



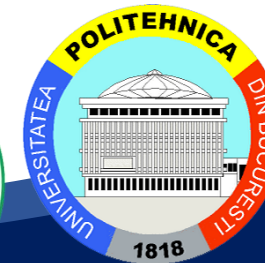
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Course #3: Smart Operations Management

Module 1: Advance science for industrial process

Session 1: Operation management strategy in industry 4.0 context



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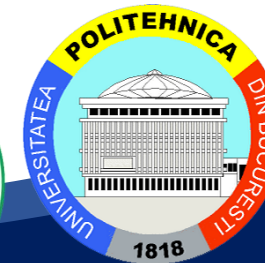
Industrial Engineering for Thailand Sustainable Smart Industry



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What is industry 4.0?



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Different names of industry 4.0



Smart Manufacturing



Factories of the Future (FoF)



Industry 4.0



Industrial Value Chain Initiatives (IVI)



Manufacturing Innovation 3.0



Made in China 2025: A New Era for Chinese Manufacturing

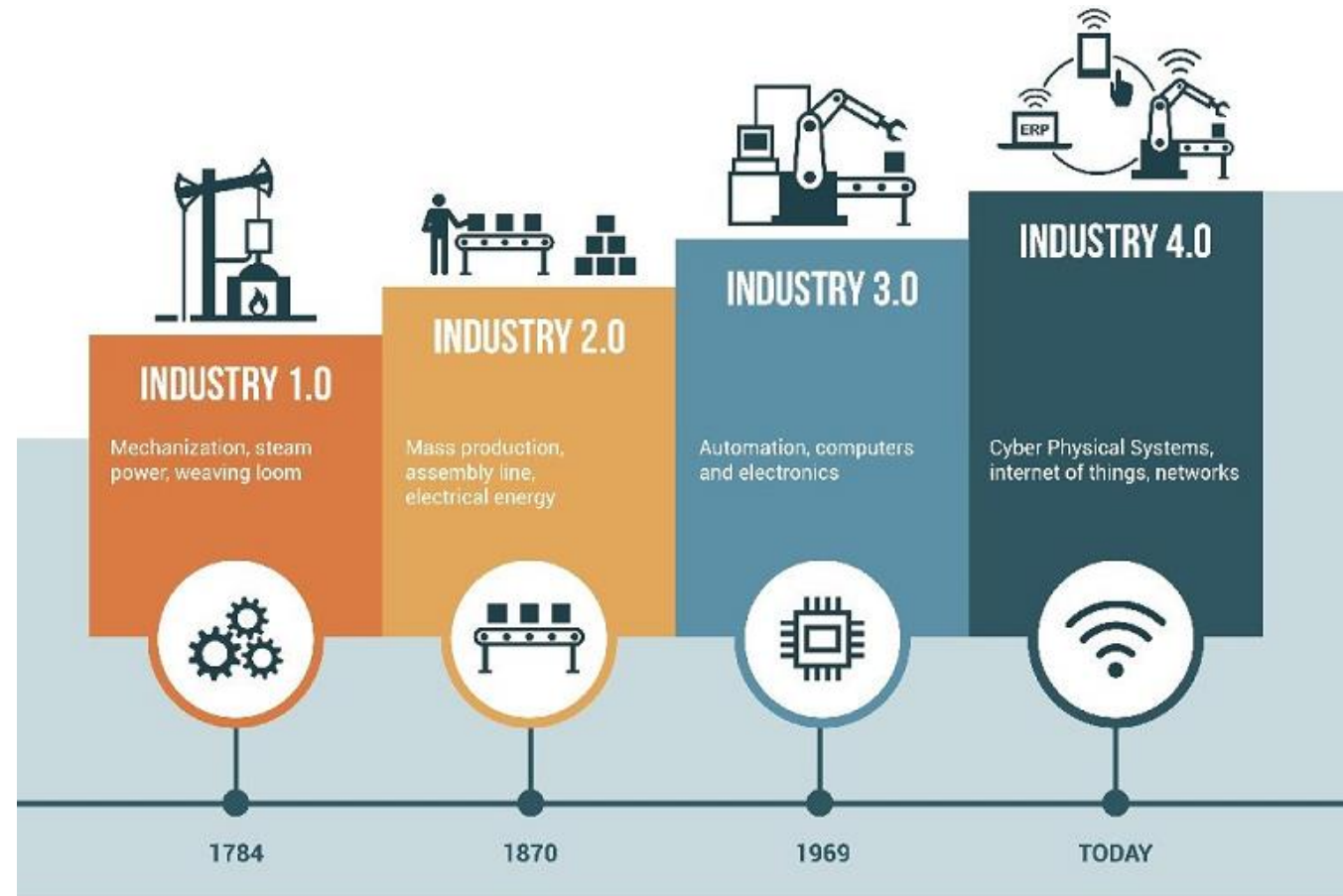


Productivities 4.0

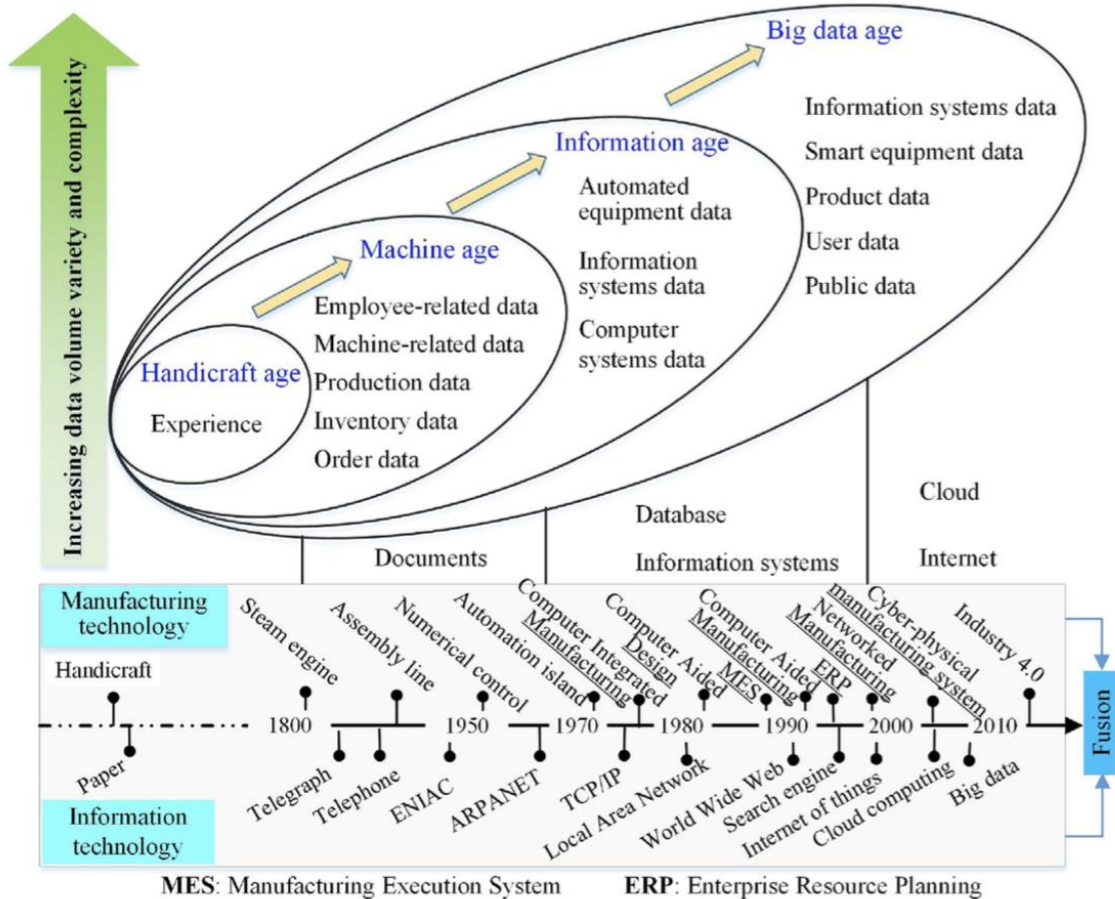
<https://www.nstda.or.th/th/nstda-knowledge/11529-industry-4-0>



What is industry 4.0 ?



Evolution of data in manufacturing



Discussion 1



Define current status of industry 4.0 from your organization

Source: Tao, F., Qi, Q., Liu, A., & Kusiak, A. (2018). Data-driven smart manufacturing. *Journal of Manufacturing Systems*, 48, 157-169.





