IT and Innovation
Wicked and Empowering

TUOMAS NURMELA AND ABAYOMI BAIYERE

@speak2ab
Outline

1. Why - Wickedness and Empowerment
2. What - IT Innovation
3. How - Scenario Planning
1. Why - Wickedness and Empowerment
Definitions: Wickedness

Wicked problem (1): A problem that is
- difficult or impossible to solve because of incomplete, contradictory, and changing requirements
- often difficult to recognize
- resist resolution as they contain complex interdependencies due to which resolving one aspect may reveal / create new problems.

Super wicked problem (2): a wicked problem for which
- time is running out
- no central authority exists
- those seeking to solve the problem are also causing it
- policies discount the future irrationally.

(1) Australian Public Service Commission / Wikipedia
(2) Levin, Cashore, Auld, Bernstein / Wikipedia

Problems can be "simple" or "complicated" (or perhaps even "complex") without being wicked.
Definitions: Empowerment

Empowerment of individuals, organizations and society as

• Enabling and permitting them to take initiative and action to achieve things not possible otherwise
Why consider wickedness and empowerment for scenario work

- Provides a perspective for narratives
  - Focuses on technology adoption at different levels in a non-linear fashion
  - Raises assumptions to the surface of discussion
- Provides means of addressing complex attributes at different levels accounting level-specific features
  - Individuals: their adoption, impact and influence
  - Organizations: their adoption and local-context issues of disruptions
  - Society: sociological impact
2. What-IT innovation

Organization-level Technology feature frame:
- Disruptive Innovation Theory (DIT)

Society-level Sociological social constructs frame:
- Computerization Movements (CM)
Examples: IT Innovation

- Industrial (Operational) Technology/Service Technology
- Information Technology
- Consumer technology

Automated Data Processing

1950s

1970s

1990s

2000

2010

“IT – Telco – Cable - Media Convergence” (1990-2010+)

Internet of Things (2000-2010+)

“Consumerization of IT” (2005+)

Personal devices and app stores, Social Media, consumer cloud services

Time

Internet and email

Web

Personal computers

Netflix

Popular Electronics

Automated Data Processing

1950s

1970s

1990s

2000

2010

1990s

2000
Disruptive Innovation - DI
DI Impact

Irrecoverable... Intense
On the other hand...
Examples

Mainframe - Minicomputers - PC -- Tablet/Mobile

Kodak - Digital Camera -- Smartphones

Landline - Telecoms -- VoIP
Your Examples: Disruptive Innovations

1. Netflix
2.?
Video: The Explainer: Disruptive Innovation - YouTube
Intro: Computerization movements

- Computerization movement (subset of technology movements)
  - Combines theorization from IT in organizational change and social movements for a macro-level theory
  - Raises the question is change really for good and if it is, does it really achieve what it claims (critical perspective)

Categorization of computerization movements (1988)
- general movements and specific (submovements)
- revolutionary and reform movements
Public discourses by:
1) Mass media/web news
2) Vendors
3) Customer advocates
4) Market analysts, communities, gurus
5) Public sector policies

Dominant of master frame provides assemblages of concepts, which computerization movement evolution can draw upon

Computerization movement consists of
1. Technological action frames
2. Discourses
3. Organization use and practices

Frames shape public discourse about new technology

Organization use and practice experiences have limited impact on discourse

Technological action frames
- Legitimize investments
- Links the social construction with social and political processes
Intro: Computerization movements

IDEOLOGY IN CM DISCOURSE

1. Computer-based technologies are central to a reformed world
2. Improved computer-based technologies can reform a world
3. More computing is better than less (and there are no limits)
4. No one loses from computerization world
5. Uncooperative people are main barriers

PROPOSITIONS OF CM THEORY

1. Continuing gap between utopian CM visions and reality of technology use in organizations and society
2. CM rhetoric shifts from utopian to pragmatic with experience
3. Technologies requiring support infrastructure take longer to diffuse, lowering CM probability for successful diffusion
4. Realities of technology use cannot be predicted on day-to-day use
5. Social context shapes technology use
# Information Technology: Using CMs to understand Wickedness and Empowerment

<table>
<thead>
<tr>
<th>Computerization Era</th>
<th>New Technology</th>
<th>Dominant Technological Frame</th>
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<tbody>
<tr>
<td><strong>Mainframe Era</strong></td>
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Empowering of concepts embedded to “positive skew” of public discourse

Automation, BPR and layoffs

Automation and subprime mortgage crises
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Empowering of concepts embedded to "positive skew" of public discourse

**Journalism/Whistleblowing**

**Hacktivism/Anonymous/LulzSec**

**Deep Web/Dark Web/Silk Road**
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Empowering of concepts embedded to “positive skew” of public discourse

Alone Together & "The Shallows" of web content

Dark side of Digitalization

Anytime, anywhere

Anyhow
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Increasing number of sources of public discourse

- Customer Advocates
- Vendor Marketing
- Mass Media
- Computer Clubs/ User Groups
- Market analysts/ Advisor consulting
- Government policies
- Standardization organizations and consortiums
- Gurus&Web Communities& Advocacy groups

Time
IT concepts today: utility computing was there from the get-go...

