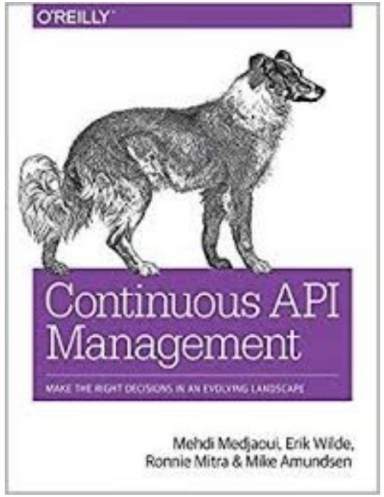
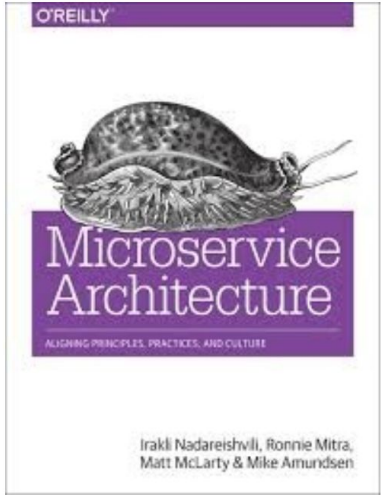
Such a Rich Set of Affordances!

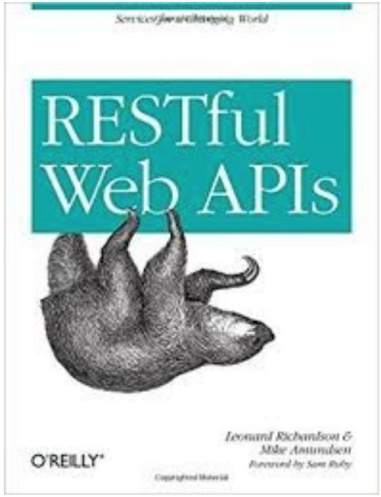
Mike Amundsen
@mamund

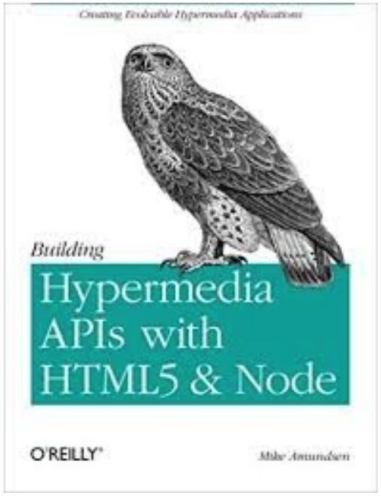

Mike Amundsen
@mamund

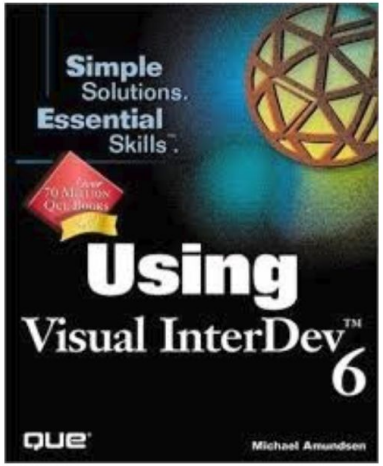

O'REILLY
Continuous API Management
MAKE THE RIGHT DECISIONS IN AN EVOLVING LANDSCAPE
Mehdi Medjaoui, Erik Wilde,
Ronnie Mitra & Mike Amundsen

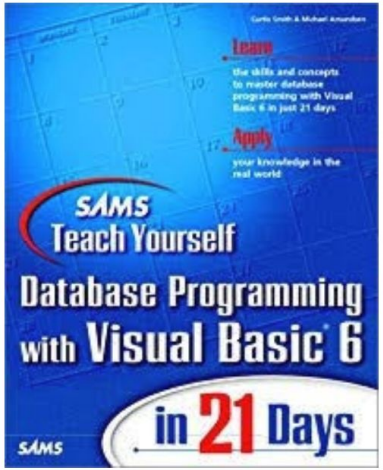

O'REILLY
Microservice Architecture
ALIGNING PRINCIPLES, PRACTICES, AND CULTURE
Irakli Nadareishvili, Ronnie Mitra,
Matt McLarty & Mike Amundsen

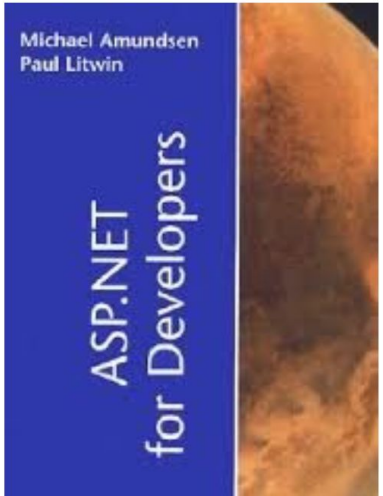

O'REILLY
RESTful Web Clients
ENABLING REUSE THROUGH HYPERMEDIA
Mike Amundsen


RESTful Web APIs
Leonard Richardson &
Mike Amundsen
O'REILLY


Building
Hypermedia APIs with HTML5 & Node
O'REILLY
Mike Amundsen


Simple Solutions. Essential Skills.
Using Visual InterDev 6
que
Michael Amundsen


Learn
Apply
SAMS
Teach Yourself
Database Programming with Visual Basic 6
in 21 Days
SAMS

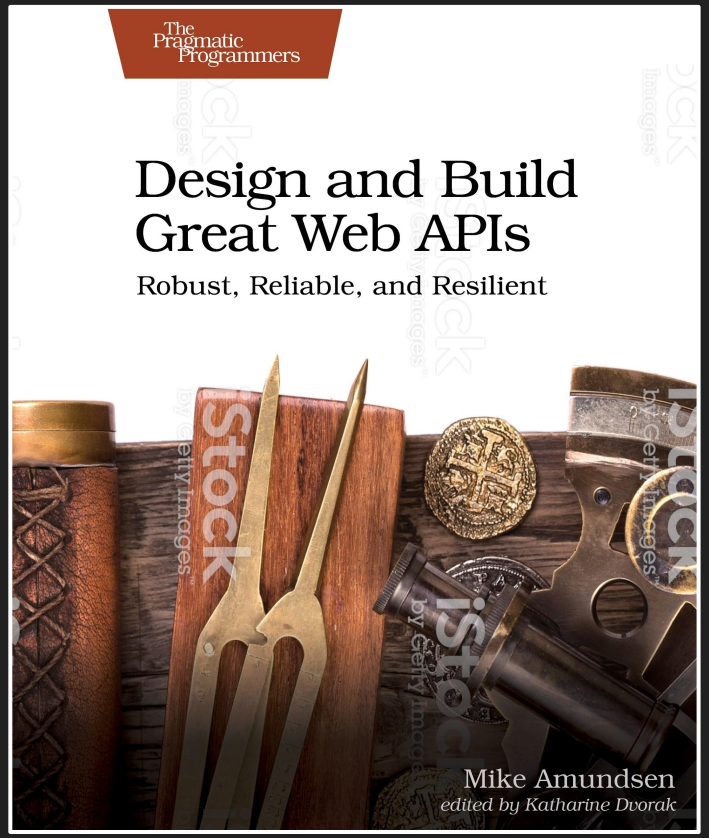

Michael Amundsen
Paul Litwin
ASP.NET for Developers

http://g.mamund.com/great-apis

"I wish I had this book 20 years ago."

"A great classroom text or web guide."

"Useful in a way that doesn't tie it to specific technologies."



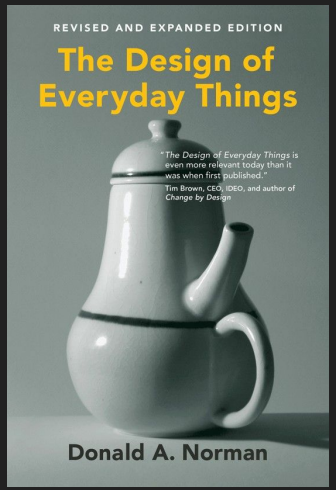
Some things to consider...

