TestNet themaavond
Embedded Testen

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Testing Embedded systems

- **TEmb = Testing Embedded systems…**

  … maar wat zijn embedded systems?

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Online Test: Wat te testen?

Wat te testen?

- **Connectiviteit**
- **Interfacing met hardware**
- **Interfacing met software**
- **Voice over IP**
- **Performance**

Online Test: Waarom STaaS?

- **Moet extern**
- **Onvoorspelbare releases**
- **Professioneel**
- **Betrouwbaar**
- **Consistent**
- **Voordelig**

Online Test: Wat doet Sogeti?

- **Strategie**
- **Testomgeving**
- **Rapportage**
- **Defect proces**
- **Continue verbeteren**
- **Kennisbehoud**

Online

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Online Test: Testomgeving.

Hardware	Software	Connections	ADSL	Telephones	Tools
1 Intel desk top 1 AMD desk top 1 Apple iBook 1 Notebook	Norton Ghost, 98 SE, 2000, ME, XP Home, XP, Vista professional OSX (all English and Dutch) Standard Browsers	4 PSTN lines (with modems)	ADSL GO ADSL Family (2x) ADSL Direct	Analogue Dect Mobile (with pre paid cards for KPN, Telfort, T-Mobile and Vodafone, Online)	Test automation Load test tools

Online

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Evolutionary algorithms: myth or possibility?

Agenda

- Darwin
- Evolutionary algorithm: step by step
- Optimization problem
- High tech systems & input variables
- Test automation
- Use algorithms or our brains?

