Surviving Digital Darwinism in the library

Louis C H Fourie
Cape Peninsula University of Technology
Cape Town
What is Digital Darwinism?
Digital Darwinism

- Digital Darwinism implies that organisations which cannot adapt to the new demands placed on them for surviving in the information age are doomed to extinction.

- Why did Polaroid and Kodak go bankrupt?
It is not the strongest of the species that survives, nor the most intelligent, but the one that is most adaptable to change.

Charles Darwin
(paraphrased)
Significant drivers of change in the library over the past few years
Users migrated to a digital world dominated by online discovery and access to information.
2. Information abundance

- We now live in a world where information is abundant
- Library collections were developed in a age of information scarcity

www.techliberation.com
Decades ago the largest collection of information would always be found in the library.

www.thisis2020.com
But now we live in a world where information is easily available online.
Important related trends influencing the library of the future
1. Social media and collaboration

www.findingdulcinea.com
## Connected via social media

<table>
<thead>
<tr>
<th>Platform</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facebook</strong></td>
<td>• 1.65 billion+ active users who spend 20 billion+ minutes per day (country = 1st)</td>
</tr>
</tbody>
</table>
| **WhatsApp** | • 1+ billion registered users  
• 50 billion messages per day                                               |
| **Twitter**  | • 1.3 billion registered users – 320+ million active.                         |
| **LinkedIn** | • 433+ million users in 200 countries & territories                          |
| **YouTube**  | • 1.3+ billion users  
• 42 million video streams every hour  
• 5 billion+ views per day                                                   |
| **Instagram**| • 500+ million active users pm  
• Hosts 30+ Billion photos  
• 70 million images uploaded per day                                        |
“‘I store my knowledge in my friends’… is an axiom for collecting knowledge… through collecting people”.

- Karen Stephenson

Distributed Cognition
Crowdsourcing knowledge
Building personal networks

http://bradley.chattablogs.com
Libraries have to be social ... where the users are
Think like a friend, not an institution

Play to your strengths by being an expert, a filter, a recommender (linker), and a facilitator

Look for opportunities to build communities with your material

Embrace the move towards mobility, constant connectivity, perpetual contact – changes the realities of time, space and presence

Facilitate information sharing – chunking (We read for you)

Rainie, 2013
2. Internet of Things
The Internet of Things: When objects anticipate and negotiate

- 50 billion devices on the Internet by 2020. (Mobile Industry Group)
- Smart phones/watches, wearable devices (Smart People), “Smart Homes” and “Smart Cities”, Robotics, remote sensing, crime prevention...

Geoffrey Fox, 2014; Robeller, F & Pénuchot, L, 2014
The Internet of Things and the Library

- **RFID**: Tracking of resources and communication.
- **Geo-location**: online content to users based on their physical position; location of library resources.
- **Smart scholarly spaces**: Use of smart technologies.

Uzwyshyn, 2016
3. Big data and analytics
Data is growing exponentially!

The Digital Universe: 50-fold Growth from the Beginning of 2010 to the End of 2020

Our Digitised World

35 Trillion Gigabytes generated annually

Millions of people expected to move into “Smart Cities” with smart infrastructures

Estimated 1 trillion sensors will be deployed globally

People generate 2,500,000,000,000,000,000,000 bytes of data DAILY!

Source: Booz & Co., 2012
Big data can be overwhelming
Do not worry librarians can help!

DATA SCIENCE ROLES

Data Librarian  Data Journalist  Data Analyst  Data Engineer  Data Steward  Data Archivist

KEEP CALM AND ASK A LIBRARIAN
Assist with data management planning

To consult the statistician after an experiment is finished is often merely to ask him to conduct a post mortem examination. He can perhaps say what the experiment died of.

— Ronald Fisher —

Federer, 2016
The world of analytics is rapidly expanding.

Jarman & Mack, 2016
Moving analytics to the edge

- Traditional analysis: data is stored and then analysed.
- The frontier: (near) real-time analysis and decisions.
- Examples: Flagging of students at risk, security cameras, full motion video analysis…
- Spatio-temporal patterns indicative of physical activities or social behaviour of students.
- Learning analytics and educational data mining.