- The Nature of Ecosystems
- Hyperagent Anatomy
- Avoiding Monoliths
- Learning from Microservices

Affordances

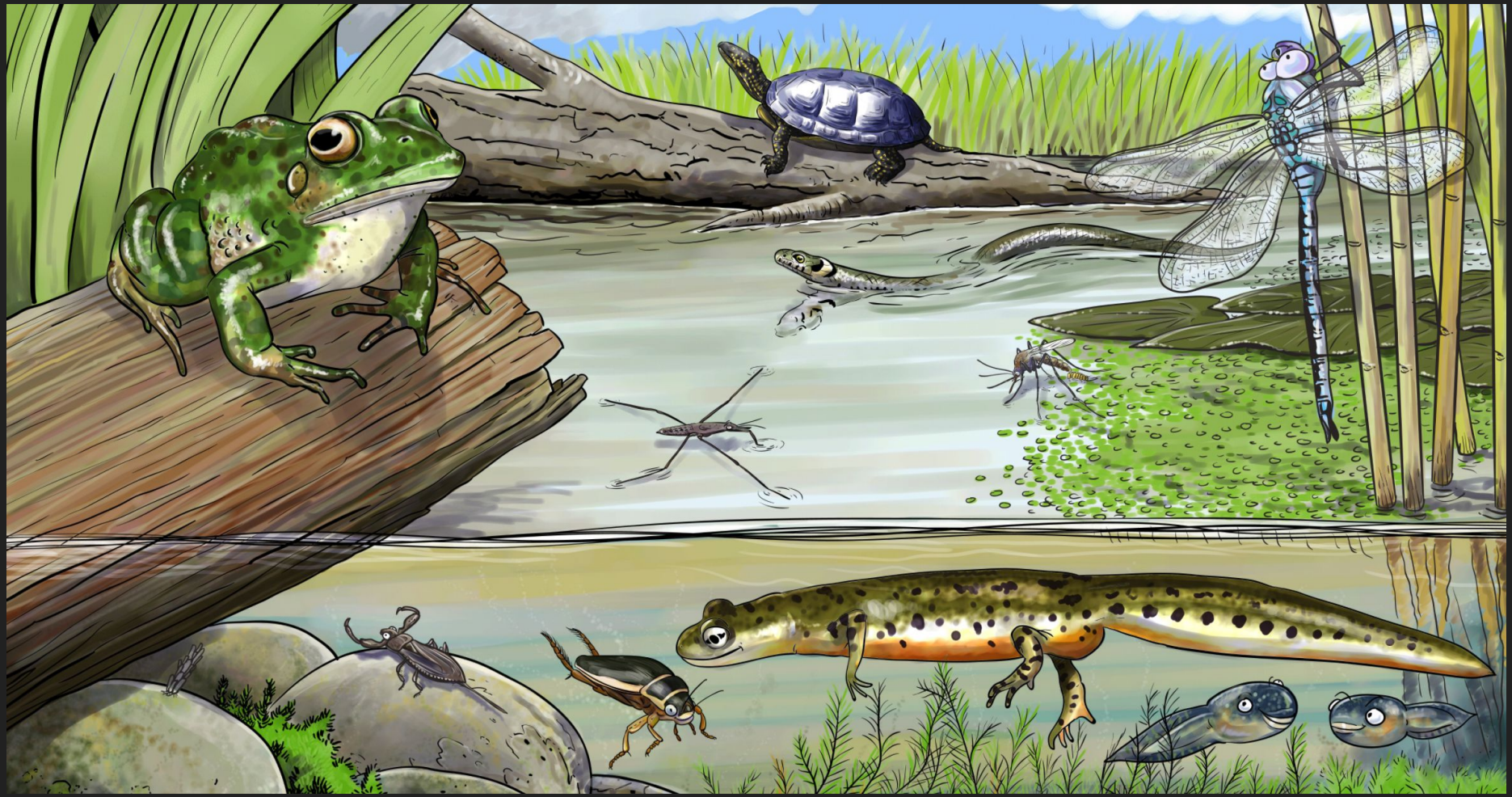
"The value of a well-designed **object** is when it has such a rich set of affordances that the **people** who use it can do things with it that the designer never imagined."

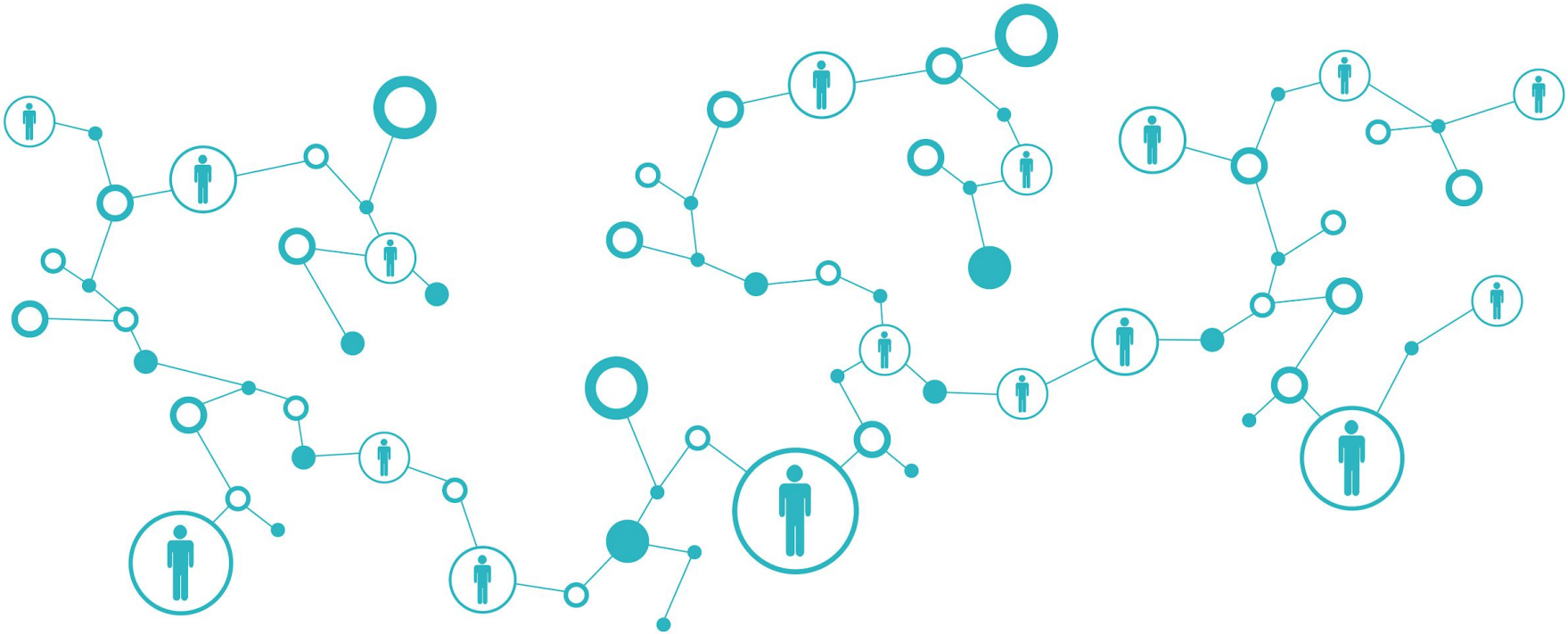
-- Donald Norman (1994)