**PARKHILL’S FEATURES (1956) FOR COMPUTING AS UTILITY**

“(1) Essentially simultaneous use of the system by many remotely located users

(2) Concurrent running of multiple different programs

(3) Availability of at least the same range of facilities and capabilities at the remote stations as users would expect if he were the sole operator of a private computer...

(4) A system of charging based on a flat service charge to cover overhead plus an additional fee of X dollars per unit of time actually spent processing the user’s information...

(5) A capacity for indefinite growth, so that as the customer load increases, the system can be expanded without limit by various means ...

... 

(c) connecting with other information utilities to draw on their unused capacity.

(6) Flexibility so that as the state of the art advances, new system and hardware capabilities can be added without interfering with the regular system services”

- Quoted from [Par66, pp.51-52].
IT concepts today: resurfacing and evolving concepts

Case of Utility/Grid/Cloud computing discourse
IT concepts today: ...what goes around, comes around

Case of Utility/ Grid/ Cloud computing discourse
IT concepts today - entanglement of concepts (looking the for master frame)
Disruptive Innovation: **Wicked but also Empowering?**

- Individuals
- Organisations
- Society
Disruptive Innovation: Wicked but also Empowering?

- Individuals?
- Organisations?
- Society?
Disruptive Innovation: Wicked but also Empowering?

• Individuals?
• Organisations?
• Society?
Disruptive Innovation: Wicked but also Empowering?

- Individuals?
- Organisations?
- Society?
Exercise for Workshop

Activity 1: Create a list of examples of (potential) Disruptive IT Innovations

Activity 2: Group formation and Selection of innovation from the list.

Activity 3: Describe the innovation attributes (Wicked & Empowerment) for - Society, Organisation and Individual.

Activity 4: Create A Scenario Plan for x years, considering implications on individual, organizational
Activity 1: **List IT innovations with DI potential**

Generate a list of potential IT trends/innovations that can be disruptive. (Wild Ideas Welcomed)

<table>
<thead>
<tr>
<th>Idealist 1</th>
<th>Idealist 2</th>
<th>Idealist 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netflix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uber</td>
<td></td>
<td></td>
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<tr>
<td>...</td>
<td></td>
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</tr>
</tbody>
</table>
Activity 2: Group Formation

Join a Group (3-5 persons per group)
Activity 3: **Innovation Selection and attributes. Wicked/Empower for?**

1. Select an innovation from the listed examples of (potential) Disruptive IT Innovations

2. Determine the different *Wicked/Empower* dimensions of the potential Disruptive IT Innovations list for –
   - Individual
   - Organization and
   - Society.
Tentative timing

4a PRESENTATION: Scenario planning explanation – Tuomas (5mins)
Scenario planning future IT
The approach for scenario planning

Different context levels:
- Government policy-level scenario making (society)
- Strategic scenario planning (organization)

Potential Disruptive Innovation

Wickedness/Empowerment traits

Key uncertainties

Rules of interaction

Multiple scenarios

Scenario planning should lead to
- Plausible scenarios and
- Implications
Traditional scenario planning

Drivers for change

Impactful Trends

Key uncertainties

Rules of interaction

Multiple scenarios

Potential Disruptive Innovation

Wickedness/Empowerment traits

Key uncertainties

Rules of interaction

Multiple scenarios

Should lead to
• Plausible scenarios and
• Implications
Traditional scenario planning: trends

<table>
<thead>
<tr>
<th>CONTEXTUALIZED DRIVERS</th>
<th>Trends</th>
<th>Key uncertainties</th>
</tr>
</thead>
</table>

**DEFINITION IMPACT**

<table>
<thead>
<tr>
<th>MICROTREND</th>
<th>TRENDS</th>
<th>COUNTER / ANTI-TREND</th>
<th>WILD CARD</th>
<th>MEGATREND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed of Change, Weak Signal</td>
<td>Behavior Pattern economic, environmental, social conditions</td>
<td>Reaction to a trend</td>
<td>Low probability</td>
<td>Significant global change, Inevitable</td>
</tr>
<tr>
<td>Mini trend</td>
<td>Low impact</td>
<td>Low impact</td>
<td>High potential impact on society</td>
<td></td>
</tr>
<tr>
<td>Uncertain future</td>
<td>Notable change with very limited effects</td>
<td>Medium impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maybe a starting trend or only regional</td>
<td></td>
<td></td>
<td></td>
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</table>

**TIMING**

<table>
<thead>
<tr>
<th>Short / Mid term</th>
<th>Mid / Long term</th>
<th>Short / Mid / Long term</th>
<th>Mid / Long term</th>
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</table>