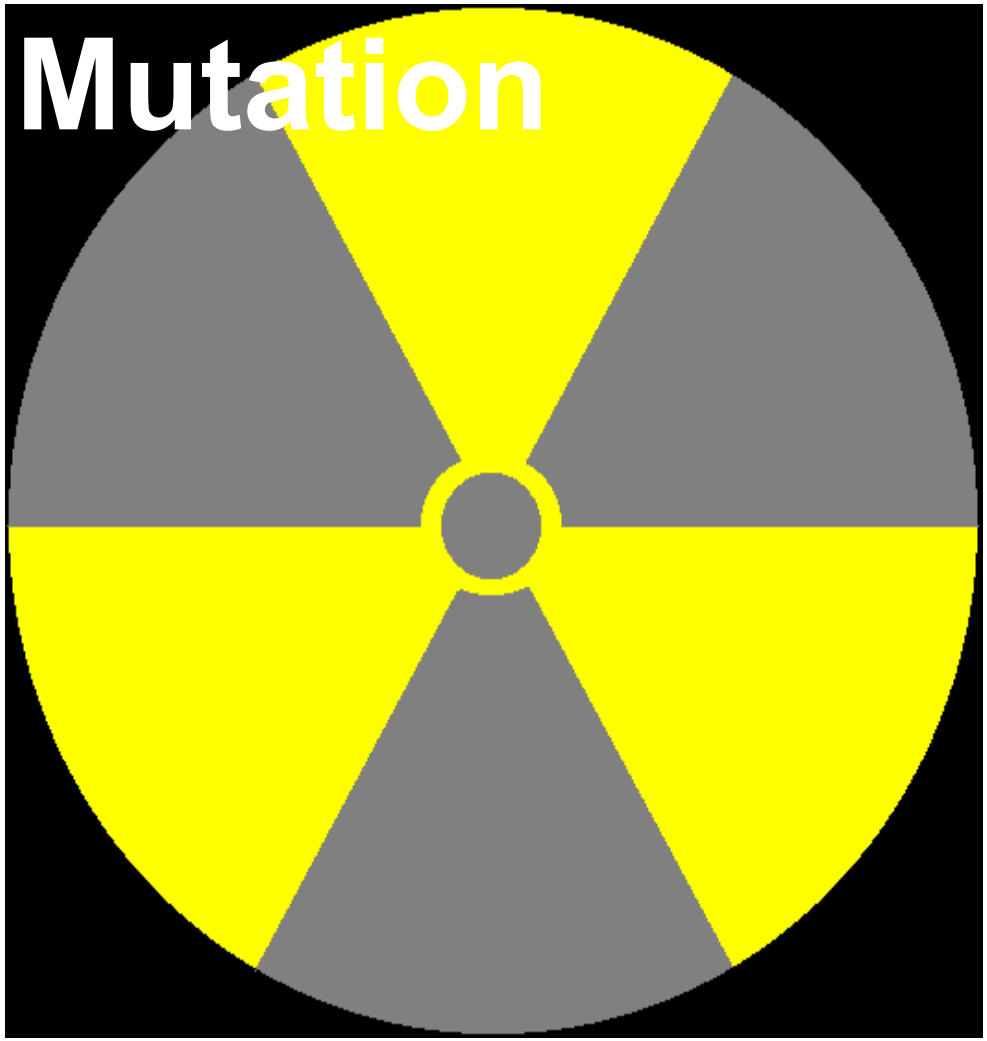
Darwin


Darwin's Voyage, 1835
91
1°
Culpepper
Wehrman
Pinta
Marchena
Genovese
Roca Redonda
V. Wolf
Equator
V. Darwin
San Salvador
V. La Cumbre
Seymour
Balta
Rabida
Fernandina
V. Alcedo
Pinzón
Santa Cruz
San Christóbal
Isabela
V. Santo Tomás
Santa Fe
Los Hermanos
Co. Azul
Tortuga
Santa Maria
Española