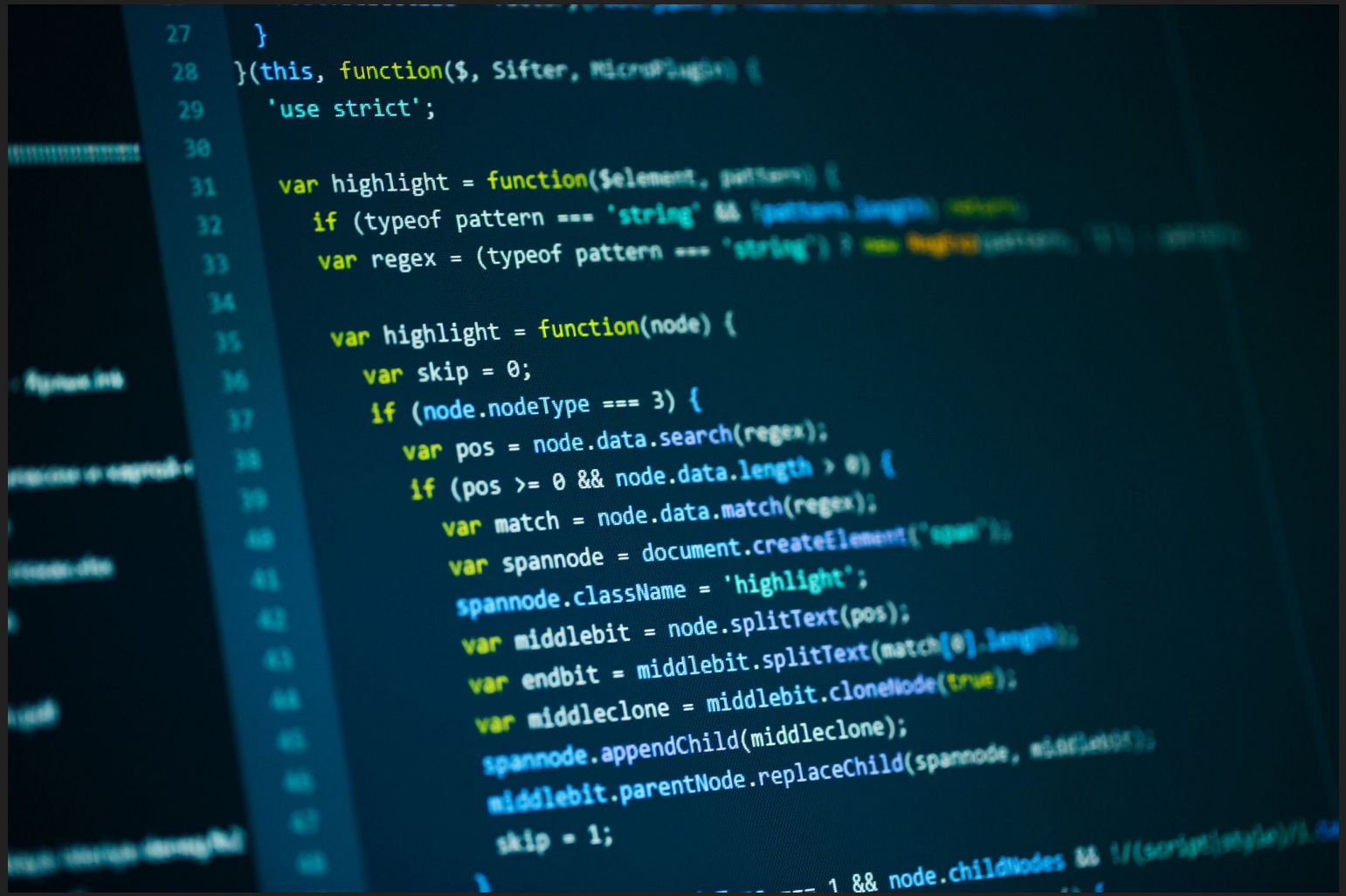
https://www.youtube.com/watch?v=NK1Zb_5VxuM

Ecosystems





You're programming ecosystems, not machines.


}
}(this, function($, Sifter, MicroPlugin) {
'use strict';
var highlight = function($element, pattern) {
if (typeof pattern === 'string' && !pattern.length) return;
var regex = (typeof pattern === 'string') ? new RegExp(pattern, 'i') : pattern;
var highlight = function(node) {
var skip = 0;
if (node.nodeType === 3) {
var pos = node.data.search(regex);
if (pos >= 0 && node.data.length > 0) {
var match = node.data.match(regex);
var spannode = document.createElement('span');
spannode.className = 'highlight';
var middlebit = node.splitText(pos);
var endbit = middlebit.splitText(match[0].length);
var middleclone = middlebit.cloneNode(true);
spannode.appendChild(middleclone);
middlebit.parentNode.replaceChild(spannode, middlebit);
skip = 1;
}
} else if (node.nodeType === 1 && node.childNodes && !/(script|style)/i.test(node.tagName)) {


}
}(this, function($, Sifter,
'use strict';
var highlight =
if (typeof patt
var regex = (typ
var highlight = fun
var skip = 0;
if (node.nodeType
var pos = node.data
if (pos >= 0 &&
var match =
var spannode
spannode.
var mid
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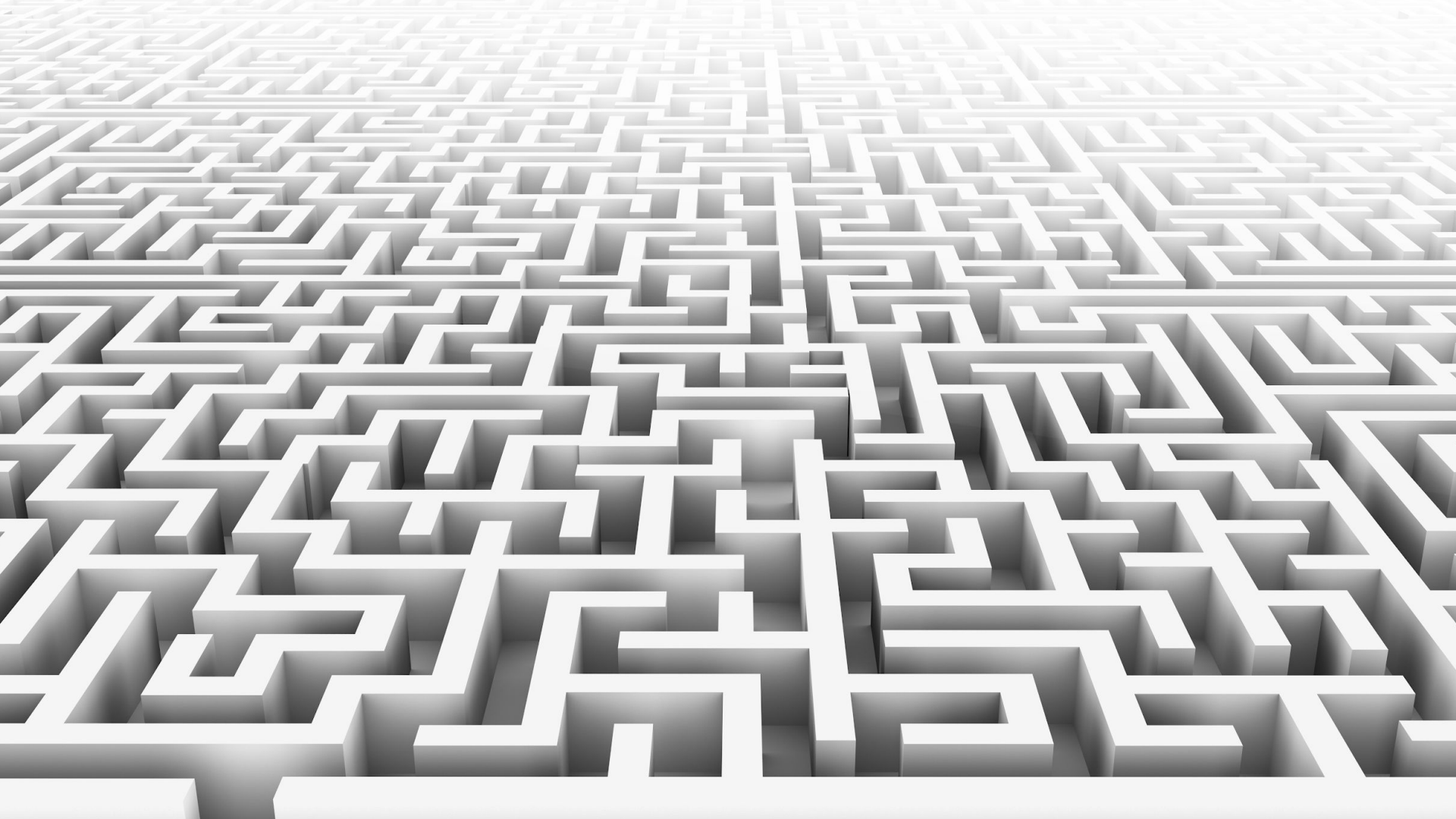
eclone = middlebit
e.appendChild(middlec
lebit.parentNode.replaceC
skip = 1;
middlebit.sp
node.spl
'string' &&
ern === 'string'
ode) {
gth > 0) {
regex);
eElement('span');
';
os);
match[0].length;
ode(true);
nnode,
1 && node.childNodes &&

pass messages, not code.



The Coffee Test

"A machine is required to enter an average home and figure out how to make coffee."

