Industry 4.0: Digitization in Danish Industry

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An Interactive Qualifying Project - Denmark May 2018

WPI

CBS CSE Entrepreneurship in society

Denmark & Industry 4.0

A Background section

Denmark's industrial sector lags behind those of its European counterparts

99% of businesses are SMEs

Shortage of skilled labor and engineers

75% of GDP generated by Service Sector

Increase in industrial outsourcing

Aspects of Danish culture can help solve some industrial problems

Government Initiatives

Strong Technological Background

Collaborative Social Culture

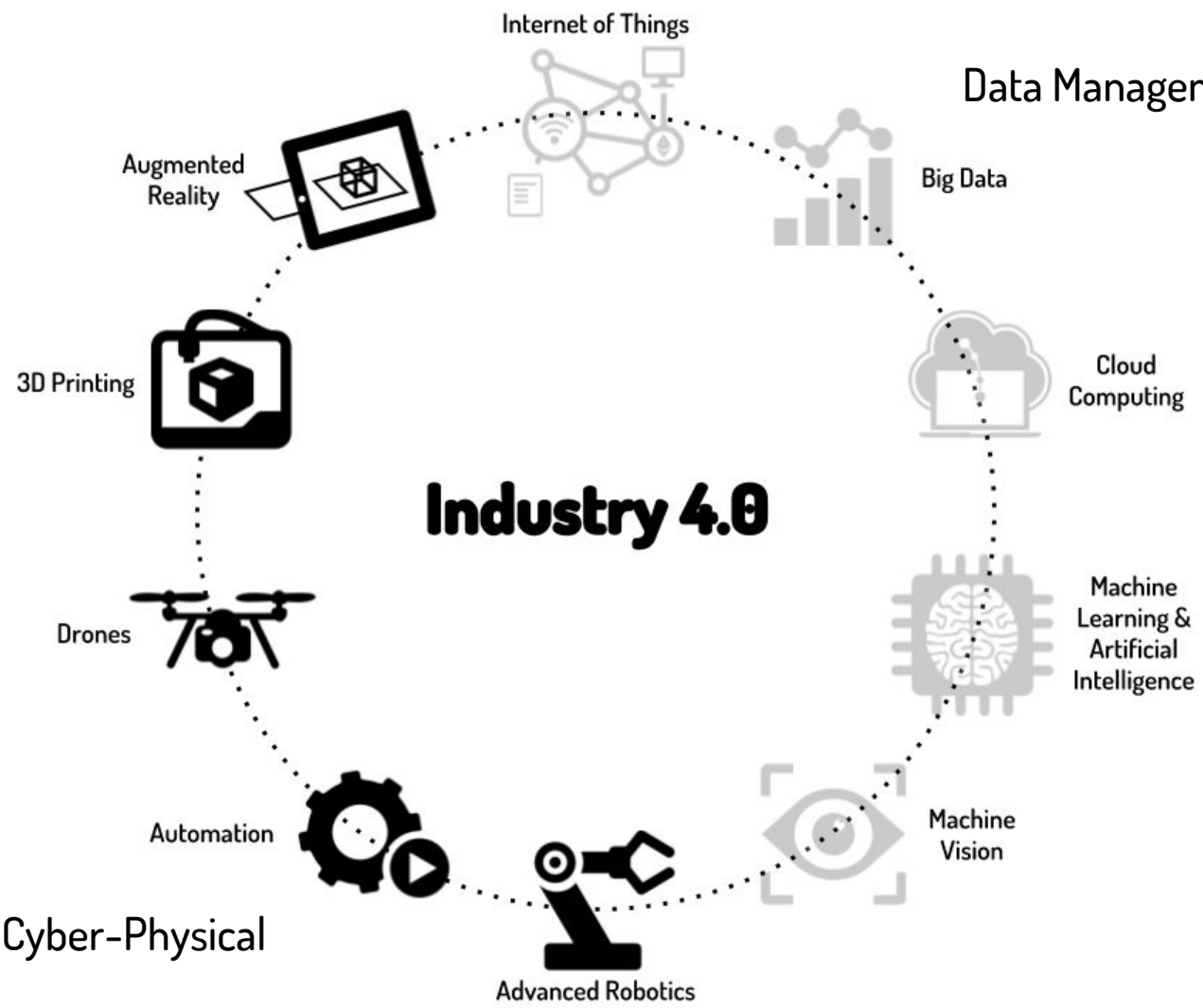
