

Automatic Speech Recognition for ATCo Support

An application of **Artificial Intelligence** and its steps from
the Idea to **Exploratory Research** to **Industrial Research**

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Knowledge for Tomorrow



What is Artificial Intelligence?

*“Artificial Intelligence is the development of computer systems that are able to perform tasks that would require **human intelligence**”* Schetinin et al. (2018)

In 1940s / 1950s a system **multiplying numbers** faster than a human was intelligent.
During the 1980s / 1990s: it was **chess playing**.

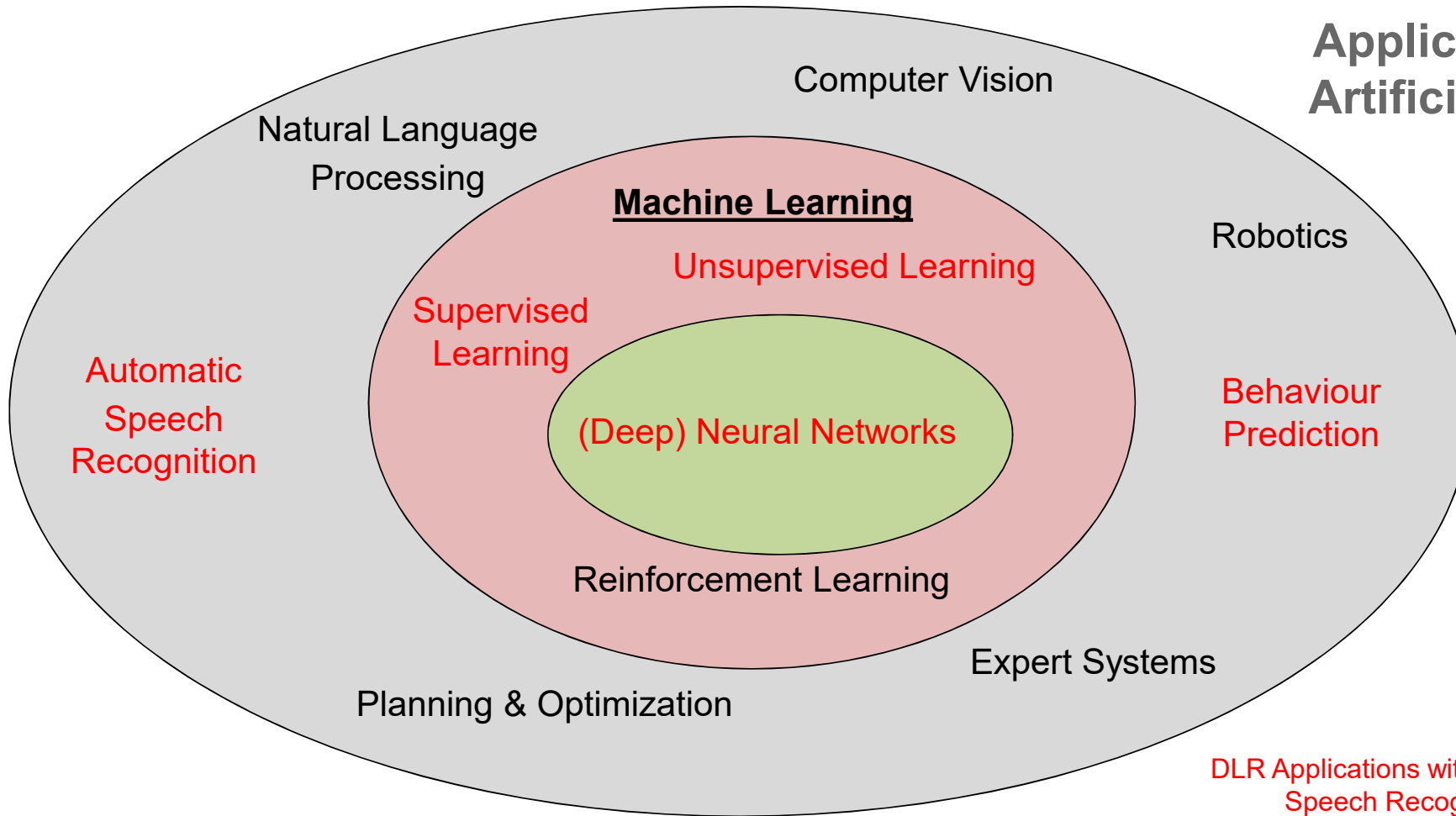
Now, we think autonomous cars or zero-person-cockpits are intelligent systems.