-- Steve Wozniak

Focus on the map, not the destination

LEGEND to MAP SYMBOLS

COUNTRY

Feature Town

desert/wasteland

grassland

swamp

hills

mountains

cave

political border

road

river

town/village

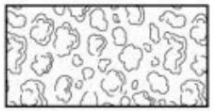
cities

tower/fortress

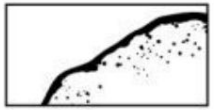
castle

country capital

windmill



forest



lake

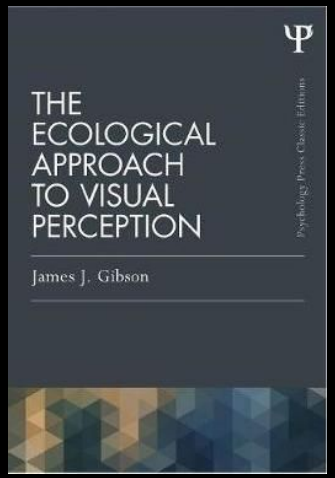
reef

canyon

Affordances

"The affordances of the environment are what it offers ... what it provides or furnishes, either for good or ill.

James Gibson, 1977



James Gibson

Ecological Approach to Visual Perception, Gibson, 1979

```
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  <collection href="URI">
    <link href="URI" rel="maze" />
    <link href="URI" rel="maze" />
    ...
  </collection>
  <item href="URI" >
    <link href="URI" rel="start" />
    <debug>CDATA</debug>
  </item>
  <cell href="URI"  debug="TEXT" total="NUMBER" side="NUMBER">
    <link href="URI" rel="current" debug="TEXT" total="NUMBER" sid
    <link href="URI" rel="north" />
    <link href="URI" rel="south" />
    <link href="URI" rel="east" />
    <link href="URI" rel="west" />
    <link href="URI" rel="exit" />
  </cell>
  <error href="URI">
    <title>TEXT</title>
    <code>TEXT</code>
    <message>CDATA</message>
  </error>
</maze>
```

```
<maze version="1.0">
aze" />
aze" />
tart" />
TEXT" total="NUMBER" side="NUMBER">
urrent" debug="TEXT" total="NUMBER" sid
orth" />
outh" />
ast" />
est" />
xit" />
>
```

```
function processLinks(response,headers)
{
  var xml,linkItem,i,rel,url,href,flg,links,rules;

  flg = false;
  links = [];
  rules = [];

  // get all the links in this document
  g.linkCollection = [];
  xml = response.selectNodes('//link');
  for(i=0;i<xml.length;i++)
  {
    rel = xml[i].getAttribute('rel');
    url = xml[i].getAttribute('href');
    linkItem = {'rel':rel,'href':url};
    g.linkCollection[g.linkCollection.length] = linkItem;
  }

  // is there an exit?
  href = getLinkElement('exit');
  if(href!='')
  {
    printLine('*** Done! '+href);
    g.done = true;
    if(g.robot==true)
    {
      alert('Done in only '+g.idx+' moves!');
    }
    return;
  }

  // is there an entrance?
  if(flg==false && g.start==false)
  {
    href = getLinkElement('start');
    if(href!='')
    {
      flg=true;
      g.start=true;
      g.href = href;
      g.facing = 'north';
      printLine(href);
    }
  }
```

```
<maze version="1.0">
aze" />
aze" />
tart" />
TEXT" total=
urrent" debu
orth" />
outh" />
ast" />
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xit" />
>
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      g.start=true;
      g.href = href;
      g.facing = 'north';
      printLine(href);
    }
  }
```

Go!

33: *** Done! http://amundsen.com/examples/mazes/2d/five-by-five/999:east
32: http://amundsen.com/examples/mazes/2d/five-by-five/24:east
31: http://amundsen.com/examples/mazes/2d/five-by-five/19:east
30: http://amundsen.com/examples/mazes/2d/five-by-five/14:south
29: http://amundsen.com/examples/mazes/2d/five-by-five/13:east
28: http://amundsen.com/examples/mazes/2d/five-by-five/8:north
27: http://amundsen.com/examples/mazes/2d/five-by-five/9:east
26: http://amundsen.com/examples/mazes/2d/five-by-five/4:south
25: http://amundsen.com/examples/mazes/2d/five-by-five/3:south
24: http://amundsen.com/examples/mazes/2d/five-by-five/2:west
23: http://amundsen.com/examples/mazes/2d/five-by-five/7:south
22: http://amundsen.com/examples/mazes/2d/five-by-five/6:east
21: http://amundsen.com/examples/mazes/2d/five-by-five/1:west
20: http://amundsen.com/examples/mazes/2d/five-by-five/6:north
19: http://amundsen.com/examples/mazes/2d/five-by-five/7:west
18: http://amundsen.com/examples/mazes/2d/five-by-five/12:east
17: http://amundsen.com/examples/mazes/2d/five-by-five/7:east
16: http://amundsen.com/examples/mazes/2d/five-by-five/2:north
15: http://amundsen.com/examples/mazes/2d/five-by-five/3:north
14: http://amundsen.com/examples/mazes/2d/five-by-five/4:west
13: http://amundsen.com/examples/mazes/2d/five-by-five/9:south
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5: http://amundsen.com/examples/mazes/2d/five-by-five/21:east
4: http://amundsen.com/examples/mazes/2d/five-by-five/16:east
3: http://amundsen.com/examples/mazes/2d/five-by-five/11:south
2: http://amundsen.com/examples/mazes/2d/five-by-five/10:east
1: http://amundsen.com/examples/mazes/2d/five-by-five/5:east
0: http://amundsen.com/examples/mazes/2d/five-by-five/0:north

Hypermedia is the Affordance

Benefits of REST-based Architecture

Simplifies
- hypertext is standardized (fewer UIs)

Simplifies
- identification is standardized (less communication)

Simplifies
- exchange protocols are standardized (fewer integrations)

Simplifies
- interactions are standardized (fewer semantics)

Simplifies
- data formats are standardized (fewer translations)

https://www.slideshare.net/royfielding/a-little-rest-and-relaxation (2008)