Types of library data that can be analysed to improve services

- Circulation data
- Open data
- Qualitative data
- Search behaviour data
- Social media data
- Usability data

Oliphant & Shiri, 2016
## Analysing library utilisation

<table>
<thead>
<tr>
<th>Academic Org</th>
<th>Course Career</th>
<th>Course Type</th>
<th>Derived Course Level</th>
<th>Term</th>
<th>Section Count</th>
<th>Section Capacity</th>
<th>Official Class Enrollment</th>
<th>Avg Official Enrollment per Section</th>
<th>Course Utilization %</th>
<th>Room Capacity</th>
<th>Room Utilization %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Rooms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,766</td>
<td>94,338</td>
<td>65,297</td>
<td>17.3</td>
<td>69.22%</td>
<td>79,756</td>
<td>81.87%</td>
</tr>
<tr>
<td>Blue River - Campus Cntr Bldg (BRCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>153</td>
<td>4,736</td>
<td>4,209</td>
<td>27.5</td>
<td>88.87%</td>
<td>6,180</td>
<td>68.11%</td>
</tr>
<tr>
<td>Blue River-Arts &amp; Science Bldg (BRAS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>93</td>
<td>2,745</td>
<td>2,014</td>
<td>21.7</td>
<td>73.37%</td>
<td>3,910</td>
<td>51.51%</td>
</tr>
<tr>
<td>Blue River-Education Cntr Bldg (BREC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>59</td>
<td>1,448</td>
<td>1,305</td>
<td>22.1</td>
<td>90.12%</td>
<td>1,924</td>
<td>67.83%</td>
</tr>
<tr>
<td>Blue River-Public Safety Bldg (BRPS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>125</td>
<td>81</td>
<td>13.5</td>
<td>64.80%</td>
<td>160</td>
<td>50.63%</td>
</tr>
<tr>
<td>BTC North Annex (BTNA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>120</td>
<td>100</td>
<td>25.0</td>
<td>83.33%</td>
<td>160</td>
<td>50.63%</td>
</tr>
<tr>
<td>Business Tech - Tech Cntr Bldg (BTTC)</td>
<td></td>
<td></td>
<td></td>
<td>2014 Fall</td>
<td>56</td>
<td>1,149</td>
<td>816</td>
<td>14.6</td>
<td>71.02%</td>
<td>1,481</td>
<td>55.10%</td>
</tr>
<tr>
<td>Business Tech-Campus Cntr Bldg (BTCC)</td>
<td></td>
<td></td>
<td></td>
<td>2014 Fall</td>
<td>128</td>
<td>2,384</td>
<td>1,621</td>
<td>12.7</td>
<td>67.99%</td>
<td>2,825</td>
<td>57.38%</td>
</tr>
<tr>
<td>Longview - Business Bldg (LVBU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>141</td>
<td>3,580</td>
<td>2,885</td>
<td>20.5</td>
<td>80.59%</td>
<td>4,686</td>
<td>61.57%</td>
</tr>
<tr>
<td>Longview - Campus Center Bldg (LVCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33</td>
<td>1,074</td>
<td>914</td>
<td>27.7</td>
<td>85.10%</td>
<td>1,145</td>
<td>79.83%</td>
</tr>
<tr>
<td>Longview - Cultural Arts Cntr (LVCAC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>56</td>
<td>41</td>
<td>13.7</td>
<td>73.21%</td>
<td>522</td>
<td>7.85%</td>
</tr>
<tr>
<td>Longview - High Tech Bldg (LVHT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37</td>
<td>682</td>
<td>580</td>
<td>15.7</td>
<td>85.04%</td>
<td>902</td>
<td>64.30%</td>
</tr>
<tr>
<td>Longview - Liberal Arts Bldg (LVLA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>235</td>
<td>5,997</td>
<td>5,163</td>
<td>22.0</td>
<td>86.09%</td>
<td>8,292</td>
<td>62.25%</td>
</tr>
<tr>
<td>Longview - Lrng Resources Bldg (LVLR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>298</td>
<td>245</td>
<td>16.3</td>
<td>82.21%</td>
<td>381</td>
<td>64.30%</td>
</tr>
<tr>
<td>Longview - Rec Center Bldg (LVRC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>44</td>
<td>32</td>
<td>16.0</td>
<td>72.73%</td>
<td>24</td>
<td>133.33%</td>
</tr>
<tr>
<td>Longview - Science Tech Bldg (LVST)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>197</td>
<td>5,831</td>
<td>5,051</td>
<td>25.6</td>
<td>86.62%</td>
<td>6,778</td>
<td>74.52%</td>
</tr>
<tr>
<td>Maple Woods - Campus Cntr Bldg (MWCC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49</td>
<td>1,449</td>
<td>1,263</td>
<td>25.8</td>
<td>87.16%</td>
<td>1,876</td>
<td>67.32%</td>
</tr>
<tr>
<td>Maple Woods - Humanities Bldg (MWHU)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>127</td>
<td>2,783</td>
<td>1,982</td>
<td>15.6</td>
<td>71.22%</td>
<td>3,689</td>
<td>53.73%</td>
</tr>
<tr>
<td>Maple Woods - Sldnt Cntr Bldg (MWSC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>313</td>
<td>256</td>
<td>22.2</td>
<td>84.98%</td>
<td>535</td>
<td>49.72%</td>
</tr>
<tr>
<td>Maple Woods - Vet Tech Bldg (MWVT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>342</td>
<td>332</td>
<td>30.2</td>
<td>97.08%</td>
<td>224</td>
<td>148.21%</td>
</tr>
<tr>
<td>Maple Woods-Computing.Bus Bldg (MWCB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>156</td>
<td>5,099</td>
<td>4,149</td>
<td>26.6</td>
<td>81.37%</td>
<td>5,632</td>
<td>73.67%</td>
</tr>
</tbody>
</table>

