Alibi Generation

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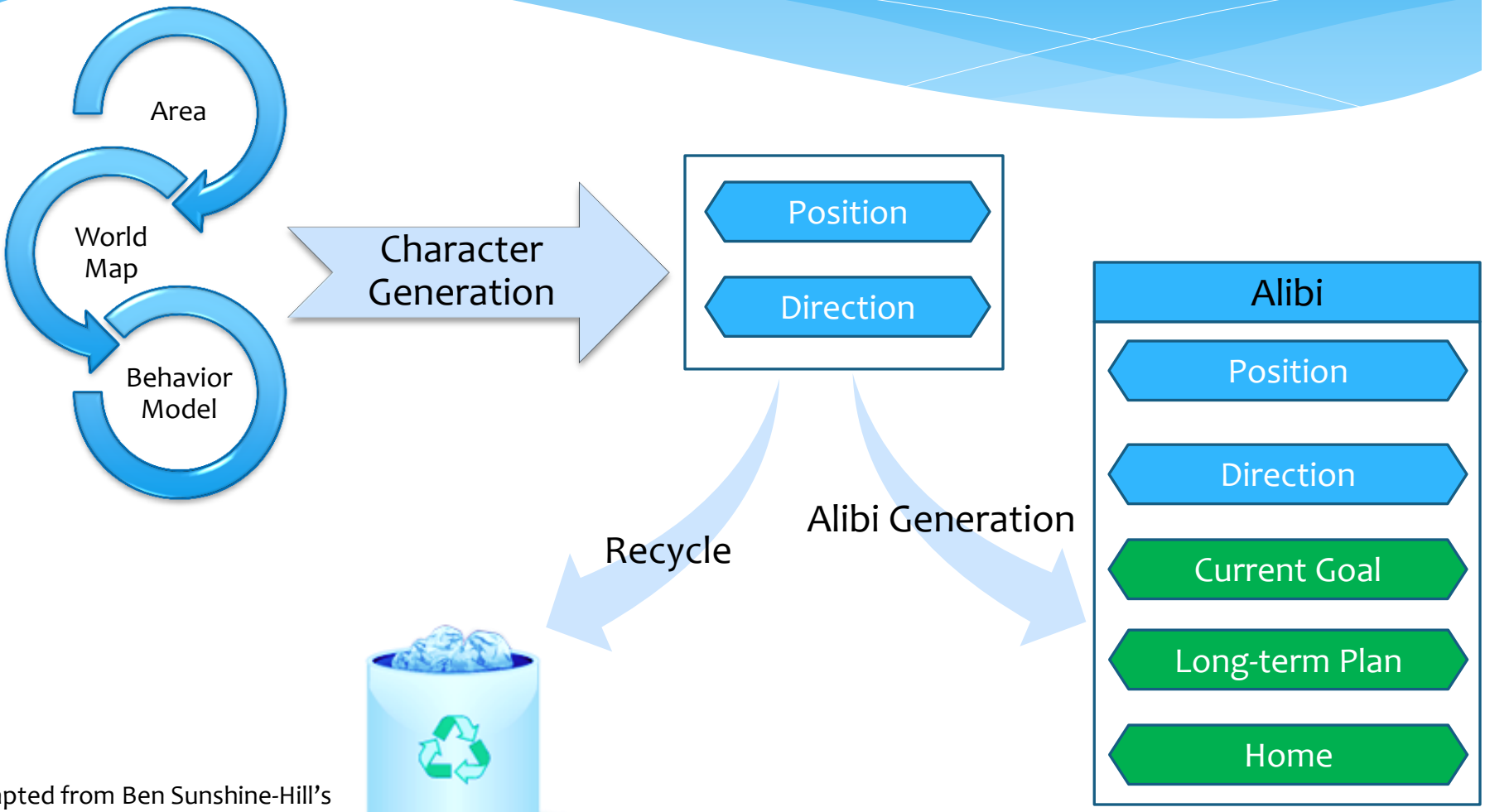
Background

From Ben Sunshine-Hill's
AI Summit 2010 Presentation

Goals of Method

* Realistic AI characters
* Fast calculations
* Limited saved data

How it Works



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How Do We Determine an Alibi?