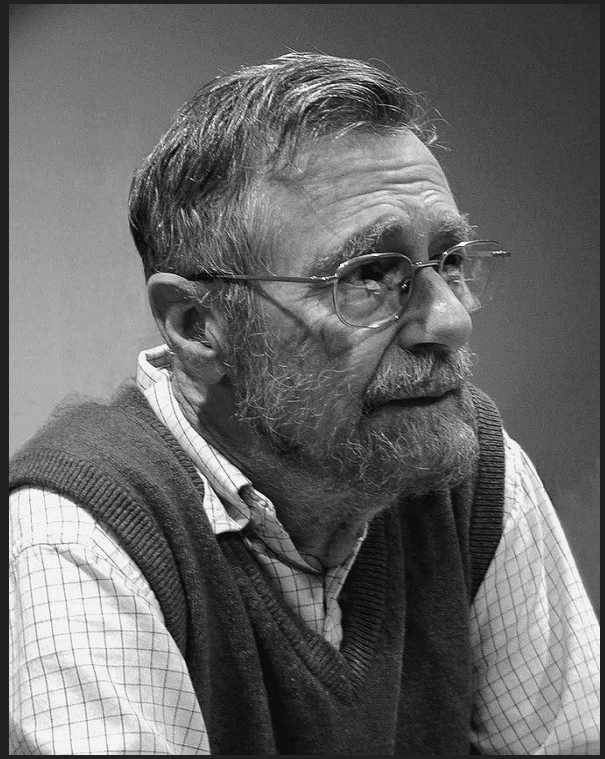
Affordance is the Key

Hyperagents

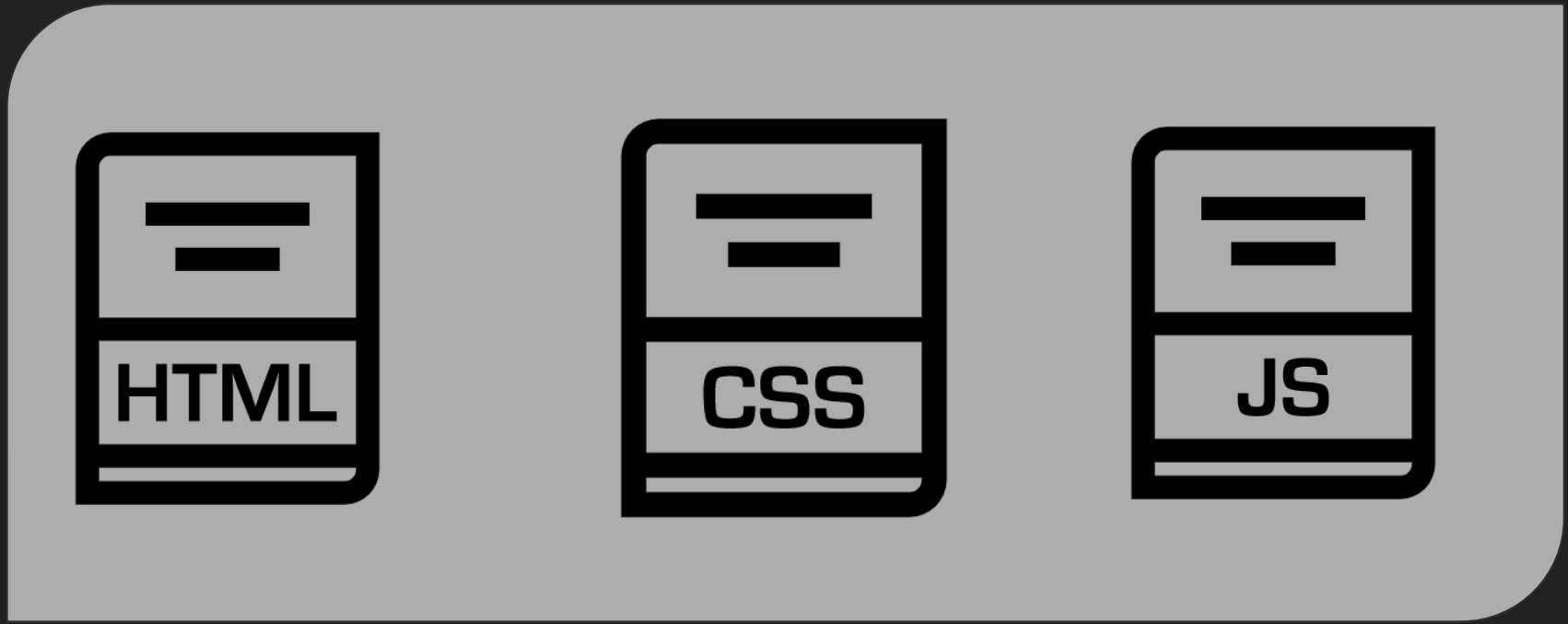
Separation of Concerns

"One is willing to study in depth an aspect of one's subject matter in isolation for the sake of its own consistency."

-- Edsger W. Dijkstra (1974)



SoC for an **agent**



SoC for an **ecosystem**

How many concerns?

"A machine is required to enter an average home and figure out how to make coffee."

-- Steve Wozniak

Agency and Curiosity

The Quest for Surprisal: Curiosity (in Math)

- Observations x_t and x_{t+1}
- *Action* a_t such that x_t transitions to x_{t+1}
- Embedding $\phi(x)$
- Prediction $p(\phi(x_{t+1}) \mid x_t, a_t)$
- **Reward $r_t = -\log p(\phi(x_{t+1}) \mid x_t, a_t$**
- Train to maximize r_t
- Agent now favors transitions with high prediction error

unity

Danny Lange
VP of AI and ML at
Unity Technologies

https://gotochgo.com/2019/sessions/719

Step 1: Navigate (Destination)

Step 1: Navigate (Destination)

Step 2: Choose (Map)

Avoiding Monoliths

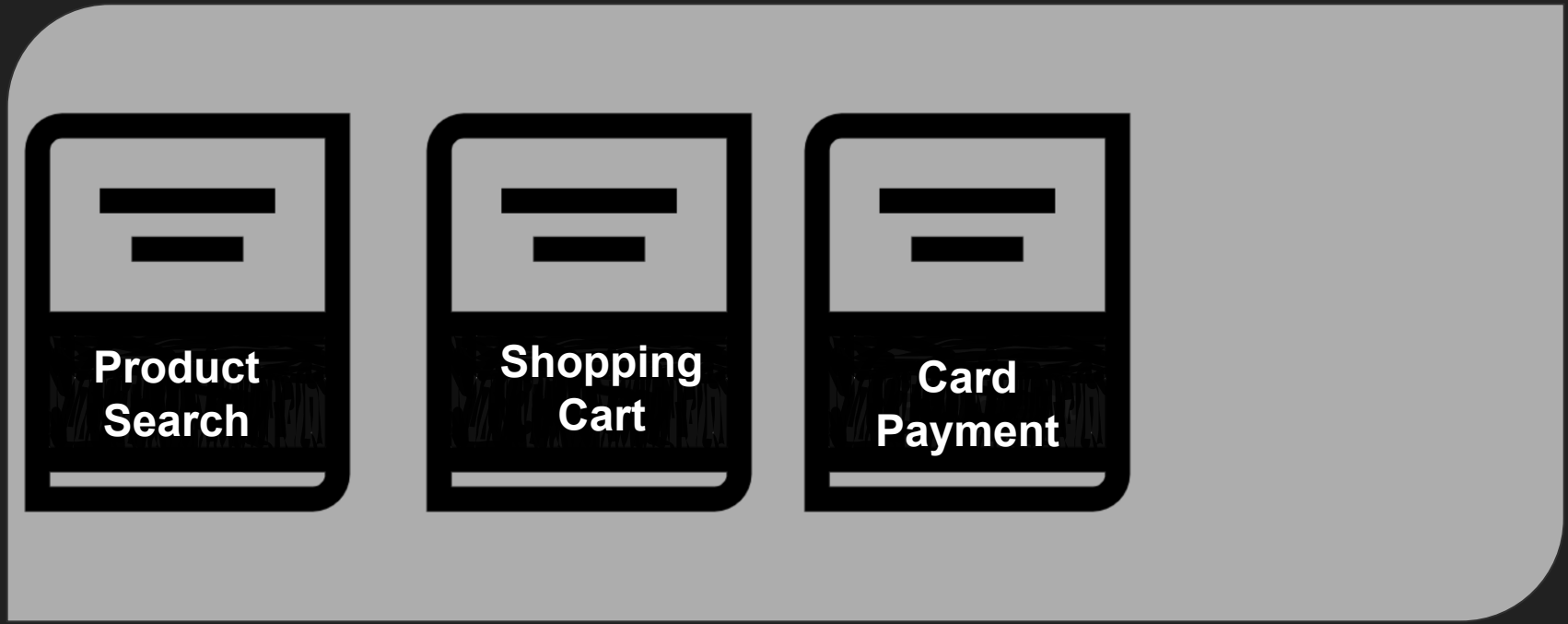

A Close Encounter of the 'Furred' Kind!
WALT DISNEY PRODUCTIONS'
THE CAT FROM OUTER SPACE
WALT DISNEY PRODUCTIONS'
THE CAT FROM OUTER SPACE
KEN BERRY
SANDY DUNCAN
HARRY MORGAN
RODDY McDOWALL
And McLEAN STEVENSON
Written by TED KEY
Co-produced by NORMAN TOKAR
Produced by RON MILLER
Directed by NORMAN TOKAR
TECHNICOLOR