Turing-Test

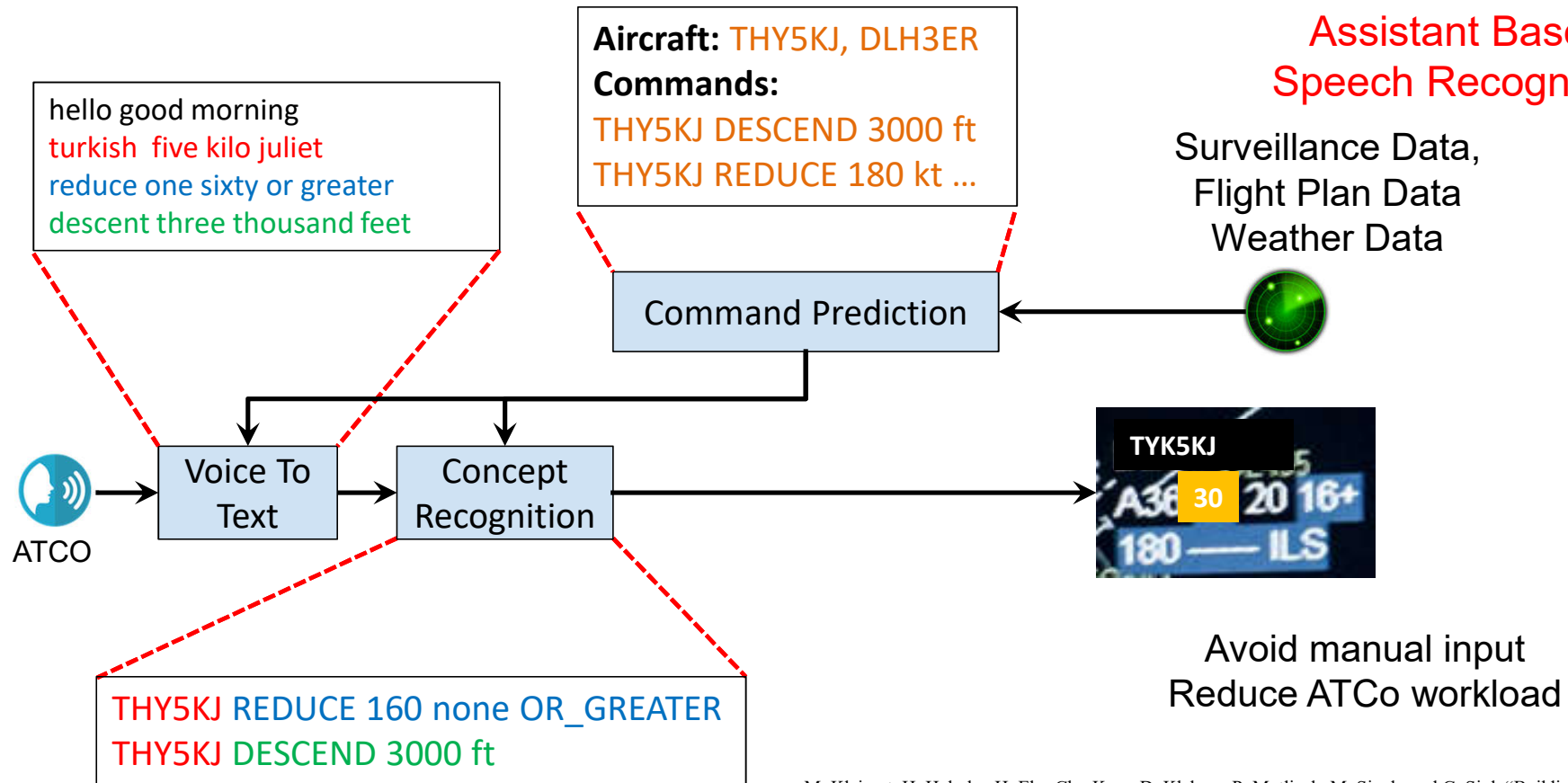


Application Areas of Artificial Intelligence



Automatic Speech Recognition & Understanding for Air Traffic Management Applications