Accelerator Programs for SMEs

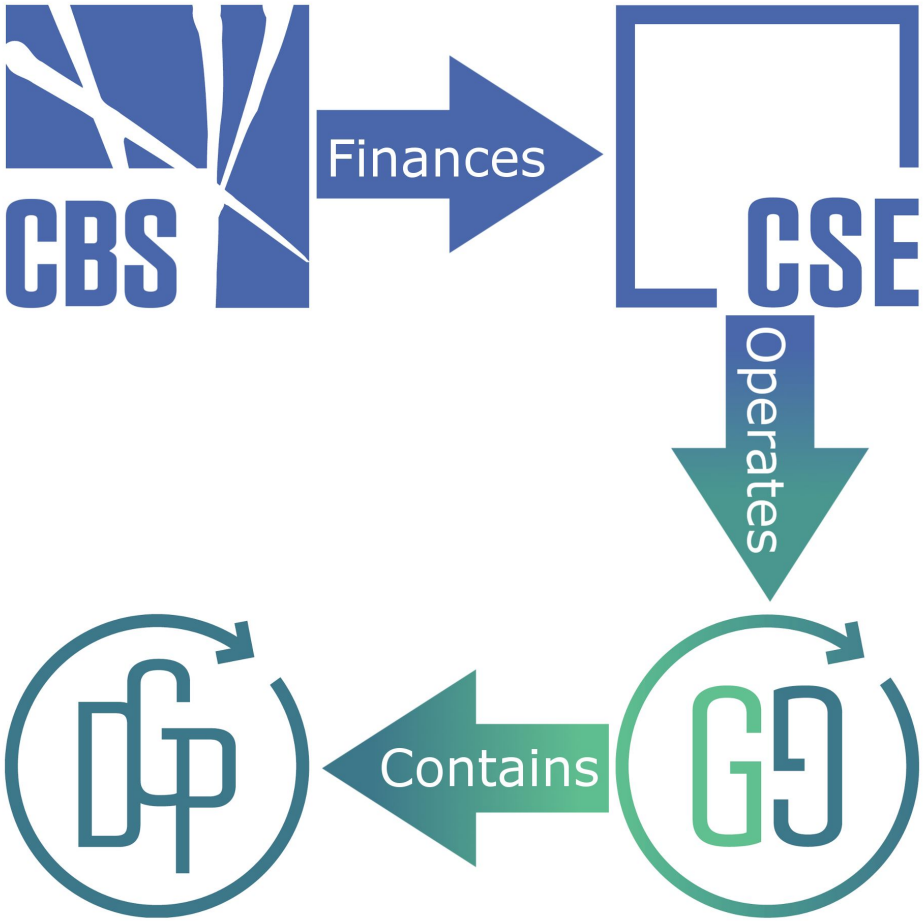
Our Project

1. Identify company attributes indicative of a successful implementation of Industry 4.0 Technologies

2. Recommend companies for participation in the Copenhagen School of Entrepreneurship's Digital Growth Path

Industry 4.0 = Augmented Operations + Increased Productivity


Internet of Things
Data Management
Augmented Reality
Big Data
3D Printing
Cloud Computing
Industry 4.0
Drones
Machine Learning & Artificial Intelligence
Automation
Machine Vision
Cyber-Physical
Advanced Robotics


CBS
Finances
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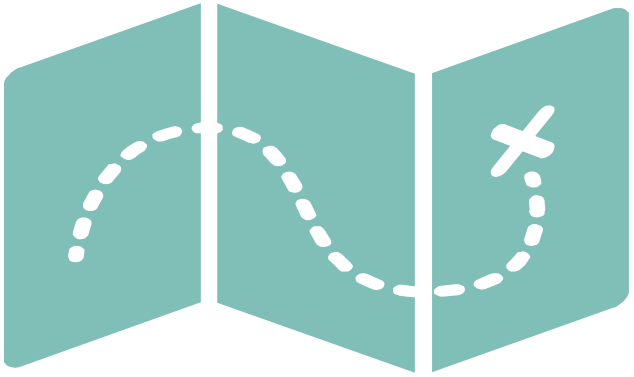