Shopping Agent

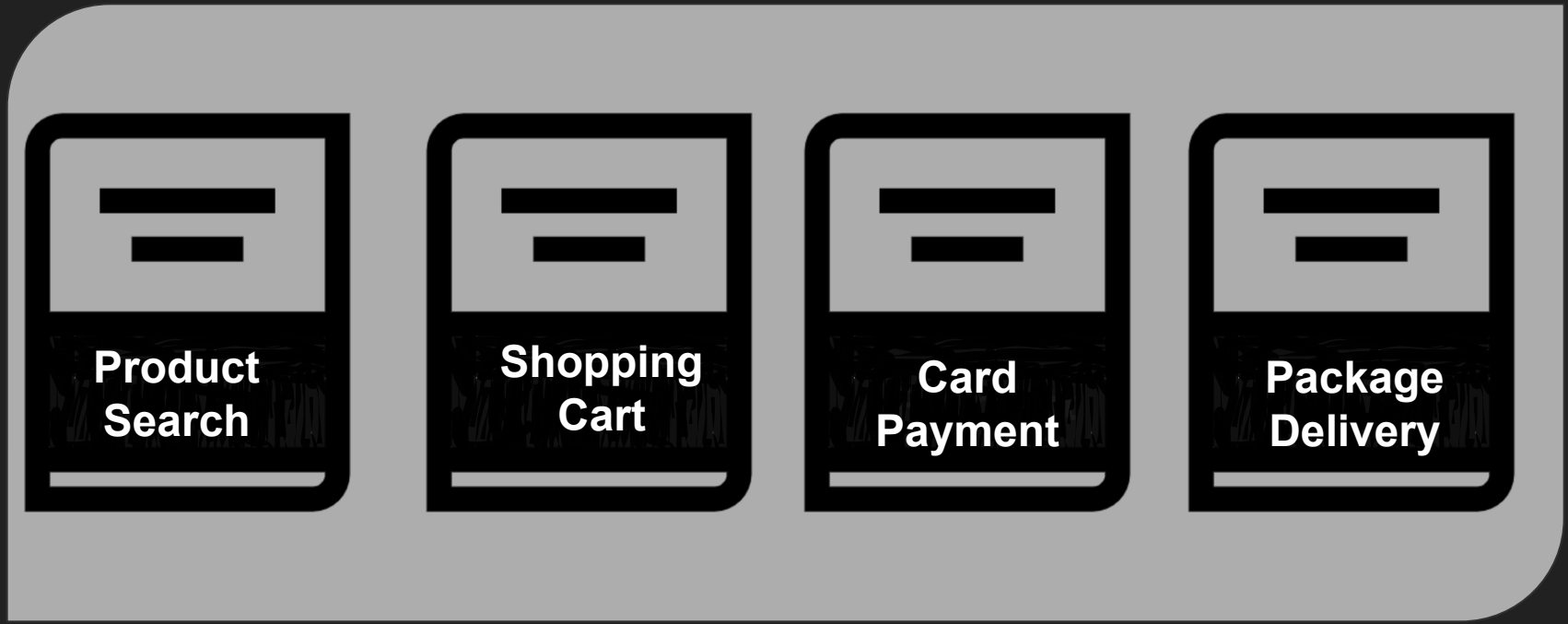
Shopping Agent

Shopping Agent

Shopping Agent



Shopping Agent



It only *appears* to be a single agent.


The Pragmatic Programmers
Release It!
Second Edition
Design and Deploy
Production-Ready Software
Michael T. Nygard
Edited by Katharine Dvorak

Michael Nygard's Stability Patterns

- **Timeout**
- **Circuit Breaker**
- **Bulkhead**
- **Steady State**
- **Fail Fast**
- **Handshaking**

“Bugs will happen. They cannot be eliminated, so they must be survived instead.”

-- Michael T. Nygard

Intelligence in Biological Systems

Senses + Computation in nature that allow organisms to:

- Eat: Consume Energy
- Don’t get Eaten: Delay Becoming Energy Yourself
- Multiply: Become Abundant
- Beware of Physics: In Particular, Inertia and Gravity
- Agency: The Ability to Act upon the Environment

unity

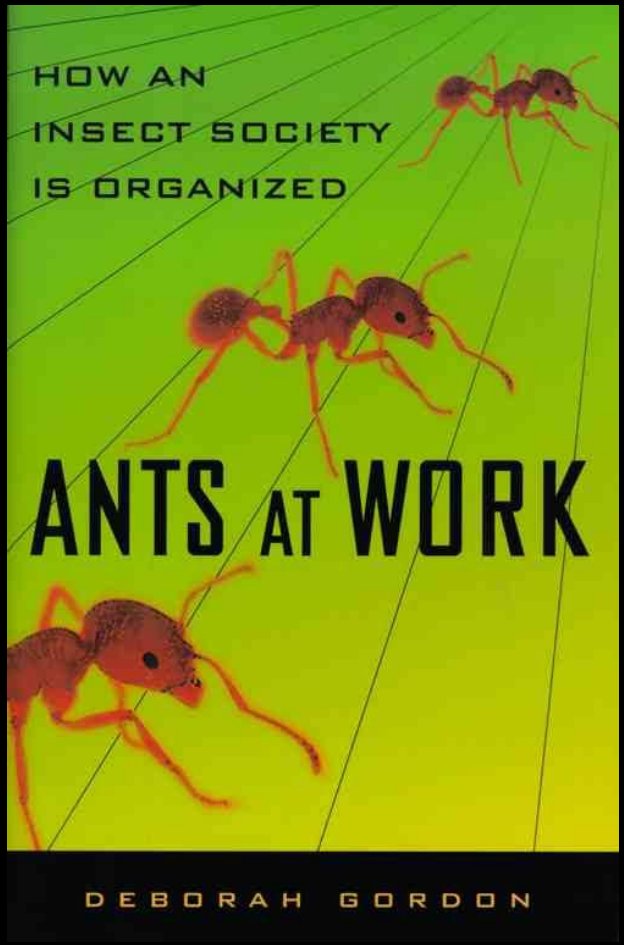
Danny Lange
VP of AI and ML at
Unity Technologies

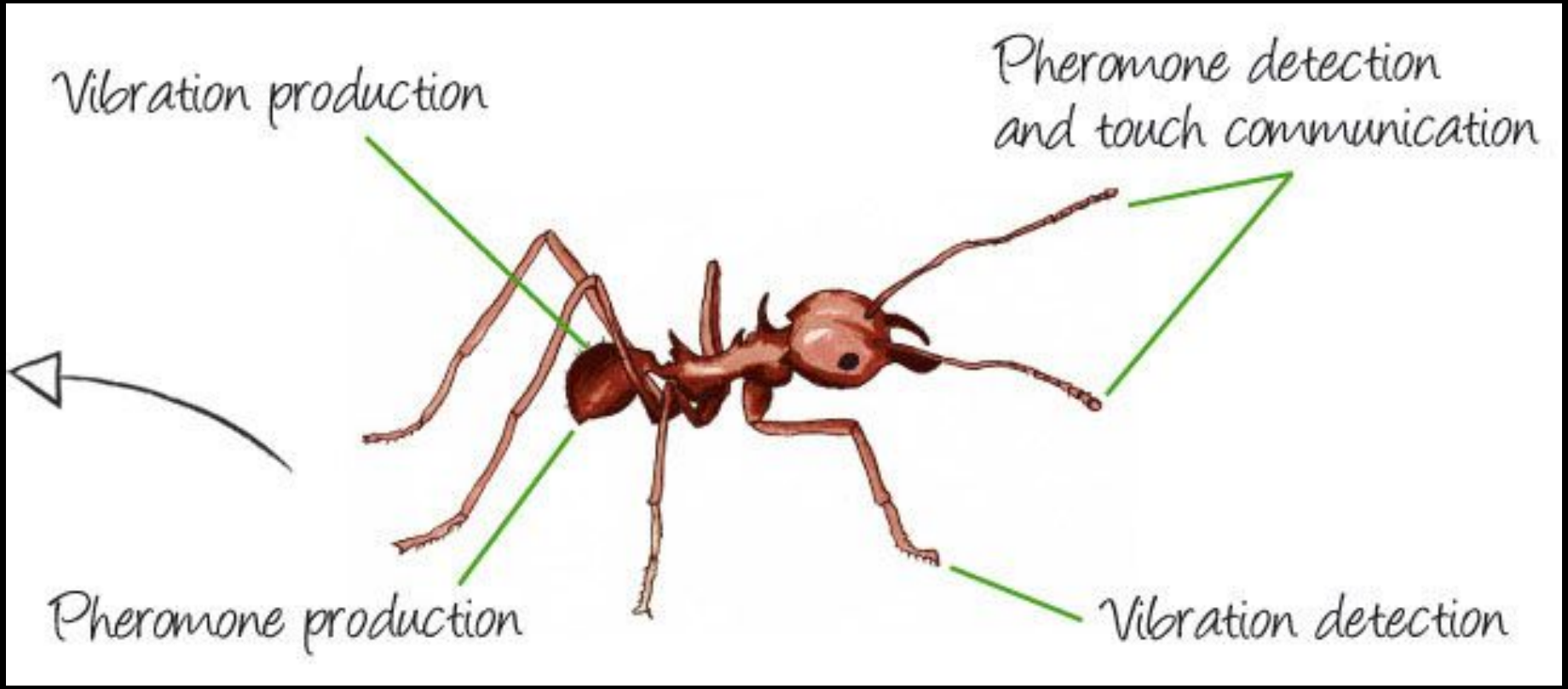
https://gotochgo.com/2019/sessions/719

Survive Failures

“No insect issues commands to another or instructs it to do things in a certain way.”

