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Nine Million Bicycles in Beijing...

Simulating Bike-Sharing Networks and Distribution

Helena Klexin, Philip Becker und Frederik Schulte, UHH Institut für Wirtschaftsinformatik, Von-Melle-Park 5, 20146 Hamburg

BS-Systems have experienced a veritable boom in recent years. They have been implemented in more and more cities all around the globe. Existing systems have been enhanced and developed. An increasing number of people is willing to share bikes.

These circumstances pose new challenges for operators:

Which strategies have been applied internationally in order to avoid empty/disproportionally equipped stations?
Can clients be motivated by bonuses like extra free times to return bikes to empty stations instead of choosing the station nearest to their destination?
How can the repositioning of bikes be modelled in an environment-friendly and less costly way?
Which stations could be added to an existing system?
How should they be equipped?
How can bike-sharing be connected with public transport and car-sharing systems?

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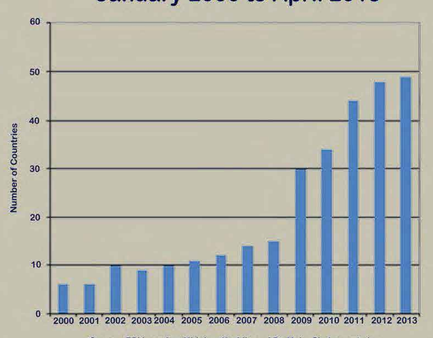
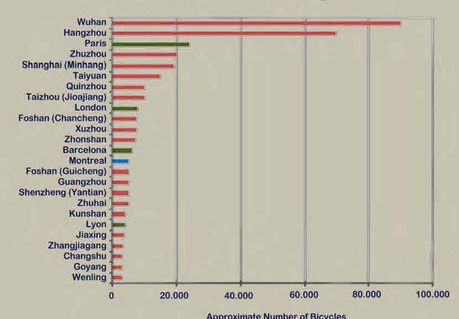
Countries with Bike-Sharing Programs, January 2000 to April 2013



Source: EPI based on Midgley; Meddin and De Maio; Shaheen et al.; Earth Policy Institute: www.earth-policy.org

Largest Bike-Sharing Programs Worldwide, Early 2013

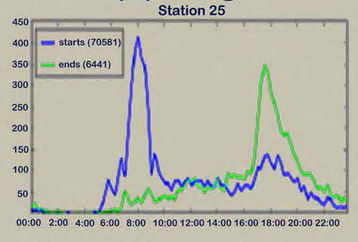


Source: EPI from Midgley; Meddin and De Maio; Yang, Pan, and Lu; Earth Policy Institute: www.earth-policy.org

