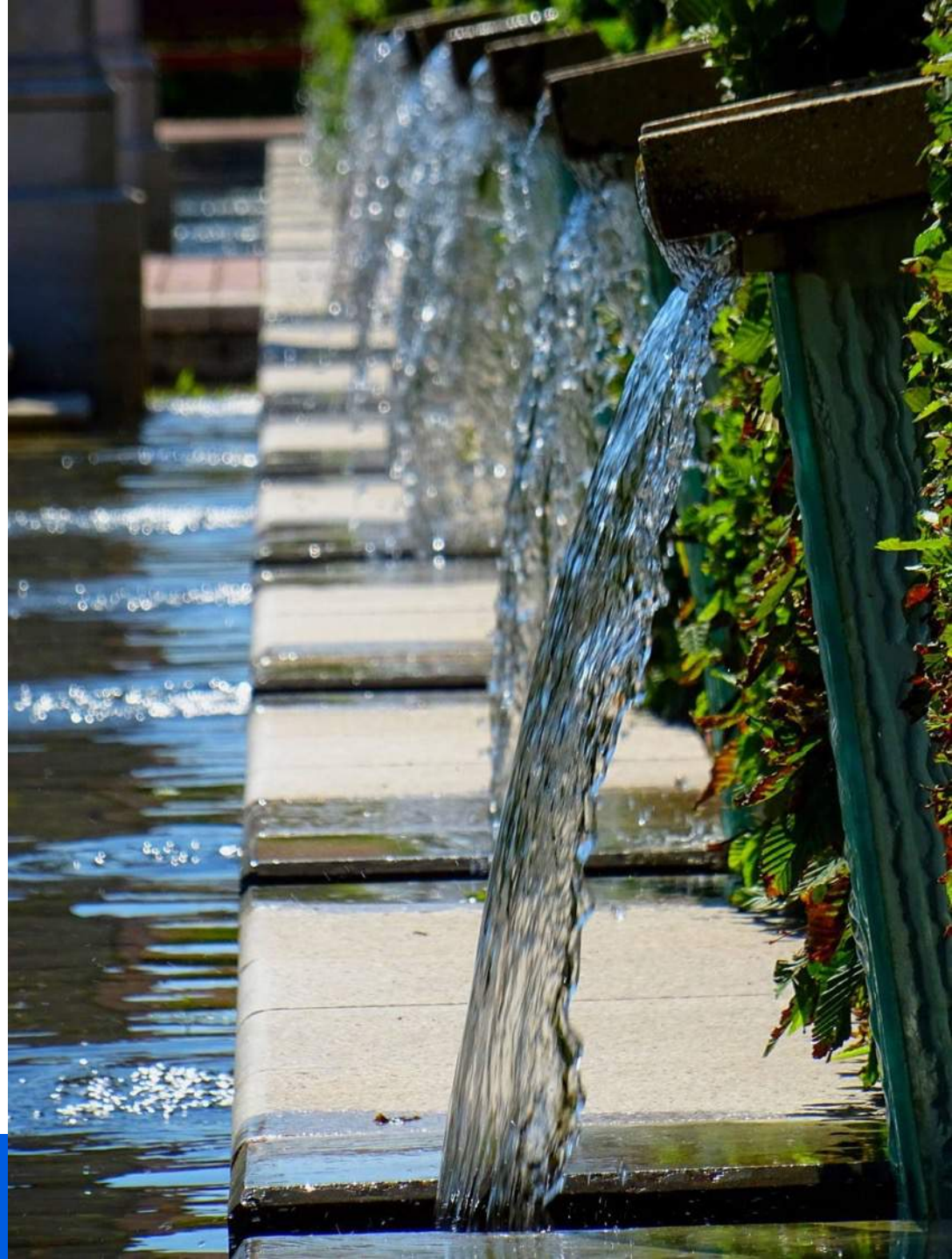
- We need to be conscious of the balance between fast and long and short and slow
- Leaning too far to one side or the other will slow down the overall system
- Our social hierarchies reflect natural proportions (few large & many small) and the flow of information across our political landscape

Using Flow

Assessment

Value Stream Mapping

Organizational Design



Assessment

- Where are the waves?
- Where are flows?
- Where is the resistance?