* Offline:
  * Run a full simulation of all AI characters for some period of time
  * Save the probabilities that describe the relationships between different goals/goal types
* Runtime:
  * Generate initial agents
  * Pick first goal at random
  * Use saved probabilities to influence random behaviors

Additional Details

* Save probability table for transitioning from one location type to another
* Apply that table when a decision is needed
* Keep prior state information when doing a round-trip
* Use bounded goals for home, work, etc. as needed
  * My home vs. a home
* Use a specific goal as appropriate
  * A restaurant vs. a good restaurant
* Stay for a random amount of time based on saved probabilities

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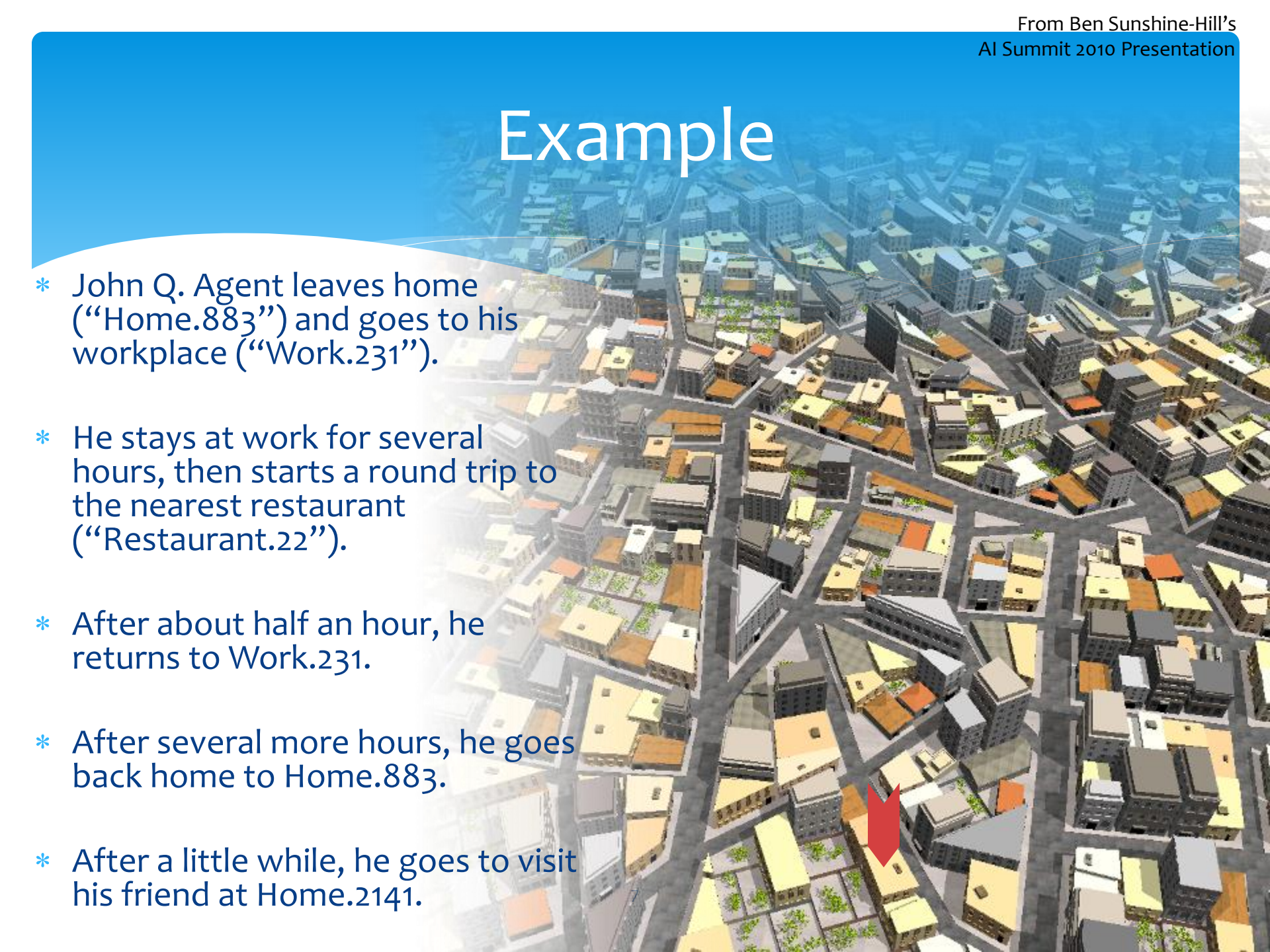
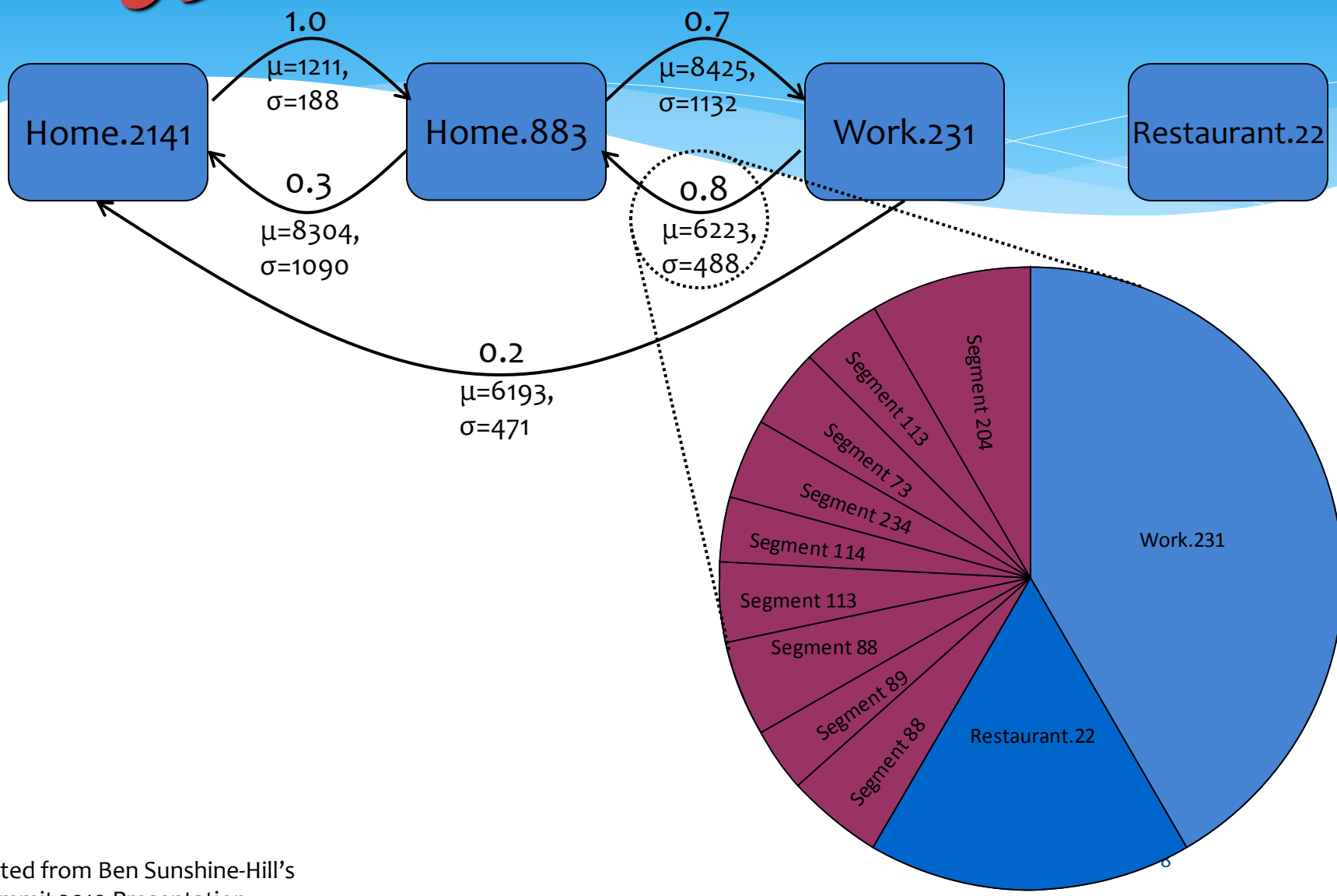
Example



* John Q. Agent leaves home ("Home.883") and goes to his workplace ("Work.231").
* He stays at work for several hours, then starts a round trip to the nearest restaurant ("Restaurant.22").
* After about half an hour, he returns to Work.231.
* After several more hours, he goes back home to Home.883.
* After a little while, he goes to visit his friend at Home.2141.