How We Did It

A Methodology section

Objectives

Identify SMEs Involved with I4O Technologies

Determine the Applications and Effectiveness of Digitization

Evaluate Characteristics of Companies Using I4O

Determine Method of Assessing I4O Readiness in Companies

Identify SMEs Involved with I40 Technologies

- Mapped companies developing I40 tech
- Mapped companies utilizing I40 tech
- Established connections with companies

Determine the Applications and Effectiveness of Digitization

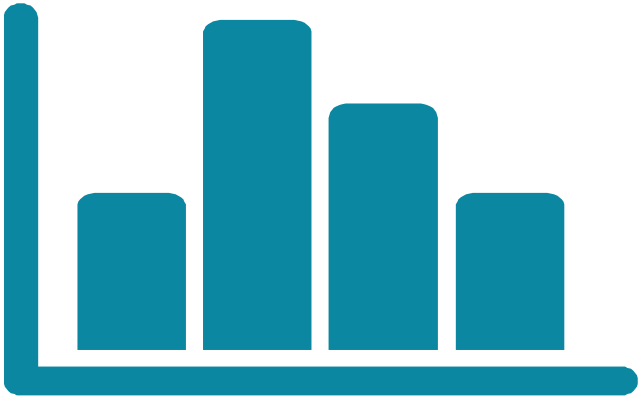
- Acquired product attributes and statements from company representatives
- Performed supplementary research

Evaluate Characteristics of Companies Using I40

- Identified benefits and drawbacks of utilizing I40 tech
- Determined the attributes needed for digitization

Determine Method of Assessing I40 Readiness in Companies

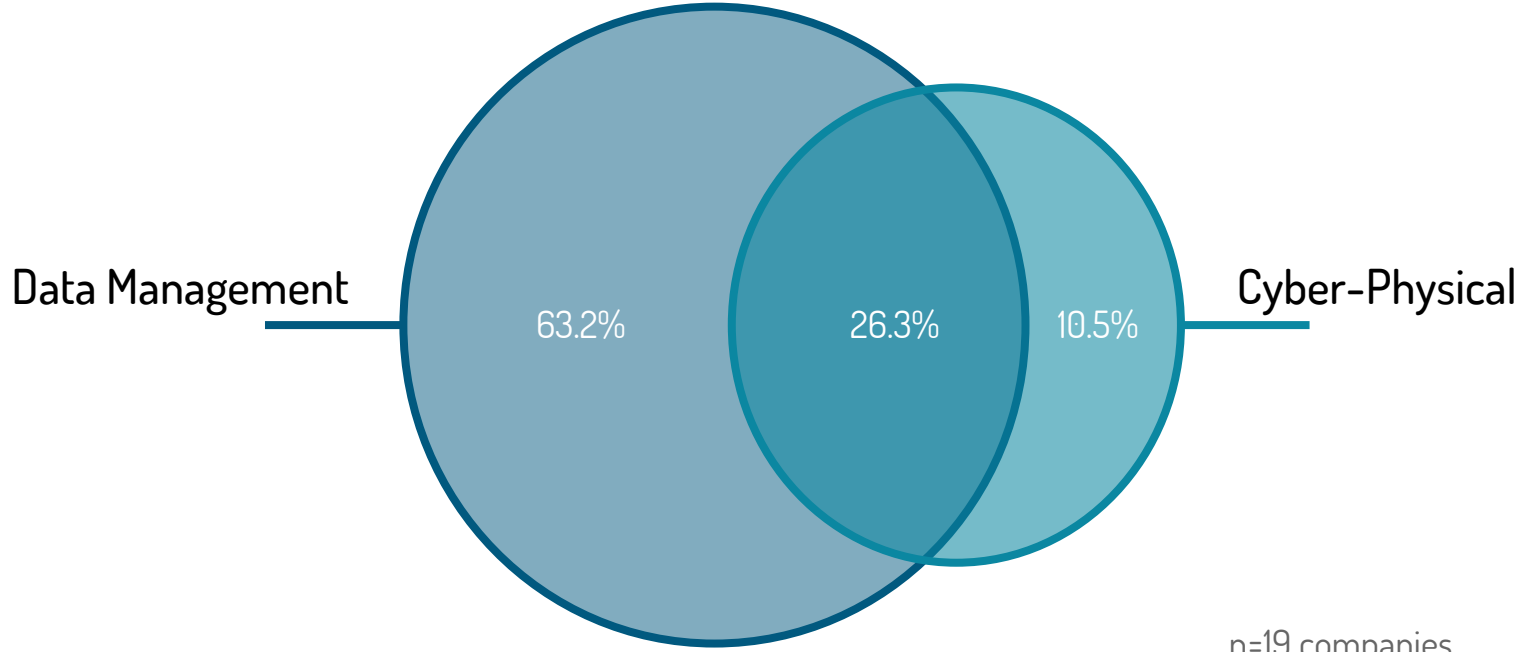
- Creation of an Industry 4.0 Readiness Assessment Tool



