



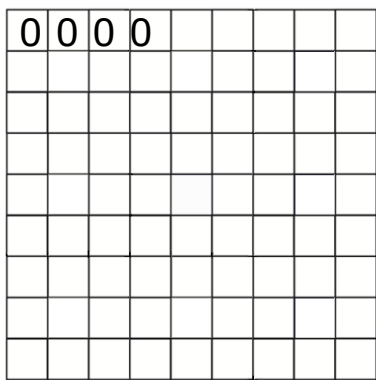
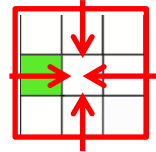
**AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY**

# **Multiscale Modelling**

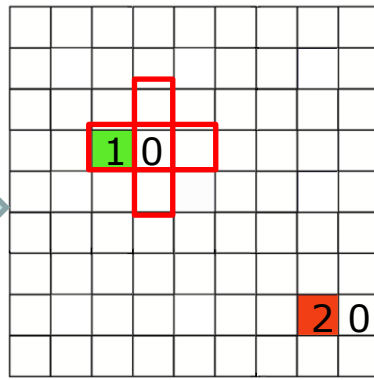
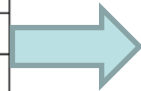
**Faculty of Metals Engineering and Industrial Computer Science  
Department of Applied Computer Science and Modelling**

# Simple grain growth algorithm (CA)

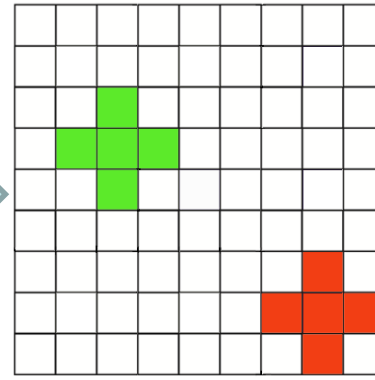
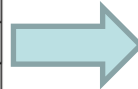
2 grains  
Von Neumann neighborhood