Assistant Based Speech Recognition

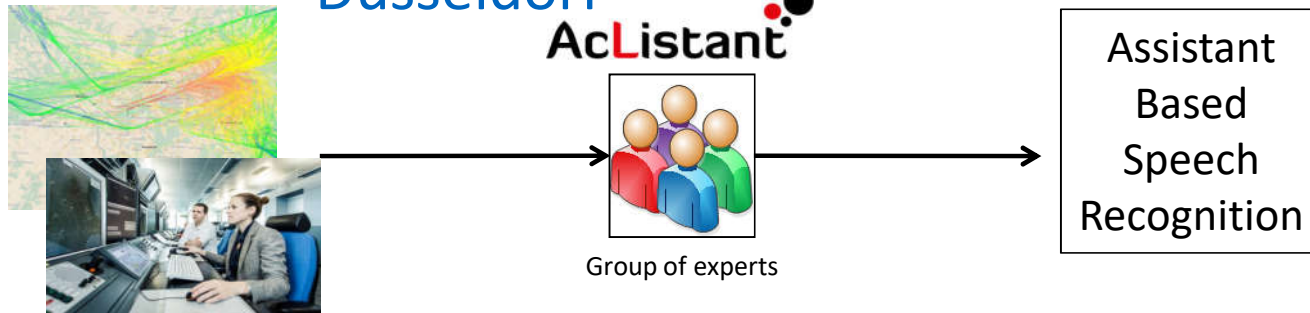


M. Kleinert, H. Helmke, H. Ehr, Chr. Kern, D. Klakow, P. Motlicek, M. Singh, and G. Siol, "Building Blocks of Assistant Based Speech Recognition for Air Traffic Management Applications," 8th SESAR Innovation Days, Salzburg, Austria, 2018.



Machine Learning of Speech Recognition Models for Controller Assistance

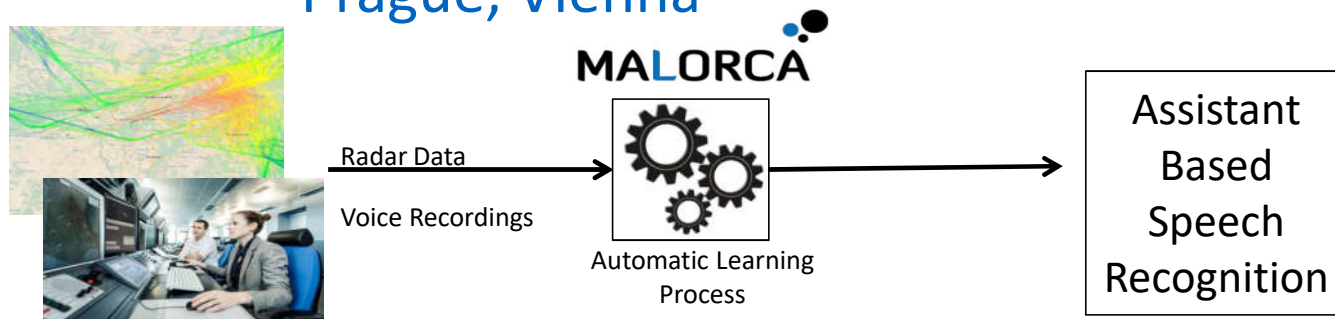
Dusseldorf



Arthur Samuel (1959):

Machine learning is the field of study that gives computers the ability **to learn without** being **explicitly programmed**