Evolutionary algorithm: step by step

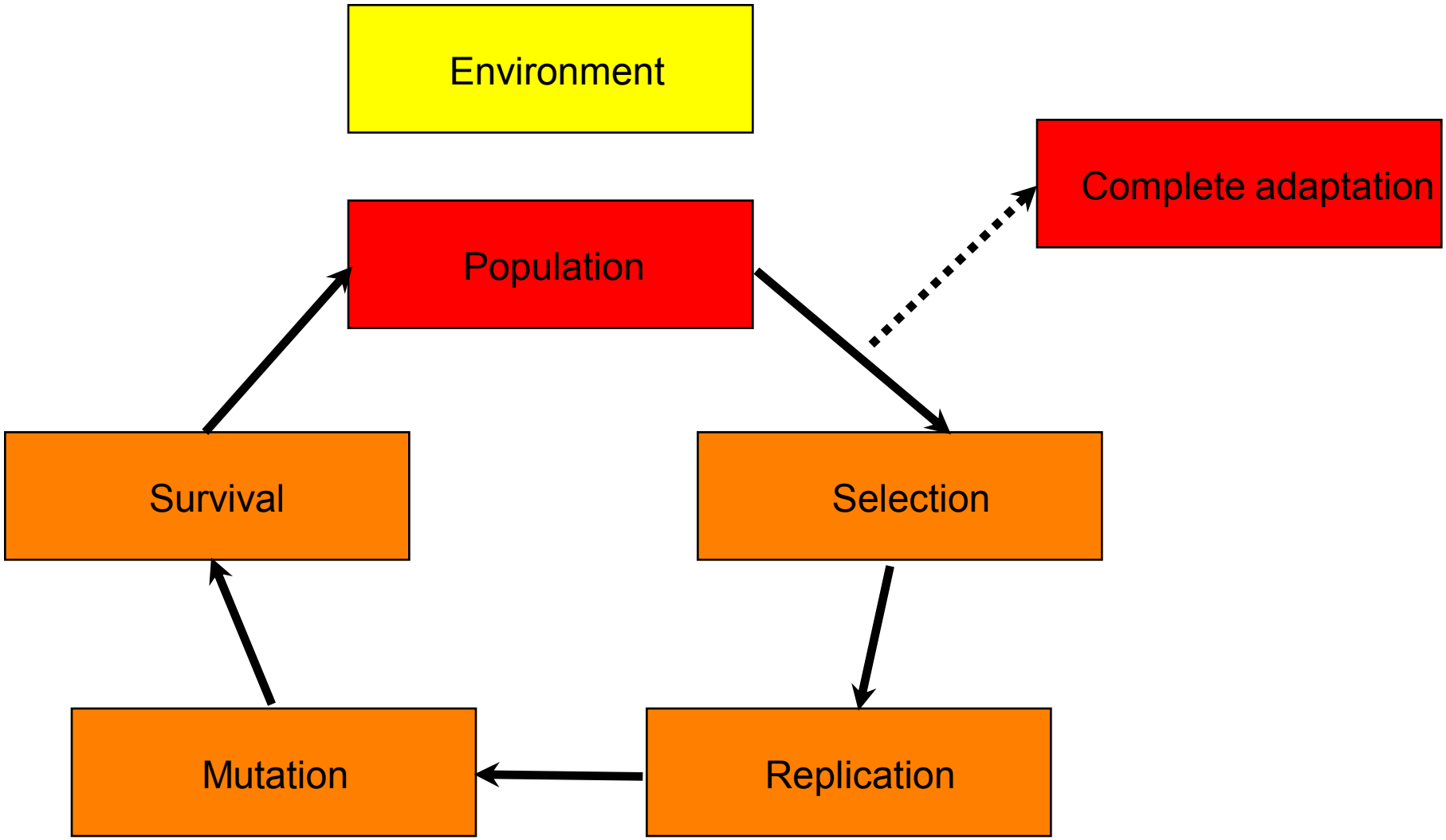
Evolutionary algorithm: step by step

Evolutionary algorithm: step by step



Evolutionary algorithm: step by step

Evolutionary algorithm: step by step



Optimization problem

- **Test cases "evolve" into "best fit" test case**
- **Optimization problems (searching for a minimum or maximum) e.g. :**
  - **searching for a violation of timing constraints**
  - **searching for a violation of tolerances**

High tech systems & input variables

Flight landing system:

- **200 input variables per test case**
- **2^{200} test cases**
- **Time limits**
- **Hardware availability limits**
- **One full test run at the end**
- **'Smart' test run during development**

High tech systems & input variables

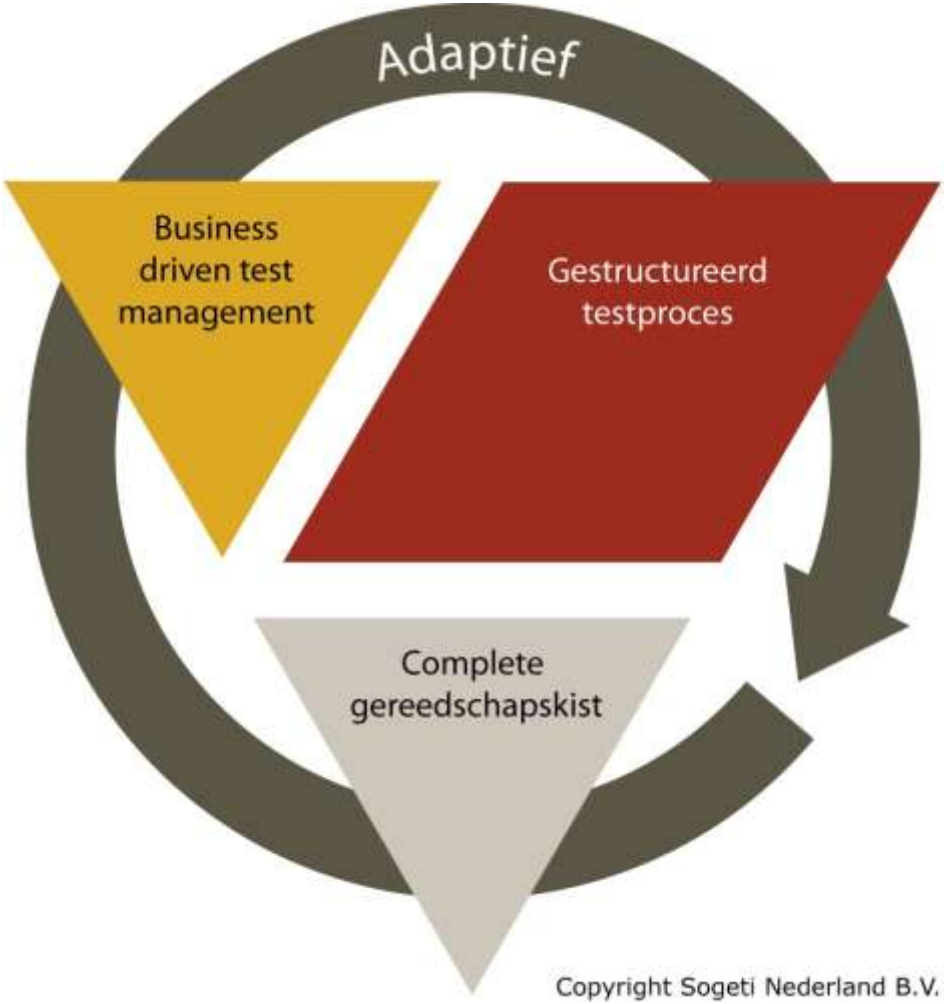
Application examples:

- **Temporal behaviour testing.**
- **Safety testing**
- **Structural testing**
- **Robustness testing**

Use algorithms or our brains?

- **You have to have brains to begin with:**
  - > choose a good fitness function
  - > define building blocks (test case)
  - > adapt your evolutionary algorithm
- **Many input variables**
  - > time constraint test execution
  - > what test cases are 'good'?
  - > test automation is needed
- **The brain can still be very efficient**
  - > recognition of complicated patterns
  - > quick selection

TEmb method - TEmb generic



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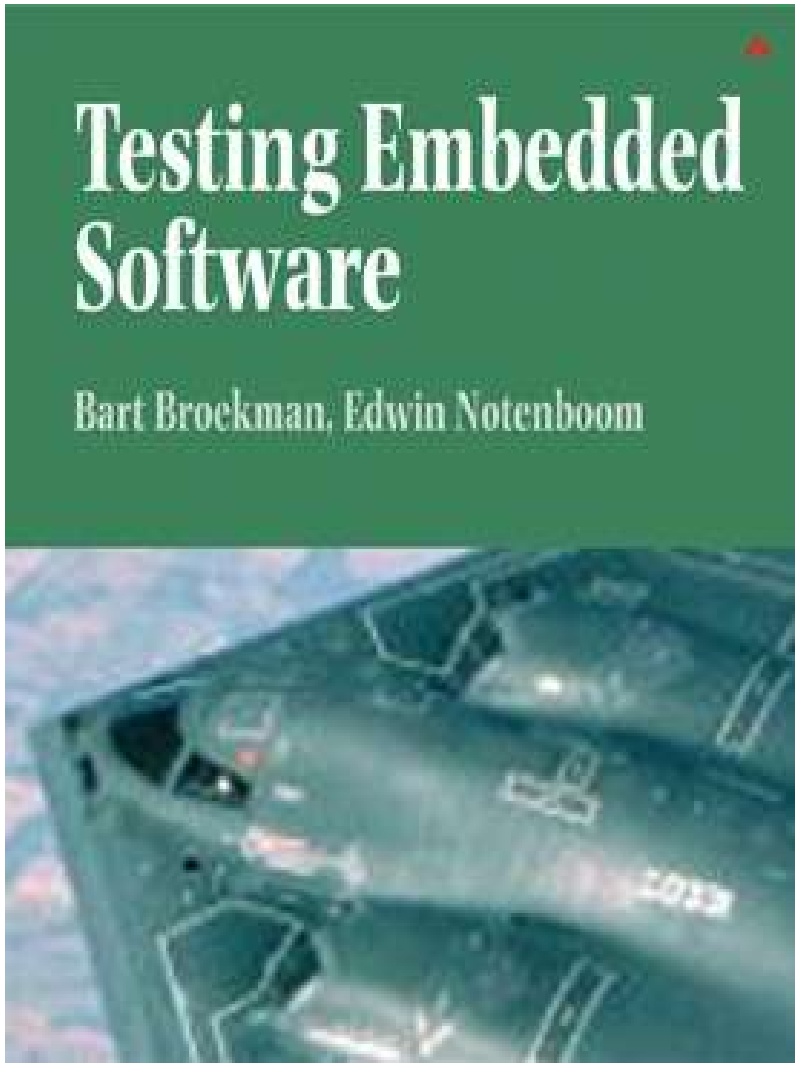
It’s all in the book



Broekman B., Notenboom E.
***Testing embedded software*,**
Addison Wesley

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