Path dependency and path developments
• Explains a current state of affairs from its history (Boschma & Frenken 2006)

• Explains how existing industrial structures preserve what already is

• Explains how industrial restructuring is slowed down

An entire region may lock into its past (Grapher 1993)

- Cognitive lock-in
- Structural lock-in
- Political lock-in

Explains how indigenous potential and creativity in regions may not be fully developed nor exploited
History matters

• Path dependency implies that history and the sequence of events matter for the future development of regions (Boschma and Frenken 2006).

• Continuities of the past include individuals’ skills and knowledge, organizational routines, network interdependencies between individuals and organizations, and institutions (Grillitsch and Rekers 2016).

• “[D]ifferent industries within a region may be subject to quite different sources/mechanisms of path dependence” (Martin and Sunley 2006).
“To be truly evolutionary, path-dependent systems also need mechanisms that generate novelty, and hence new pathways of development.”
(Martin and Sunley 2006)

“New industrial path development comes in many shapes “
(Martin and Sunley 2006; Grillitsch and Tripl 2016)

“The emergence of new paths can be understood as processes of distributed and embedded agency”
(Garud and Karnøe 2003, Dawley 2014, Sotarauta and Suvinen 2018; Grillitsch & Sotarauta, 2019)

“Actors mobilize the past not necessarily to repeat or avoid what happened, but, instead, to generate new options”
(Garud et al 2010)
Path creation
New technologies, new competencies

Path branching (diversification)
New functions of technology and competencies

Path extension
Enhancing existing technology and competencies

Path transplantation
Importing new technologies and competencies

Path exhaustion
Loss of technologies and competencies
Path exhaustion
Loss of technologies and competencies
The closure of the Australian car manufacturing industry (Beer 2018)
Was decline inevitable, and was it the product of a strong currency buoyed by a mining boom?

<table>
<thead>
<tr>
<th>What</th>
<th>Announced (Closure)</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Toyota</td>
<td>2014 (2017)</td>
<td>• 30 000 jobs in South Australia</td>
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<tr>
<td>General Motors Holden (GMH)</td>
<td>2013 (2017)</td>
<td>• 100 000 jobs in Victoria</td>
</tr>
<tr>
<td>Ford Australia</td>
<td>(2013)</td>
<td></td>
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<tr>
<td>Mitsubishi</td>
<td>(2008)</td>
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<tr>
<td>Nissan</td>
<td>(1992)</td>
<td></td>
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<tr>
<td>Chrysler</td>
<td>(1981)</td>
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<td>Leyland</td>
<td>(1971)</td>
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</table>
• All sectors are potentially vulnerable in a globalised economy

• Relative labour costs alone are not the sole determinant of an industry’s capacity to survive

Why

○ A peripheral position in global production networks - limited knowledge base and innovation capacity

○ The small scale of local production - no cluster effect

○ High cost structures relative to competitor plants

○ No supportive industrial ecology around the major producers - limited knowledge base and innovation capacity

○ A strong currency

○ The shifting priorities of parent corporations

(Beer 2018)
Detroit

• Population
  o In 1900 - 286,000
  o In 1930 – 1,600,000
  o In 2010 – 714,000
    ▪ 40 % decline from 1970 to 2010

• Crime rate among the highest in the US

• African-American population share 83 %

• The birth place of the large-scale automobile industry
  o In 1925, the combined market share of Detroit area firms was 85 %
  o Ford, General Motors, Chrysler
  o The HQ of Cadillac moved to New York for image reasons few years ago

(Yates 1983; Klepper 2010; Maynard 2004)
The industrial crisis in Tampere
The largest industrial companies in Tampere began to fall dramatically after energy crisis

(Source: Olli Niemi)
The fall was fastest in Textile and Leather Industry

(Source: Olli Niemi)
Metal Industry crisis in the early 1990’s

Source: Olli Niemi / TToy
Difficulties in the 2000’s (indexed in 2015)

Combined turnover of all firms

Combined turnover of firms – technology industry
Path creation
Case Silicon Valley
www.sotarauta.info

Twitter: @Sotarauta

Markku Sotarauta

Silicon Valley

18
The Silicon Valley system

- Entrepreneurial experimentation
- Venture capital finance
- Firm specialization and focus
- Open labor markets & information exchange
- Governance via cross-cutting institutions

- Regional economy may adapt when individual firms and even industries don’t survive!
The “Secret” of Silicon Valley

- Tolerance of failure
- Hyperactive and risk seeking culture
- Willingness to give back
- Meritocracy
- Obsession to find disruptive innovations
- Tolerance to treachery
Path creation
Case human spare parts industry and Tampere
Stem cells

• A class of **undifferentiated cells** that are able to **differentiate** into specialized cell types

• Commonly, stem cells come from two main sources:
  - Embryos formed during the blastocyst phase of embryological development (embryonic stem cells)
  - Adult tissue (adult stem cells)
Regenerative Medicine (RM)

- The third discipline in human healthcare alongside medicine and surgery (Polak et al., 2010)

- The term ‘human spare parts industry’ is a metaphor that describes the potential embedded in regenerative medicine
  - Embryonic industry
  - No direct antecedent in the economy

The Catholic Church is against embryonic stem-cell research because it involves the destruction of human embryos. Pope John Paul II said embryonic stem-cell research is related to abortion, euthanasia and other attacks on innocent life.
(Source: Catholic News Service)
Regenerative medicine companies

How jaw bone was grown from fatty tissue

**IN THE OPERATING THEATRE**

1. A generous decilitre of fat is removed from under the patient’s skin (containing around 100,000 fatty tissue

2. The fat is broken into single cells and stem cells are separated by centrifuge.

3. Stem cells are grown and increased in number in the laboratory for some two weeks.

**IN THE LABORATORY**

4. The cells are attached to a granule-like biomaterial which directs them to differentiate into bone cells.

5. The lumpy porridge-like material is placed into a mould made of titanium mesh and shaped according to the patient’s upper jaw bone.

6. The mesh mould is fitted inside the patient’s stomach muscle. In some six months, the contents ossify and are filled with blood vessels.

7. The finished bone and the surrounding muscle are removed together with their blood vessels. The bone is fitted in place and the blood vessels are microsurgically connected to the vessels in the neck. Finally, artificial roots are made for the teeth.
Innovation ecosystem, ideal type
(kind of Silicon Valley type)

Savvy management teams with broad and deep competencies called for
Innovation ecosystem
(current situation)

- Development agencies
- Science
- SparkFinland
- VC
- Major intl. players
- Hospitals
Path branching
Case Rochester
A quick case of Rochester
(source: Sean Safford)
Rochester, New York: The Silicon Valley of its Day
(source: Sean Safford)

Kodak, Xerox and Bausch & Lomb

- By the 1980s, companies had moved manufacturing to lower cost regions
- Broadened research and development beyond local area
- Moved away from optics and optical electronics and into new technologies

Copiers, cameras, etc → Optoelectronics

the study and application of electronic devices that source, detect and control light
Rochester, New York
The Silicon Valley of its Day
(source: Sean Safford)

What was there to build on:
- Strong community of scientists and researchers
- Significant wealth and access to funding
- Well established manufacturing infrastructure
- Commitment of policy makers
- Strong universities

What proved crucial
- Absorptive capacity
- Unlocking capabilities
- Generating the broader social and institutional context for something new to emerge
Path extension
Was covered when discussing clusters