What We Found

A Findings & Analysis section

Distribution of Industry 4.0 Technologies in Interviewed Companies



n=19 companies

Industry 4.0 technologies positively affect company performance

Finding 1: Coordinated data management techs improve business operations

Finding 2: Data management techs are easy to implement

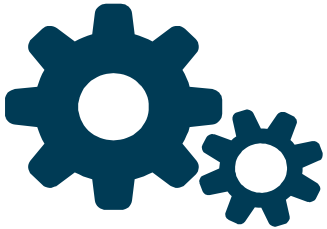
Finding 3: Cyber-physical systems expedite traditionally human performed processes

“No human could do what those robots do today

-David Coen, Haarslev Industries

Cultural and societal externalities directly affect the implementation of Industry 4.0

Finding 4: Using I40 tech results in a shift to technical skills, but not a decrease in employment



Finding 5: Time and resource constraints prevent companies from investing in digitization

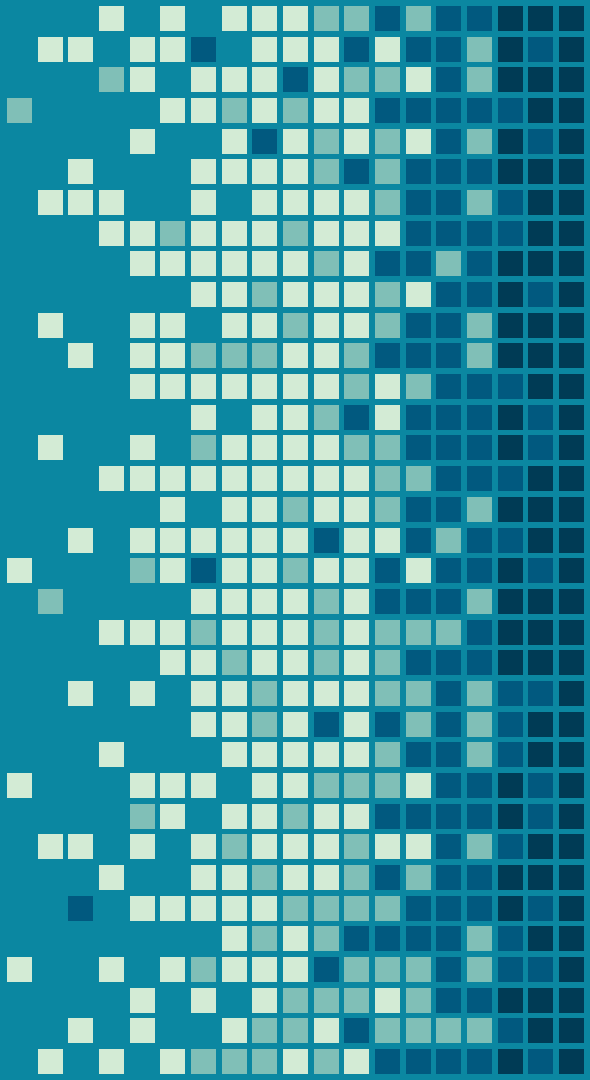
Cultural and societal externalities directly affect the implementation of Industry 4.0