Prague, Vienna

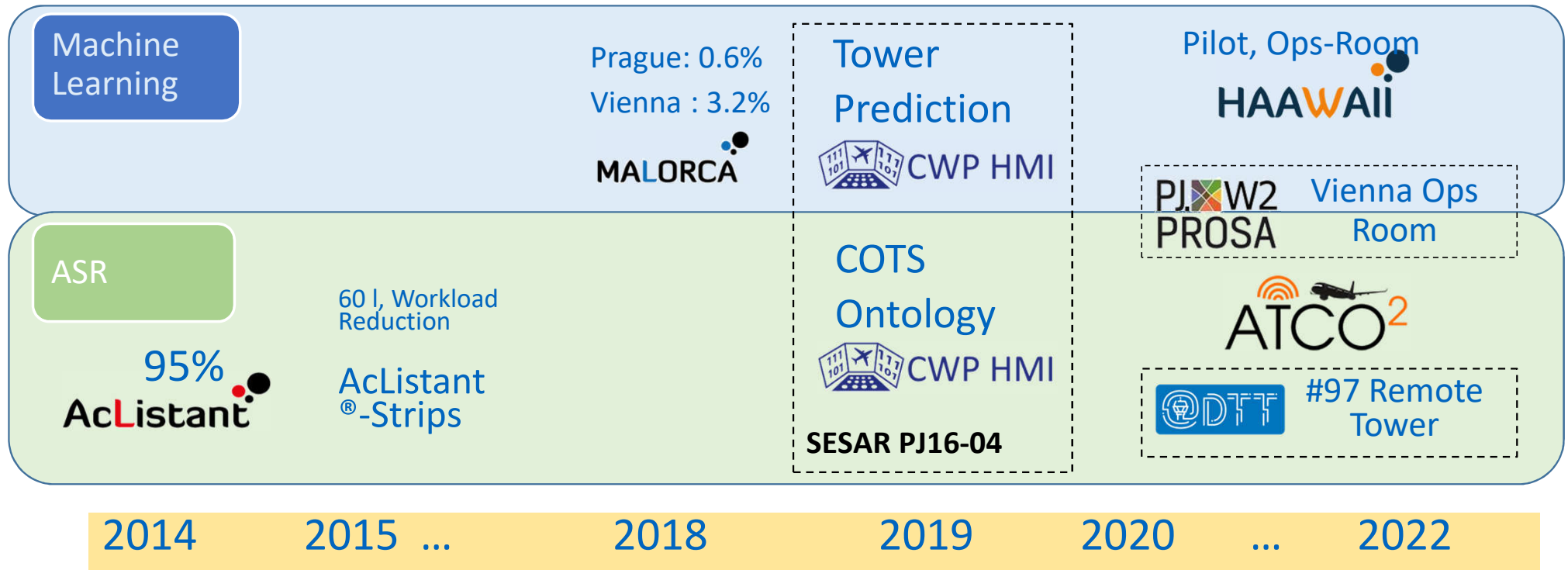


Instead of (highly skilled and paid) **experts**, **machine learning** is used.

H. Helmke, O. Ohneiser, J. Buxbaum, and C. Kern, "Increasing ATM efficiency with assistant-based speech recognition," 12th USA/Europe Air Traffic Management Research and Development Seminar (ATM2017), Seattle, Washington, USA, 2017.



Speech Recognition and Machine Learning Roadmap



From Exploratory Research to Industrial Research to the Future in the Ops Room

J. Rataj, H. Helmke, O. Ohneiser: "AcListant® with Continuous Learning: Speech Recognition in Air Traffic Control"
 in Lect. Notes Electrical Eng., Vol. 731, (Ed): AIR TRAFFIC MANAGEMENT AND SYSTEMS IV, 978-981-33-4668-0, 488801_1_En (6)



Google versus MALORCA

Google (US company) uses
300,000 hours of
training data

*

22 hours of voice
recordings from Prague

Thank you very much for your attention



Knowledge for Tomorrow

