The Road to Manzikert
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The Road to Manzikert

- builds on work initiated by Vince Gaffney and John Haldon in the Birmingham/Princeton Medieval Logistics Group
- uses Agent-Based Modelling to investigate the context of the Byzantine army’s journey to the Battle of Manzikert in AD1071
The Road to Manzikert

- The Battle of Manzikert
- Agent-Based Modelling (ABM)
- What can ABM do for our knowledge of the Manzikert campaign?
The Manzikert Campaign

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The Manzikert Campaign

Byzantine Anatolia

Constantinople

Turkish nomads

Manzikert
The Manzikert Campaign

Manzikert

Seljuk Turks
What is a model?

A simplified, abstracted view of a more complex reality
Agent-based Modelling in archaeology

http://www.flickr.com/photos/brendenzeni/
Agent-based Modelling in archaeology

Agents

Environment
Agent-based Modelling in archaeology

http://www.flickr.com/photos/burningimage/
Agent-based Modelling in archaeology
Agent-based Modelling in archaeology

The Village Project - Washington State University
Agent-based Modelling in archaeology

http://www.flickr.com/photos/sandys-pictures/
What is the purpose of Agent-based Modelling?

- Not recreating the past
- Null hypothesis
What can Agent-based Modelling tell us about the Manzikert campaign?
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Matthew of Edessa
Ibn Al Qalanisi
Imad Ad Din and Al Fariqi
Ibn Al Athir
J.J. Norwich
J.F. Haldon

- 1,000 men
- minimum
- maximum

J.J. Norwich 60-70,000
J.F. Haldon 40-60,000
What are the requirements of Agent-based Modelling?

- A well-defined group of agents with plausible behavioural rules
- A detailed environment to interact with
- Software that can govern the interactions of the agents and the environment on the hardware available
- Adequate hardware
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Agents

- Army organisation and composition
- Human and animal physical endurance
- Human and animal health
- Equipment
- Sensory data
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Environment

- Terrain
- Climate
- Water sources
- Settlement types and distribution
- Transport methods and infrastructure
- Food (human and animal) and industrial production
Hardware

- University of Birmingham’s BlueBear cluster
- 384 dual-processor dual-core (4 cores/node) 64-bit worker nodes giving a total of 1536 cores
- over 150 TB disk space
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- Statistics
- 2D plans
- 3D animations
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