SEMI-Markov process



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The Math Behind it All . . .

Definitions

* i, j = Specific targets within the world
* l, k = Target types within the world
* D_{ij} = Time for target to travel from target i to target j
* W_k = Time target spends at target of type k
* N_{kl} = Number of roundtrips taken from target of type k to target of type l
* F_{ij} = Distribution of the time for the transition from i to j to occur
* D_{ij}^{R} = Roundtrip travel time for a roundtrip destination to a target of type l
* E[x] = Expected value for x

Equation

$$E[F_{ij}] = E[W_k] + \sum_{l=1}^{m} E[N_{kl}](E[D_{il}^{R}] + E[W_l] + E[W_k]) + E[D_{ij}]$$

Sum for each target type could go to:

Times:

The expected wait time at the transit target of type k

The expected number of roundtrips from targets of type k to targets of type l

The expected roundtrip travel time from location i to l

The expected wait time at location of type l

The expected time to travel from location i to j

The expected wait time at location of type k

Application of the Equation

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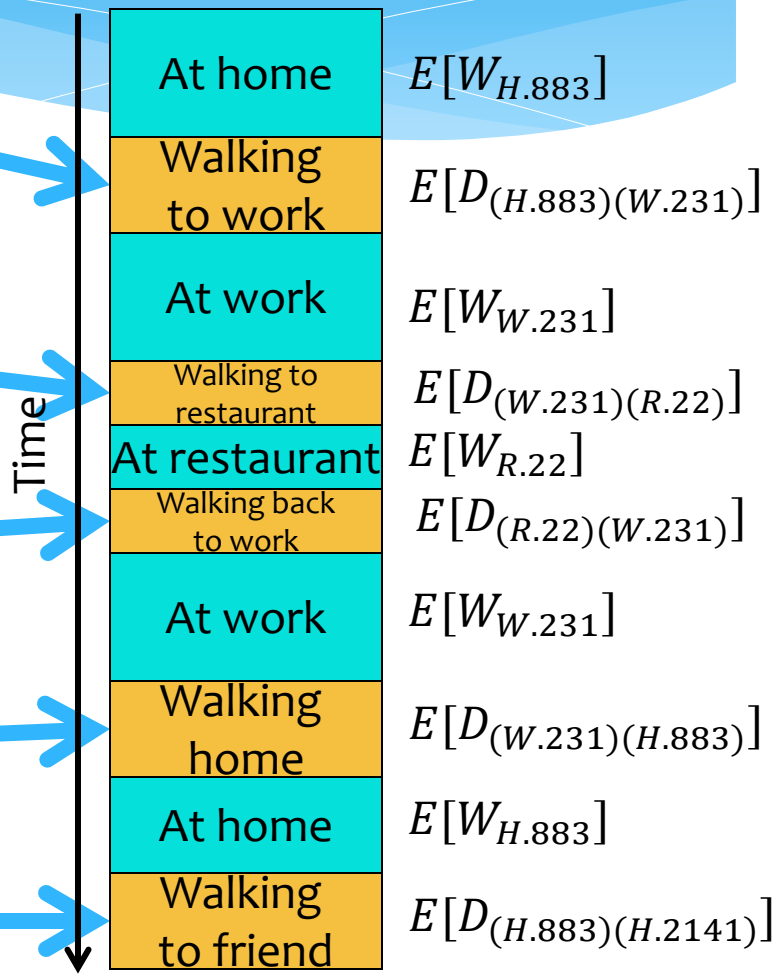

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Demo Setup

* Rooms are organized by type (classroom, hallway, closet, etc.)
* Building is broken up into segments with portals between them
* Table of pre-defined probabilities for goals based on prior visited room's type
* Agent stays inside room for a varying period of time after arriving
* Goals can be round-trip or one-way

Demo

Questions?

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