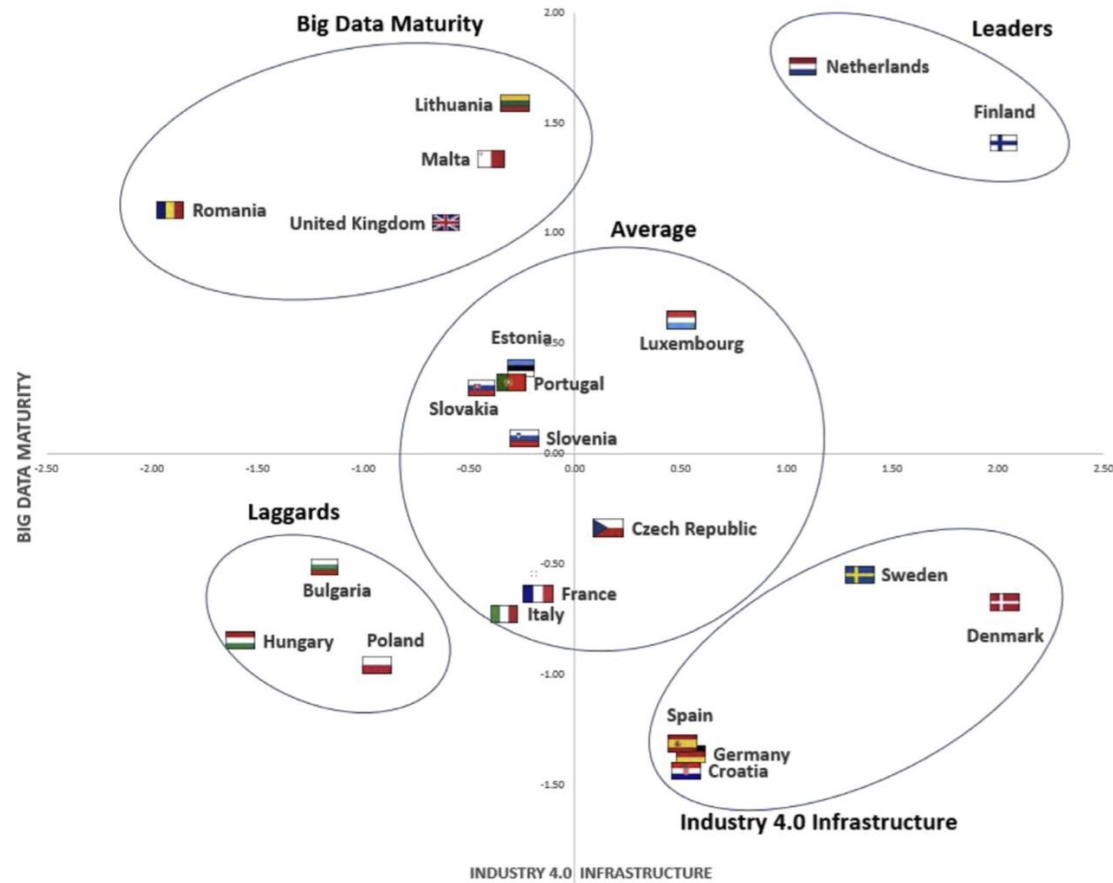
Comparison of manufacturing data in different manufacturing ages

	Data Source	Data Collection	Data Storage	Data Analysis	Data Transfer	Data Management
Handicraft Age	Human experience	Manual collection	Human memory	Arbitrary	Verbal communication	N/A
Machine Age	Human and machines	Manual collection	Written documents	Systematic	Written documents	Human operators
Information Age	Human, machines, information and computer systems	Semi-automated collection	Databases	Conventional algorithms	Data files	Information systems
Big Data Age	Machines, product, user, information systems, public data	Automated collection	Cloud services	Big data algorithms	Digital files	Cloud and AI

Source: Tao, F., Qi, Q., Liu, A., & Kusiak, A. (2018). Data-driven smart manufacturing. *Journal of Manufacturing Systems*, 48, 157-169.



Industry 4.0 clusters by country



Discussion 2



Where do you think Thailand fit in?