Deborah Gordon
Ants at Work, 1999




Vibration production
Pheromone detection and touch communication
Pheromone production
Vibration detection

“The basic mystery about ant colonies is that there is no management.”

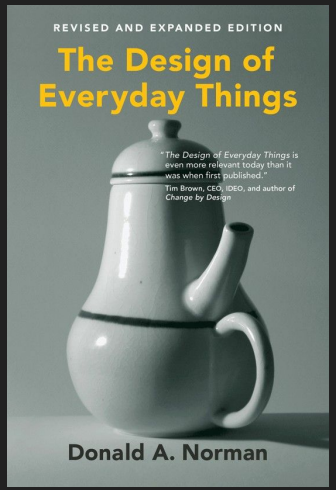
Deborah Gordon,
Stanford Biologist

Respond to signals in the environment, not internal commands.

Affordances

"The value of a well-designed **object** is when it has such a rich set of affordances that the **people** who use it can do things with it that the designer never imagined."

-- Donald Norman (1994)

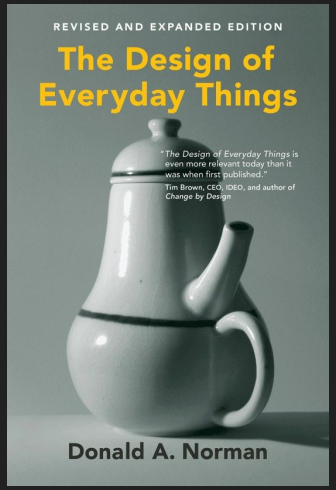


https://www.youtube.com/watch?v=NK1Zb_5VxuM

Affordances

"The value of a well-designed **ecosystem** is when it has such a rich set of affordances that the **agents** who use it can do things with it that the designer never imagined."

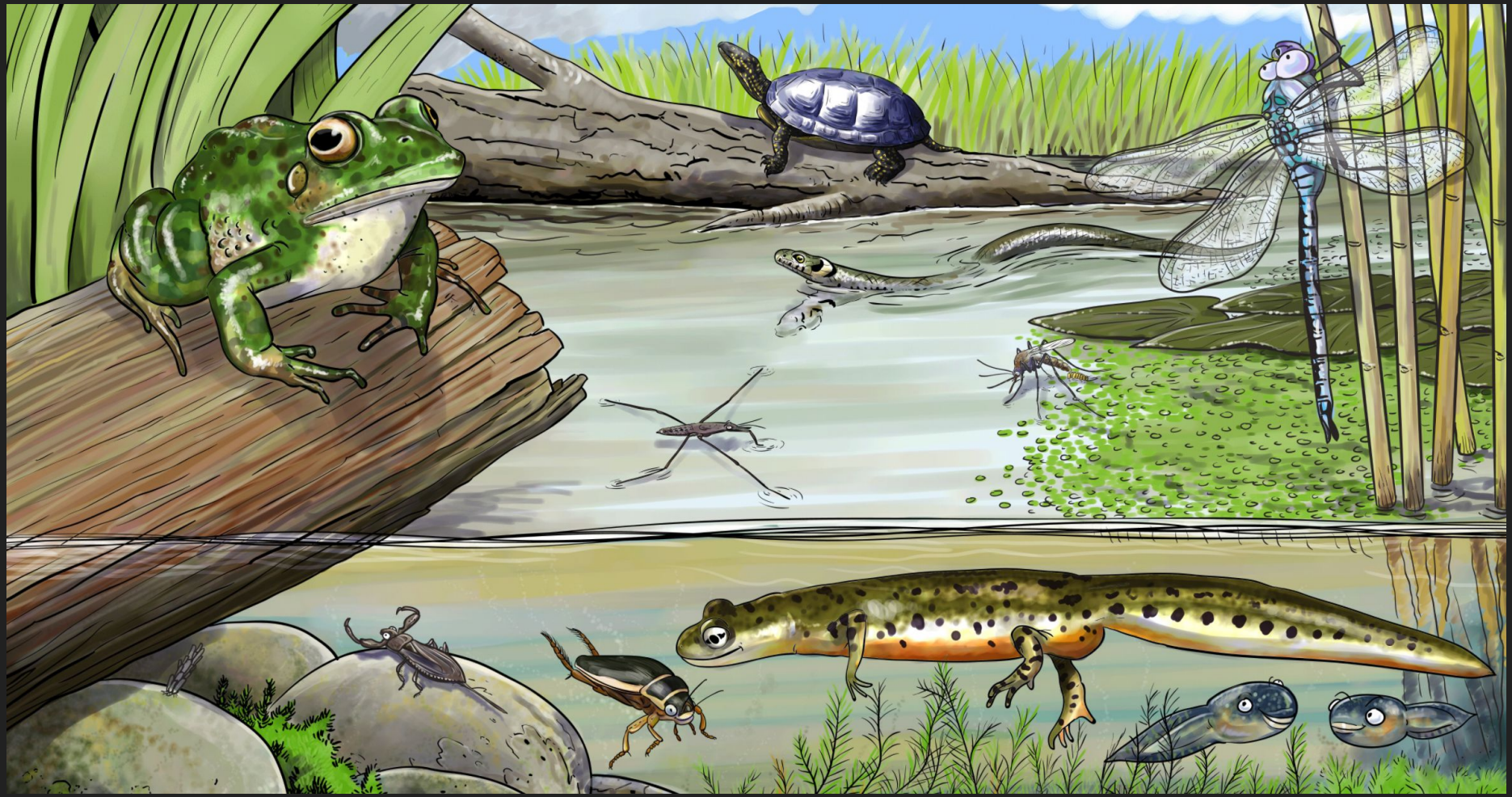
-- Donald Norman (1994)



https://www.youtube.com/watch?v=NK1Zb_5VxuM

And So...