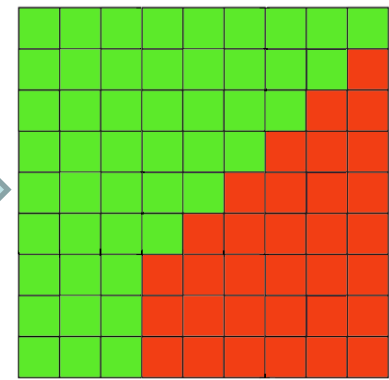
Initial space



1<sup>st</sup> step

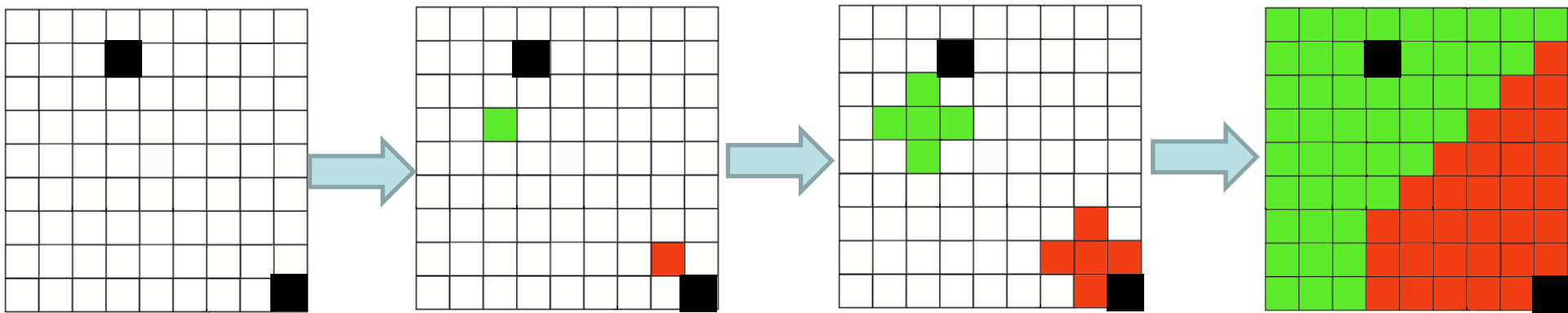


2<sup>nd</sup> step

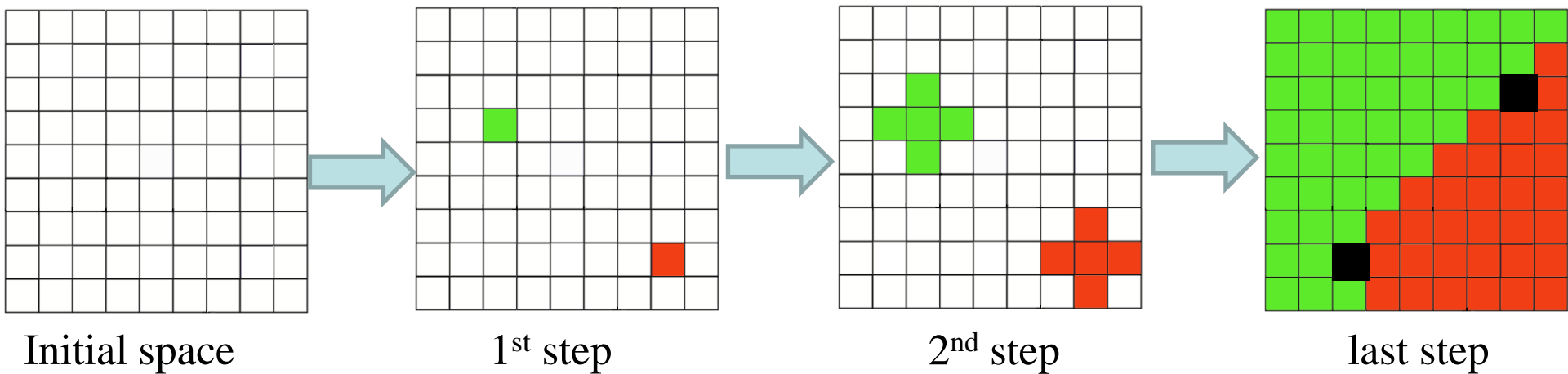


last step

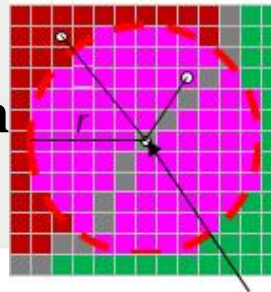
1. At the beginning of simulation (square *diagonal*  $d$  and circle with *radius*  $r$ ).



2. After simulation (square with *diagonal*  $d$  and circle with *radius*  $r$ ).



# Before Grain Growth



- CA cells in the radius, representing inclusion
- CA cells outside the radius, representing grains
- CA cells representing grain boundary