Source: Castelo-Branco, I., Cruz-Jesus, F., & Oliveira, T. (2019). Assessing Industry 4.0 readiness in manufacturing: Evidence for the European Union. *Computers in Industry*, 107, 22-32.

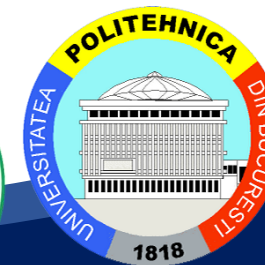




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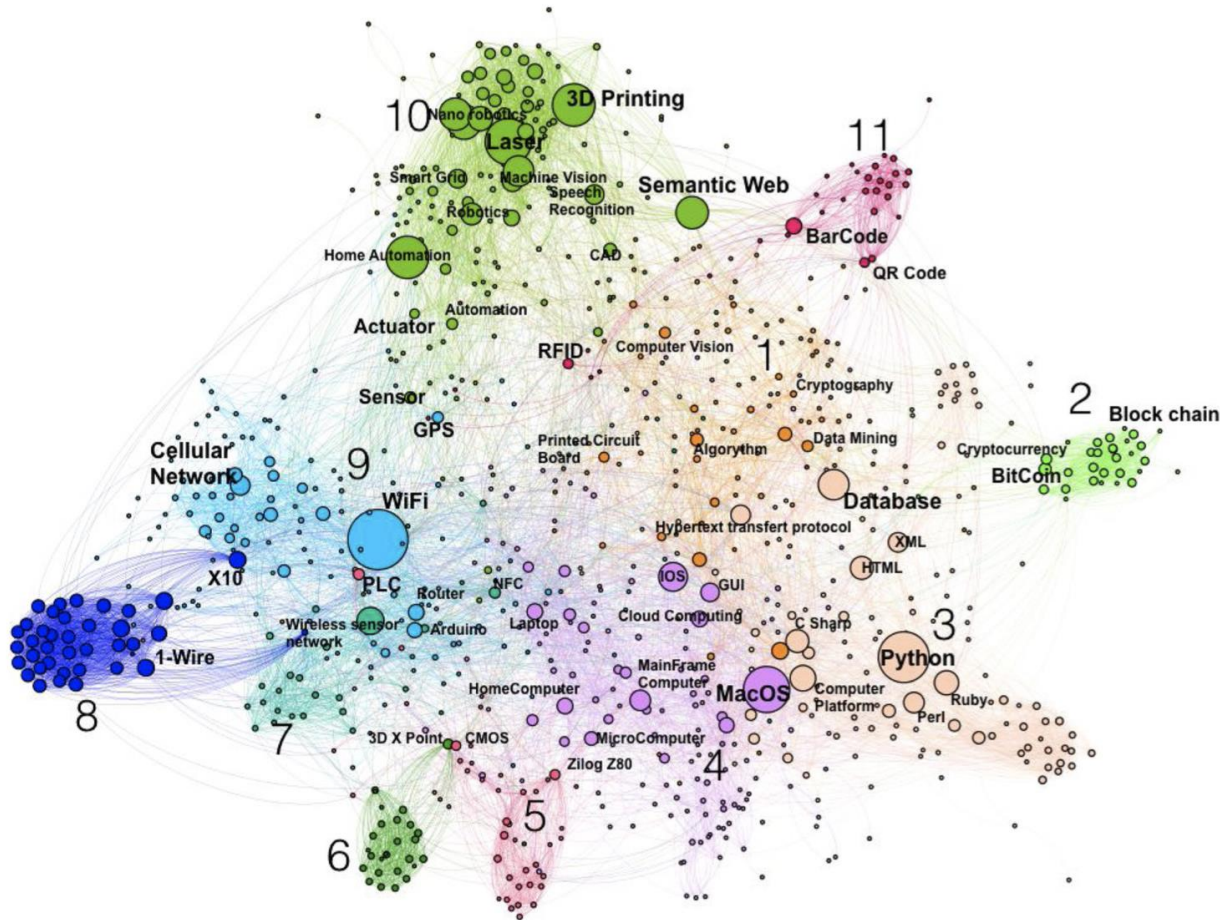


Industry 4.0 technologies



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Representation of the graph of 4.0 technologies



Discussion 3



What are the industry 4.0 technologies that you are already familiar with?