Hirner, 2015
Tweet analysis and categorisation

Categorisation scheme

- recommendations suggestions
- request
- acknowledgement
- advisory services
- announcement
- event
- feedback seeking
- informal conversation
- information sharing
- library operations
- news
- opinion
- query
Using Knowledge Assistants

Key capabilities

- Digest and analyse thousands of articles without reading
- Rapidly identify groupings, trends, connections, and experts
- Explore technology gaps that could be leveraged
- Identify cross-domain leverages and research

Ambur, Chen, Liles, Milletich, Sammons, Sidehamer, & Yagle, 2016
Knowledge Assistants: Deep Analytics Examples

Expert Networks

Software: IBM Watson Content Analytics algorithms

Ambur, Chen, Liles, Milletich, Sammons, Sidehamer, & Yagle, 2016
4. Changing library spaces

The Tama Art University
Hachioji Library

http://designerscollaborativenyc.com/tag/jerry-caldari/page/2/
From physical to virtual...

- The **cloud** will get bigger
- **Shared services** will achieve even greater scale and reach
- Distinctions between libraries & information services (physical and in the cloud) will get more blurred
- **Spaces** will be redesigned – print collections might be 2% of the usage

Seeman, 2015; Ranschaert, 2016
From traditional to creative spaces.

NCSU Technology Sandbox:
- Test bed for new collaborative display technologies.
- Surrounded by glass walls. Moveable furniture.
- Also Gaming Studio, Prototyping Spaces.

http://learningspacetoolkit.org/space-browser/category/collaborate/
Visualisation technologies

Rice; UT Austin; Deloitte University; University of Calgary; Johns Hopkins

Uzwyshyn, 2016; Walker, 2016
Visualisation walls (VizWall)

Brown University Rockefeller Library

NCSU Hunt Library

Uzwyshyn, 2016
3D Immersive & Interactive Environments

Google Liquid Galaxy

Brody Learning Commons Display Wall

Uzwyshyn, 2016; Walker, 2016
Virtual reality

3D simulated environment for interaction and experience in the library

- Virtual reality headsets (Oculus Rift; Samsung Gear VR)
- Immersive VR
- Free VR Apps: Sites in VR; Anatomy VR; Titans of Space; Tuscany Dive; Jurassic VR
Augmented Reality
Technology recognises what you are doing and then **enhances** it.