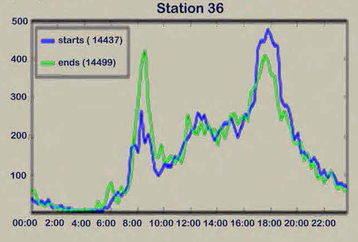
...these Problems are addressed in a

Bike-Sharing Simulation Study in Boston

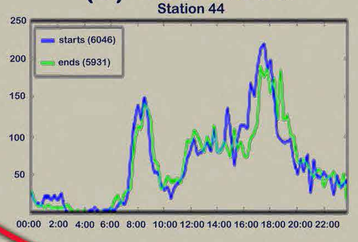
Types of stations
(a) Origin

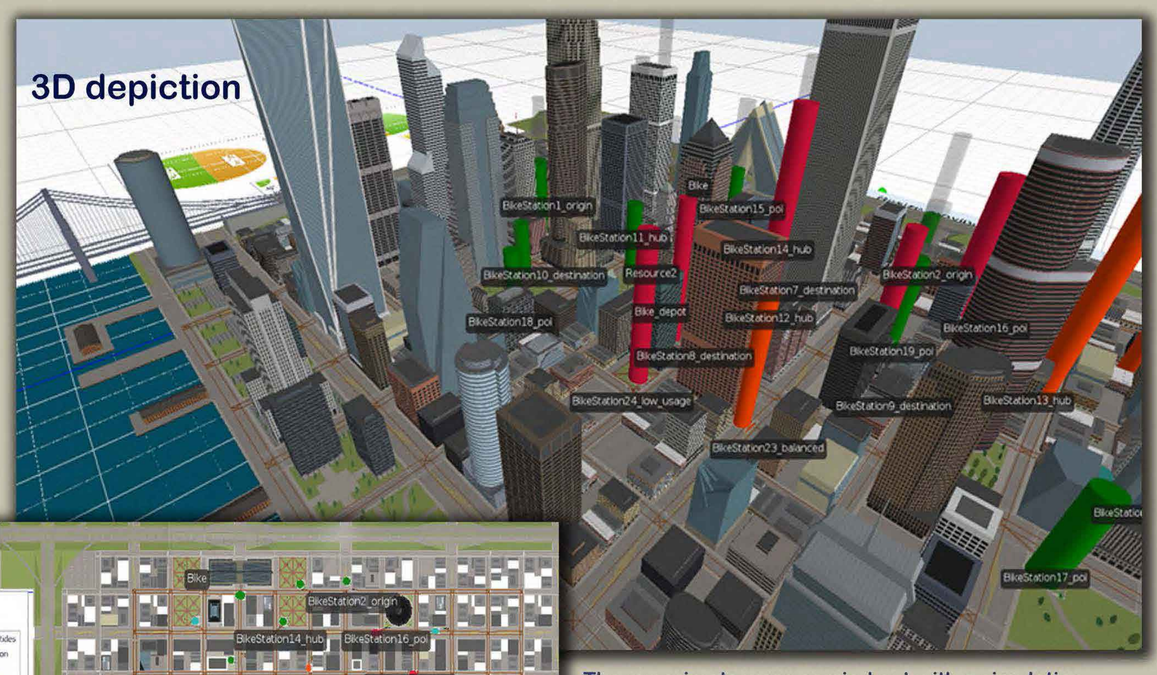


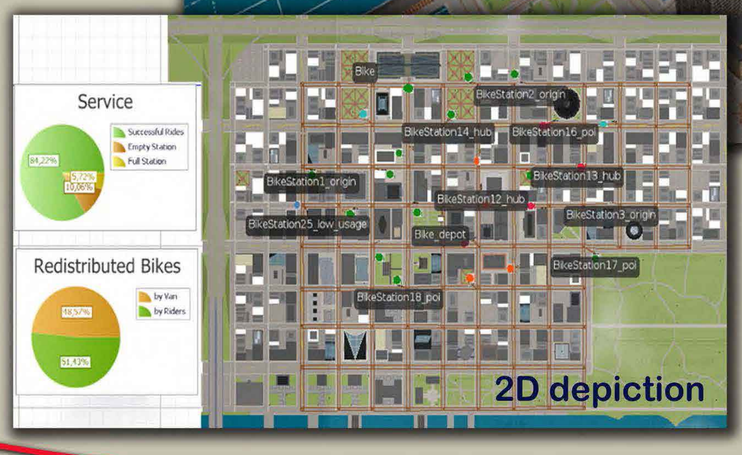
(c) Transportation Hub



(e) Balanced

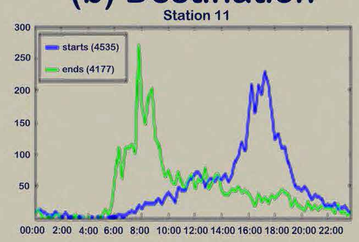




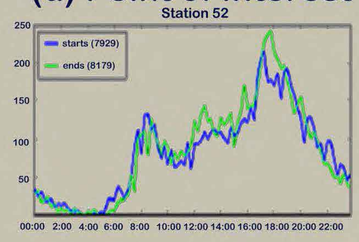


The experimets were carried out with a simulation software called SIMIO on a Windows 7 (64-Bit) desktop PC including an Intel Core i5-2500k @ 3,4 GHz four-core processor with 8 GB DDR 3 RAM. Nonetheless, it became obvious that SIMIO increasingly used up RAM while calculating the experiments.Therefore it is recommended to calculate larger experiments intermittently.In this simulation two calculation phases per experiment stood the test, i.e. 25 runs per 30 scenarios were calculated which sums up to 750 runs multiplied by two phases, i.e. 1500 runs per experiment.

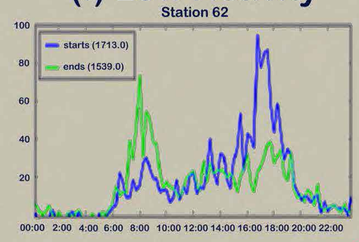
Types of stations
(b) Destination



(d) Point of Interest



(f) Low Activity



Poster created by Julia Bachale