Organizational Design

- Look for turbulence, try to create laminar flow
- Pressure is necessary, so don't try and eliminate all of it
- Match your pulse to your customer demand
- Few Large & Many Small
- Aim for Fast & Long and Slow & Short



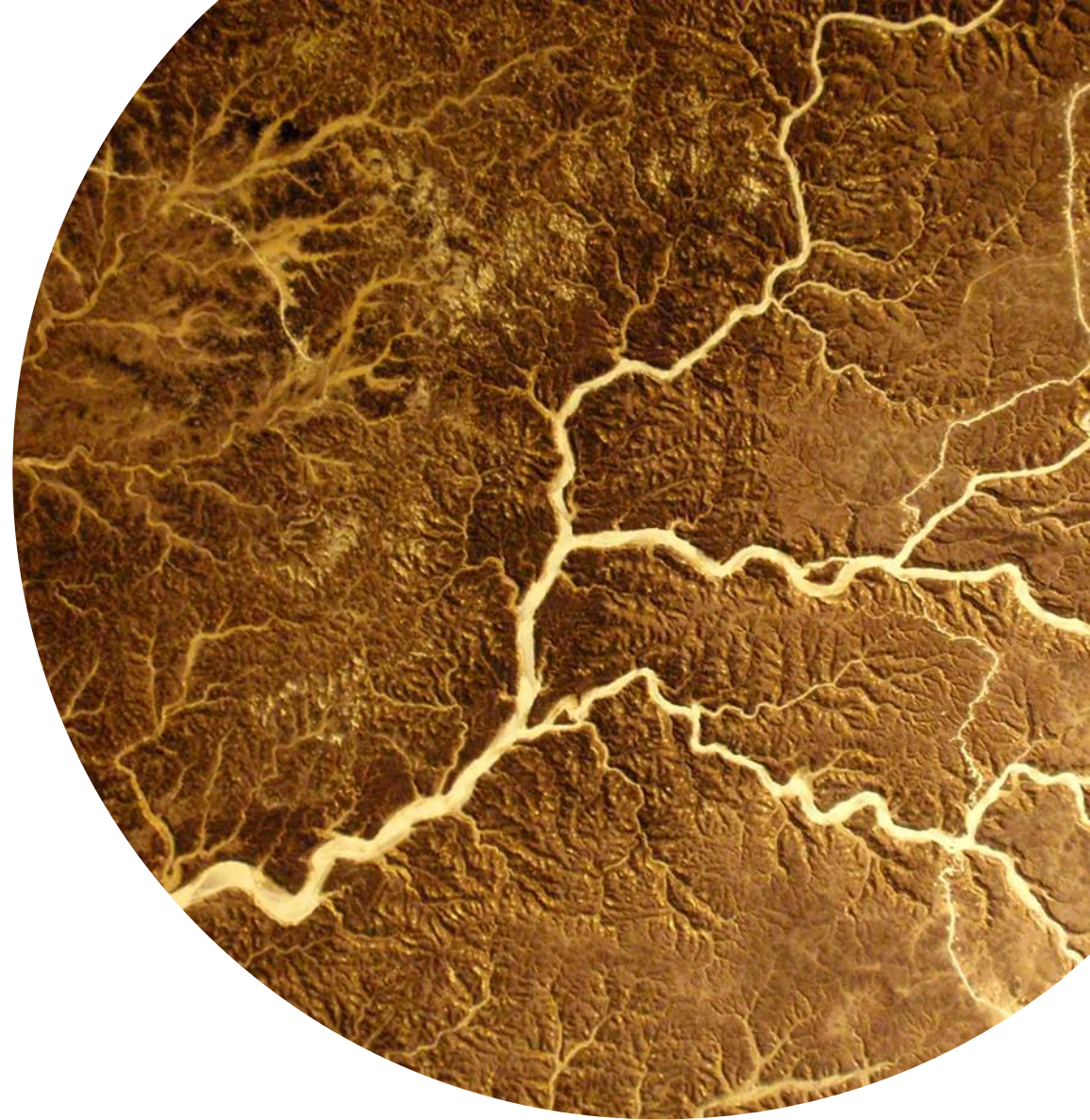
Using Flow: Key Takeaways

- Constructal Law can help us better see flow
- Value stream mapping can benefit from the Constructal vision by expanding the flows we look at
- Organizational design should account for many types of flow

The Constructal Law

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-Adrian Bejan, Design in Nature (p. 3)



Further Resources



Design In Nature: How the Constructal Law Governs Evolution in Biology, Physics, Technology, and Social Organization. Adrian Bejan & J. Peder Zane, 2012



The Principles of Product Development Flow: Second Generation Lean Product Development. Donald G. Reinertsen, 2009

Q&A

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