AR apps add information to the world around us.

**Context awareness**
Overlays of information about the object in front of you....

layar.com

Steve Wheeler, University of Plymouth, 2011

Sheryl Nussbaum-Beach, 2015
5. Makerspaces

www.libraryasincubatorproject.org
Traditionally 3-D printing
Now include other spaces to create content:
- Large-format printing
- Physical computing
- Prototyping
- Sandboxing
6. Open access and open resources

steve-wheeler.blogspot.com
Given the rising cost of journal subscriptions it is time to treat open access as acquisitions!
Instead of chasing journal subscriptions skywards, optimise open access investment

- By supporting them as part of library collections strategies and budgets
- By weaning us off dependence on unsustainably priced content
- By building Institutional Repositories

Greenstein, 2010; Cirasella, 2015
7. Information discovery and on demand information delivery
Speed and convenience

- Google preferred over libraries for speed & convenience
- Locate and access e-journals via Google - Ignore publishers’ platforms
- Cannot distinguish between databases held by the library & other online sources
- Users demand
  - 24/7 access
  - Instant gratification

Connaway, 2011
The future catalogue

Library OPACs difficult to use

“I wish the results page would list a short blurb (one line) about the book similar to the way Google shows you a tiny bit about what a site link is about.”


“Make the library catalog more like search engines.”

(Connaway, 2011)
The importance of metadata

- Metadata management becomes the focus for Technical Services as processing of physical objects wanes.
8. Mobile content
The First Mobile Phone?
Exponential growth of Mobile

Mobile Growth Continues Through 2020
By 2020, more people will have mobile phones than electricity at home

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>People with mobile phones</td>
<td>5.4 billion</td>
<td>69%</td>
</tr>
<tr>
<td>People with electricity</td>
<td>5.3 billion</td>
<td>68%</td>
</tr>
<tr>
<td>People with bank accounts</td>
<td>4.5 billion</td>
<td>58%</td>
</tr>
<tr>
<td>People with running water</td>
<td>3.5 billion</td>
<td>45%</td>
</tr>
<tr>
<td>People with cars</td>
<td>2.8 billion</td>
<td>36%</td>
</tr>
<tr>
<td>People with landlines</td>
<td>2.2 billion</td>
<td>28%</td>
</tr>
</tbody>
</table>

Consumer mobility reached critical mass

There are more mobile phones than toothbrushes (5B vs 2.2B)

Wright, 2011
Mobile connectivity alters access points to knowledge

- Real-time sharing, just-in-time searching
- Pervasive, perpetual awareness of social networks
- Augmented reality
Multi-device mobile access to libraries

Allow students to use whatever tools and devices they choose... smart phones, tablets, laptops.... (BYOD)
Content must be Mobile!

- Libraries have to deliver content and services to multiple devices.
- Need to be available, anywhere, anywhen, anyhow.

Bosch, 2015
• Bio-chips will mediate cognition and emotion.
• BMIs would be posited on bio-feedback between neurons and bio-chips and driven by neuronal electrical impulses.
• Implants would facilitate the creation of virtual realities and augment intelligence.
The future role of the library?

The Matrix
10. Beam a librarian…😊

Just wanted to let you know – your librarian will be in your living room soon…
A few conclusions
Is the future of libraries extinction?
Great companies like Borders, Polaroid, Kodak and video shops toppled because they couldn't keep up with today's rapidly changing digital landscape.

Many of them were too product oriented instead of customer oriented....; they could not adapt!
A rethink and redesign is needed
“Our traditional model was one in which we thought of the user in the life of the library...but we are now increasingly thinking about the library in the life of the user.”
(Dempsey 2015)
We need a paradigm shift!!
The only question:
Are you thirsty enough to act?
Thank you

I hope you are not too tired for the rest of the afternoon!

E-mail: FourieL@cput.ac.za
Twitter: @LouisCHFourie