Source: Chiarello, F., Trivelli, L., Bonaccorsi, A., & Fantoni, G. (2018). Extracting and mapping industry 4.0 technologies using wikipedia. *Computers in Industry*, 100, 244-257.





9 pillars of industry 4.0



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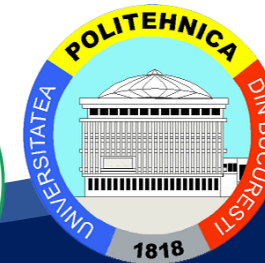




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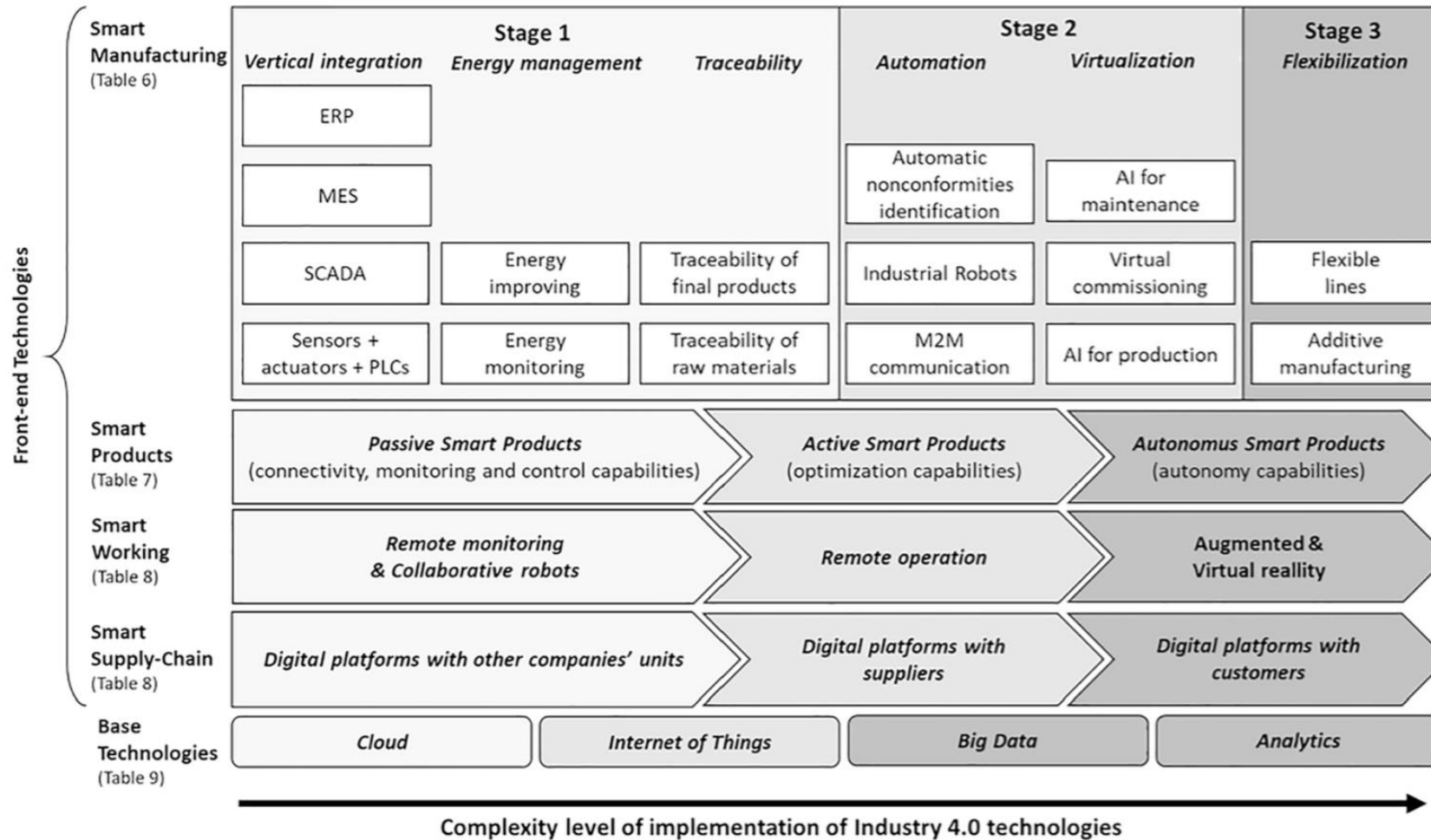


Industry 4.0 framework



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Framework of industry 4.0 adoption patterns



Frank, A. G., Dalenogare, L. S., & Ayala, N. F. (2019). Industry 4.0 technologies: Implementation patterns in manufacturing companies. *International Journal of Production Economics*, 210, 15-26.