Finding 6: Measures can be taken to decrease fears of cyber attacks from digitization

Finding 7: People are skeptical of I40 due to its new and experimental nature

“Industry 4.0 is a leap of faith

-Ole Feddersen, Novo Nordisk CVP



What We Recommend

A Recommendation section

For the Digital Growth Path

- We recommend that CSE continue to treat participant and client companies on a case-by-case basis

Industry 4.0 Implementation Stages

For the Digital Growth Path

- We recommend that companies exhibit five key attributes before attempting implementation of I40 technologies

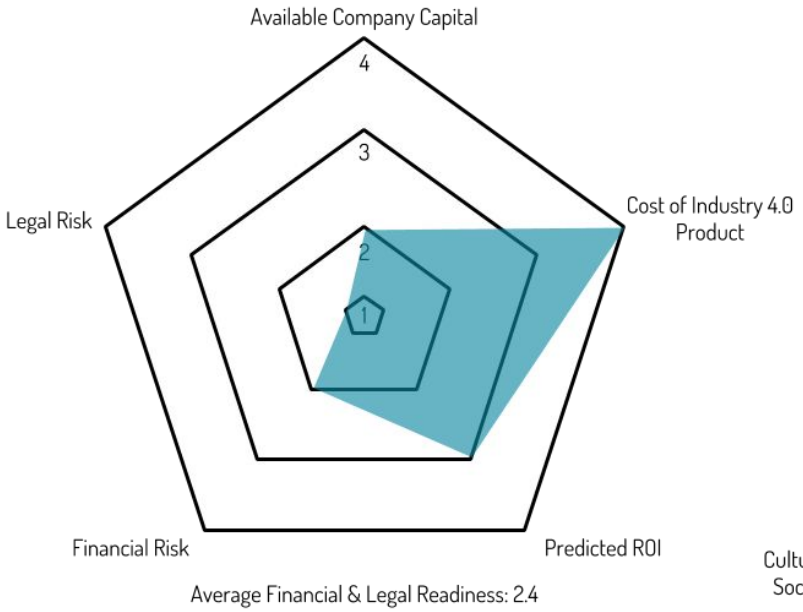
1. Adequate financial capacities
2. Adequate technological infrastructure and background
3. Strong connection between management and operator
4. Solid understanding of the benefits of digitization
5. Desire to innovate

Company 140 Readiness Tool

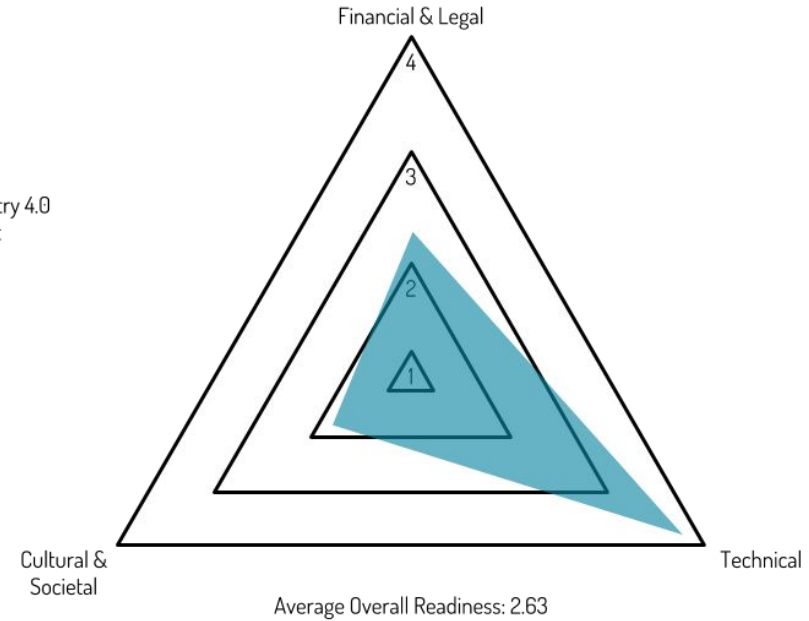
- Financial and Legal
- Technical
- Cultural and Societal