Center of the inclusion

Choose dimension x of space

Choose dimension y of space

Choose amount of grains

Amount of inclusions

Size of inclusions

Type of inclusion

Choose boundary condition

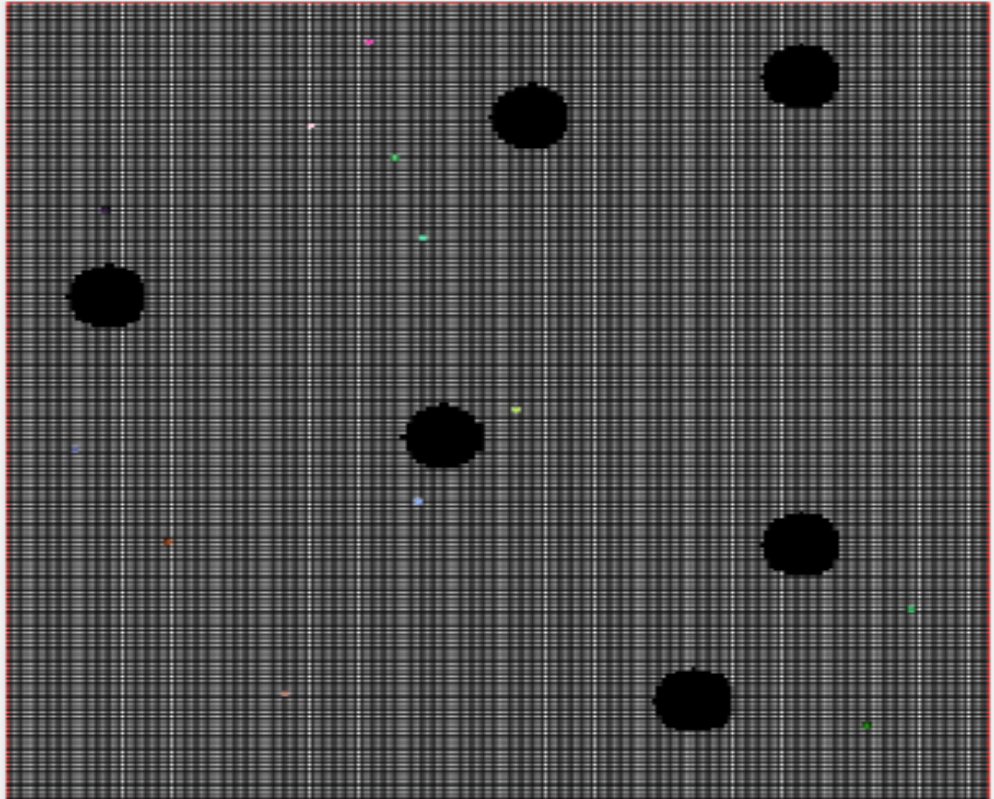
Choose a neighborhood

Amount grains to delete

Substructure

Amount of states

Amount of MC steps



circle (*radius r*)

# After Grain Growth

Form1

Choose dimension x of space

Choose dimension y of space

Choose amount of grains

Amount of inclusions

Size of inclusions

Type of inclusion

Choose boundary condition

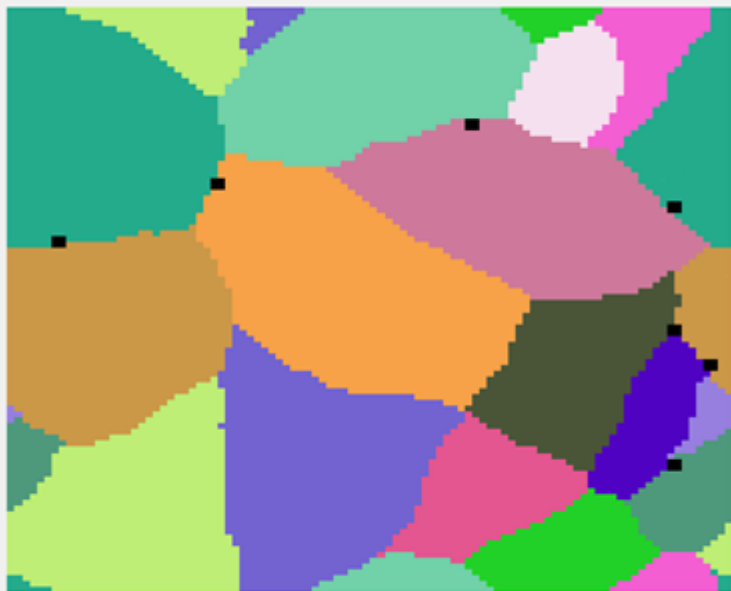
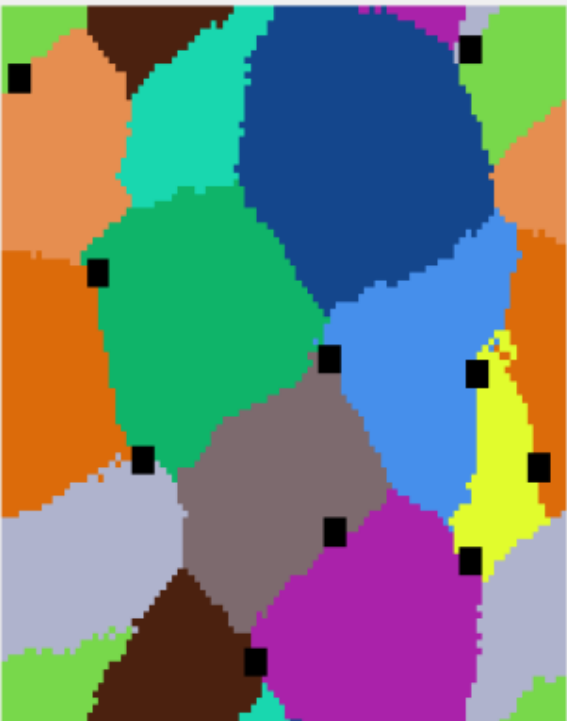
Choose a neighborhood

Amount grains to delete

Substructure

Amount of states

Amount of MC steps



Grain expended!