**EXAMPLES**

<table>
<thead>
<tr>
<th>Moustache</th>
<th>Fashion</th>
<th>Mobile penetration</th>
<th>SMS</th>
<th>Earthquake</th>
<th>Tsunami</th>
<th>Aging population</th>
<th>24x7 Connectivity</th>
<th>Neo-urbanization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure information in Africa</td>
<td>Smartphone</td>
<td>Health applications</td>
<td>Low &quot;de-tach&quot; services</td>
<td>Open data vs Privacy</td>
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<tr>
<td>Self sufficient house</td>
<td></td>
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Source: Gloria Alvarez Hernández & Smriti Collins, Alcatel-Lucent 2012 based on several resources.
Traditional scenario planning: trends and uncertainties
Traditional scenario planning: uncertainties and scenarios

CONTEXTUALIZED DRIVERS
- Trends
- Key uncertainties

CONTEXTUALIZED SCENARIOS
- Plausible scenarios
- Implications and paths forward
Scenario design

<key uncertainty / scenario dimension 1>

<key uncertainty / scenario dimension 2>

<name of scenario>   <name of scenario>

<name of scenario>   <name of scenario>
# Summary of plausible scenarios

<table>
<thead>
<tr>
<th></th>
<th>Scenario A</th>
<th>Scenario B</th>
<th>Scenario C</th>
<th>Scenario D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of scenario</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Implications of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scenario</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeframe of scenario</td>
<td></td>
<td></td>
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</table>
Example: Scenario design for EU cloud computing market

- **Digital Savannah**
- **Digital Rainforest**
- **Digital Desert**
- **Digital Greenhouse**

Global growth

- Low (< 3%)
- High (> 5%)

Degree of Integration in EU market area

- Low
- High
### Example: Scenario implications for EU cloud computing market

<table>
<thead>
<tr>
<th></th>
<th>Digital Desert</th>
<th>Digital Savannah</th>
<th>Digital Greenhouse</th>
<th>Digital Rainforest</th>
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<tbody>
<tr>
<td><strong>Summary of scenario</strong></td>
<td>Business strategies focus on maximizing home markets. National drivers push to for nationalism. ICT products do not provide price and choice options as they optimally could.</td>
<td>Fragmented EU market limits growth and scaling, gap between US and EU continues to widen. Companies skip EU and go for global market. India and China markets increase. Non-EU firms acquire EU firms. EU consumers price and offering limited.</td>
<td>National champions compete for share in slow EU and global economy. Protectionism denies possibility to succeed in global competition. Best quality of offering not available from EU.</td>
<td>Strong integrated EU market creates a globally competitive market. Barriers are reduced and support rapid change and adjustments. Clusters form, specialization is vibrant.</td>
</tr>
<tr>
<td><strong>Implications of scenario</strong></td>
<td>People lose jobs due “transformation” initiatives but no new business develops. EU ICT efforts have no impact to GDP increase or levels of unemployment. No dominant categories form, new technology frames replace or adjust cloud in global market, categories are adjusted.</td>
<td>People lose jobs as EU ICT firms close shop or loose jobs to acquiring firms, as these outsource operations. ICT impact to GDP development remains insignificant. Global discourse and categories continues, yet the technology frame evolution is driven by non-EU market actors.</td>
<td>Local markets maintain employment levels in ICT sector, yet have limited impact to EU level GDP development. Global discourse and categories continue, yet the technology frame evolution is driven by non-EU market actors.</td>
<td>Organizational transformations create new skill needs, industry-education–collaboration creates new entrepreneurship opportunities. EU funding mechanisms become more relevant. Global discourse continues. EU actors impact direction with e.g. “Trusted Cloud” positioning concept.</td>
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<tr>
<td><strong>Timeframe</strong></td>
<td>7 years</td>
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*Note: The table is a simplified representation of scenario implications.*
Conclusion: **Group Presentations**

Each group gives a quick presentation of their scenario planning results.

(Use the summary, impact, timing matrix)
References


Baiyere A. (2015) When Disruptive Innovations is not about only companies. Proceedings of ISPIM Conference, Budapest, 26, 1


Rob Kling and Suzanne Iacono (1988): The mobilization of Support for computerization – the role of computerization movements”, Social problems 35 (3)


Margaret S. Elliott and Kenneth L. Kraemer Computerization (2008), "Movements and the Diffusion of Technological Innovations", In M. Elliott & K. Kraemer (Eds.), Computerization Movements and Technology Diffusion: From Mainframes to Ubiquitous Computing, (p. 3-41), Medford, New Jersey: Information Today, Inc.

David Edwards and Keith Horton (2015), "Ideology and Utopia – A technology action frames perspective on IT Adoption", 23rd European Conference on Information Systems (ECIS), Münster, Germany


Loppu.

Kiitos. Thank you.

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