Financial and Legal Readiness				
Parameters	Score			
Available Company Capital	1 < DKK 2,000	2 DKK 2,000-20,000	3 DKK 20,000-100,000	4 > DKK 100,000
Cost of Industry 4.0 product	1 > DKK 100,000	2 DKK 20,000-100,000	3 DKK 2,000-20,000	4 < DKK 2,000
Predicted Return on Investment	1 > 5 years	2 2-5 years	3 1-2 years	4 < 1 year
Financial Risk	1 None identified	2 Some identified	3 Some identified, limited precautions	4 Many identified, precautions active
Legal Risk	1 No protection, no regulation	2 Some protection, limited regulation	3 Robust protection, outdated regulation	4 Robust protection, high regulation

Readiness Tool Example



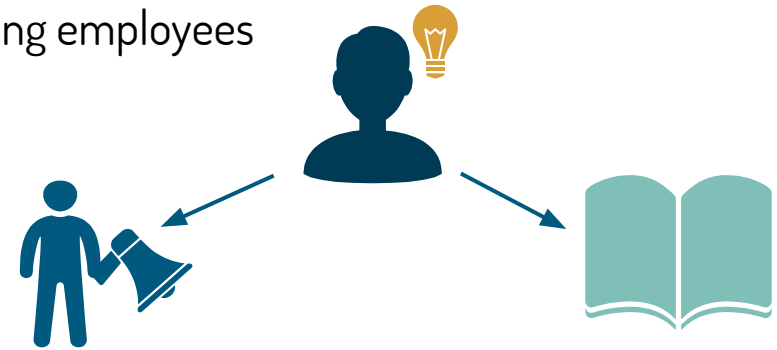
Average Financial & Legal Readiness: 2.4



Average Overall Readiness: 2.63

Recommendations for Encouraging Industry 4.0 Adoption in Denmark

- We recommend CSE focuses on improving inter-industry collaboration and communication
- We recommend CSE and other academic organizations increase emphasis on technical education for Danish students and manufacturing employees



Recommendations for Future Research

- Perform more interviews with representatives from company demographics that were not covered
- Determine possible methods of increasing awareness of Industry 4.0 benefits

Acknowledgments

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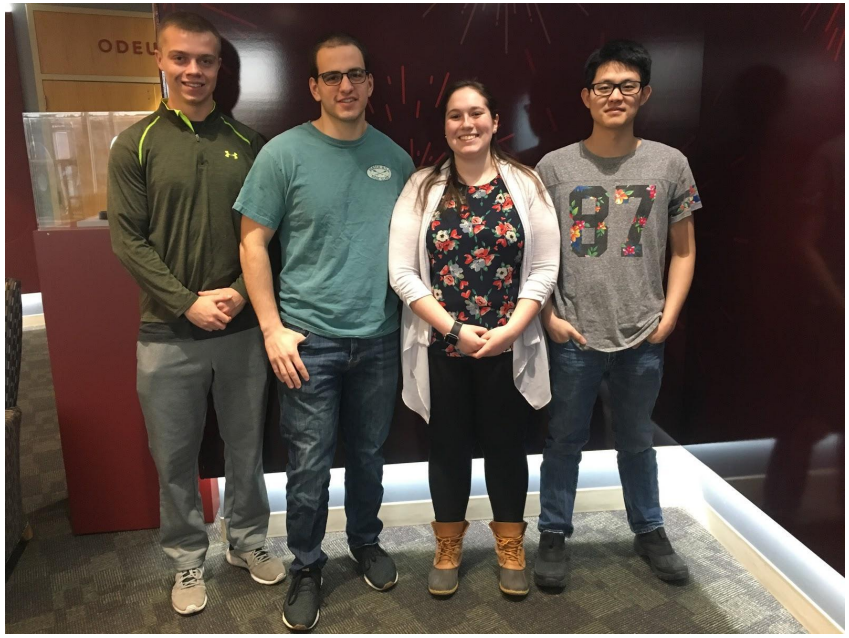
- All of our interviewees and their companies
- Xenia Obel, Ivan Butler
- SlidesCarnival & Unsplash



Questions?

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