A Porter-like Value chain framework for industry 4.0

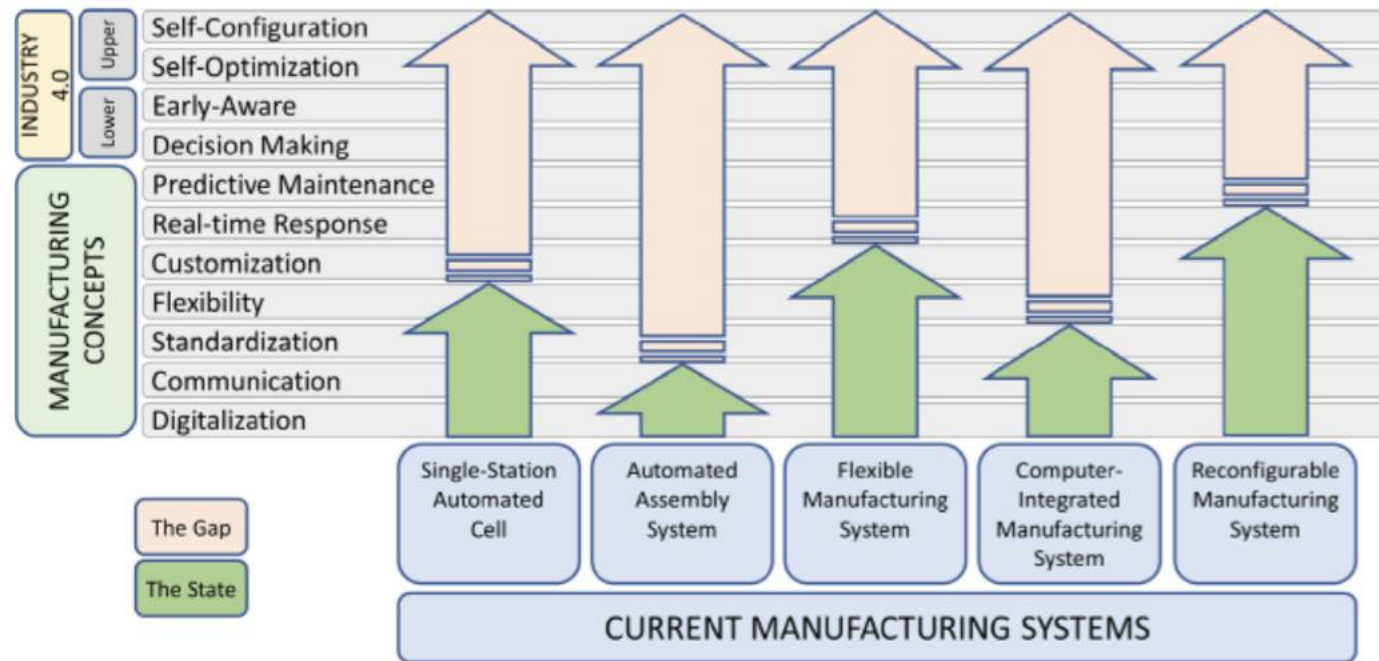


Source: Chiarello, F., Trivelli, L., Bonaccorsi, A., & Fantoni, G. (2018). Extracting and mapping industry 4.0 technologies using wikipedia. *Computers in Industry*, 100, 244-257.





Research gap between current manufacturing systems and I4.0



Source: Alcácer, V., & Cruz-Machado, V. (2019). Scanning the Industry 4.0: A Literature Review on Technologies for Manufacturing Systems. *Engineering Science and Technology, an International Journal*, 22(3), 899-919.





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Thank You

Together We Will Make Our Education Stronger



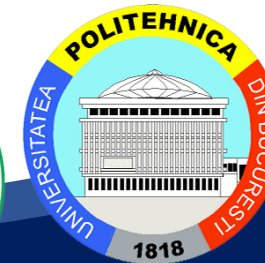
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