Populate Ecosystems



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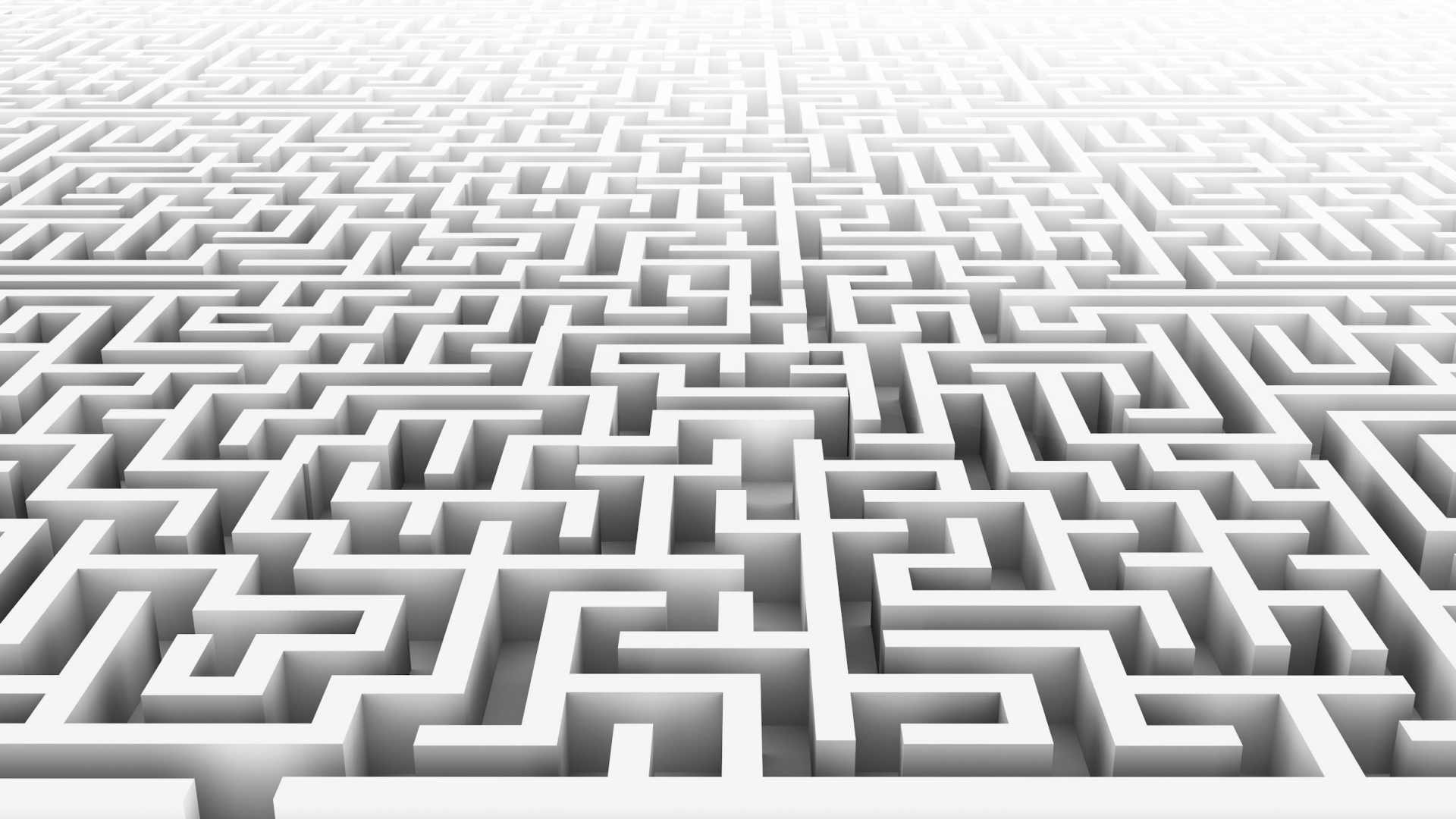
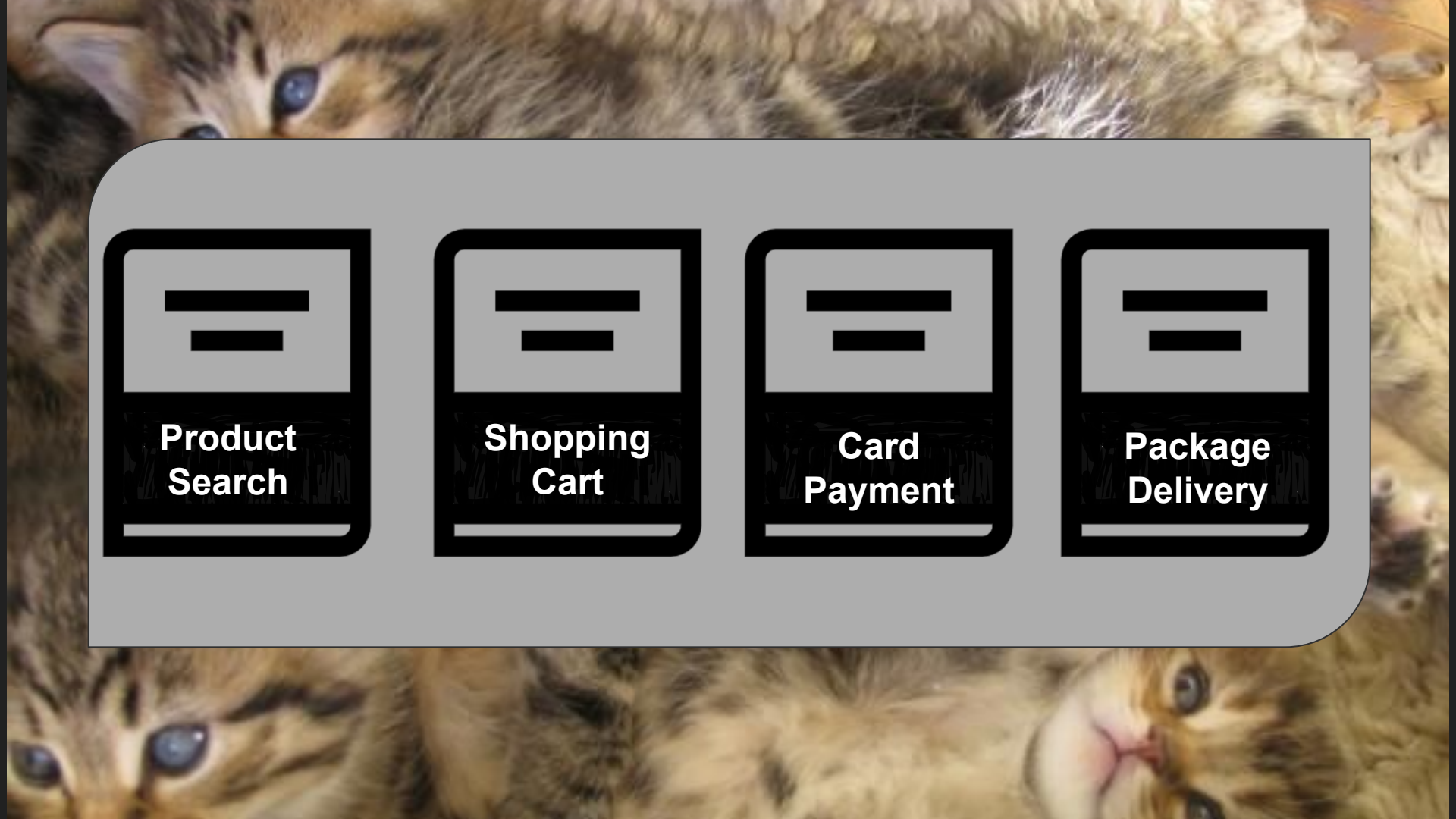
<collection href="URI">
<link href="URI" rel="maze" />
<link href="URI" rel="maze" />
...
</collection>
<item href="URI" >
<link href="URI" rel="start" />
<debug>CDATA</debug>
</item>
<cell href="URI" debug="TEXT" total="NUMBER" side="NUMBER">
<link href="URI" rel="current" debug="TEXT" total="NUMBER" sid
<link href="URI" rel="north" />
<link href="URI" rel="south" />
<link href="URI" rel="east" />
<link href="URI" rel="west" />
<link href="URI" rel="exit" />
</cell>
<error href="URI">
<title>TEXT</title>
<code>TEXT</code>
<message>CDATA</message>
</error>
</maze>

Focus on the Map, not the Destination



```
function processLinks(response,headers)
{
  var xml,linkItem,i,rel,url,href,flg,links,rules;

  flg = false;
  links = [];
  rules = [];

  // get all the links in this document
  g.linkCollection = [];
  xml = response.selectNodes('//link');
  for(i=0;i<xml.length;i++)
  {
    rel = xml[i].getAttribute('rel');
    url = xml[i].getAttribute('href');
    linkItem = {'rel':rel,'href':url};
    g.linkCollection[g.linkCollection.length] = linkItem;
  }

  // is there an exit?
  href = getLinkElement('exit');
  if(href!='')
  {
    printLine('*** Done! '+href);
    g.done = true;
    if(g.robot==true)
    {
      alert('Done in only '+g.idx+' moves!');
    }
    return;
  }

  // is there an entrance?
  if(flg==false && g.start==false)
  {
    href = getLinkElement('start');
    if(href!='')
    {
      flg=true;
      g.start=true;
      g.href = href;
      g.facing = 'north';
      printLine(href);
    }
  }

  // ok, let's "wall-follow"
  rules = g.rules[g.facing];
  for(i=0;i<rules.length;i++)
```

Avoid Monoliths


Product Search
Shopping Cart
Card Payment
Package Delivery

Respond to signals in the environment, not internal commands.

LEGEND to MAP SYMBOLS

COUNTRY

Feature Town

desert/wasteland

grassland

swamp

hills

mountains

cave

political border

road

river

town/village

cities

tower/fortress

castle

country capital

windmill

forest

lake

reef

canyon

The Quest for Surprisal: Curiosity (in Math)

- Observations x_t and x_{t+1}
- *Action* a_t such that x_t transitions to x_{t+1}
- Embedding $\phi(x)$
- Prediction $p(\phi(x_{t+1}) \mid x_t, a_t)$
- **Reward $r_t = -\log p(\phi(x_{t+1}) \mid x_t, a_t$** 
- Train to maximize r_t
- Agent now favors transitions with high prediction error

unity

Danny Lange
VP of AI and ML at
Unity Technologies

https://gotochgo.com/2019/sessions/719

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unity

https://gotochgo.

"Bugs will happen. They cannot be eliminated, so they must be survived instead."

-- Michael T. Nygard

Such a Rich Set of Affordances!

Mike Amundsen
@mamund

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