# ASIMOV

BRING COMPUTATION TO LIFE

# Founding team: Four biological engineers

## Alec Nielsen, PhD

**MIT Biological Engineering**

- Genetic engineer, cell biophysicist, comp. biologist
- Published circuits research in *Science*, *Nature Methods*, *Nature Chemical Biology*

MIT BE
BIOLOGICAL ENGINEERING

## Prof. Chris Voigt, PhD

**MIT Biological Engineering**

- Synbio pioneer with >80 synbio publications and patents
- Co-director of MIT Syn Bio Center

MIT-Broad Foundry
MIT BE
BIOLOGICAL ENGINEERING

## Raja Srinivas, PhD

**MIT Biological Engineering**

- Structural biologist, molecular biophysicist, protein engineer
- Founded biotech while in grad school, product entering clinic in 2018

MIT BE
BIOLOGICAL ENGINEERING

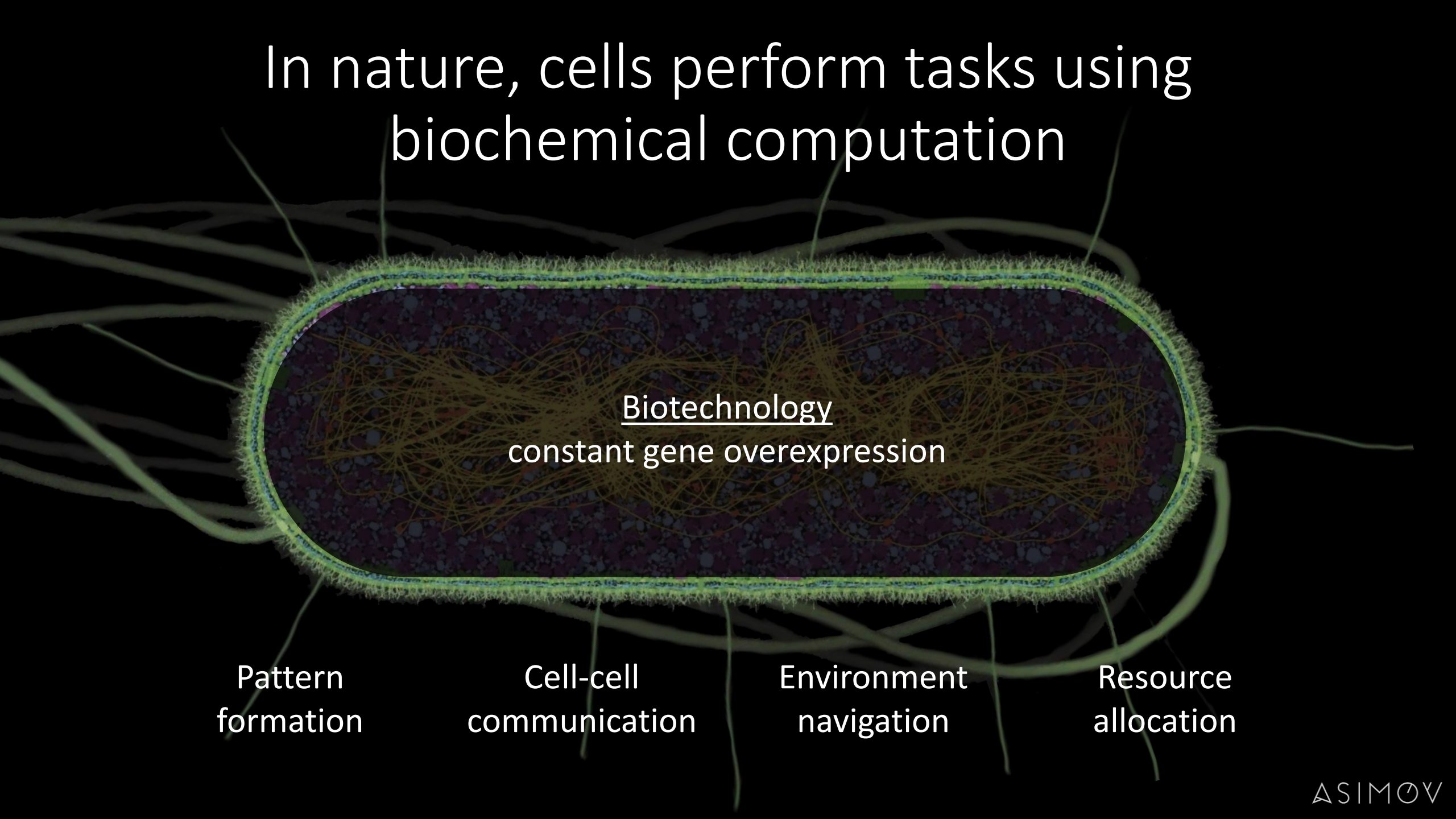
## Prof. Doug Densmore, PhD

**BU Electrical & Computer Engineering**

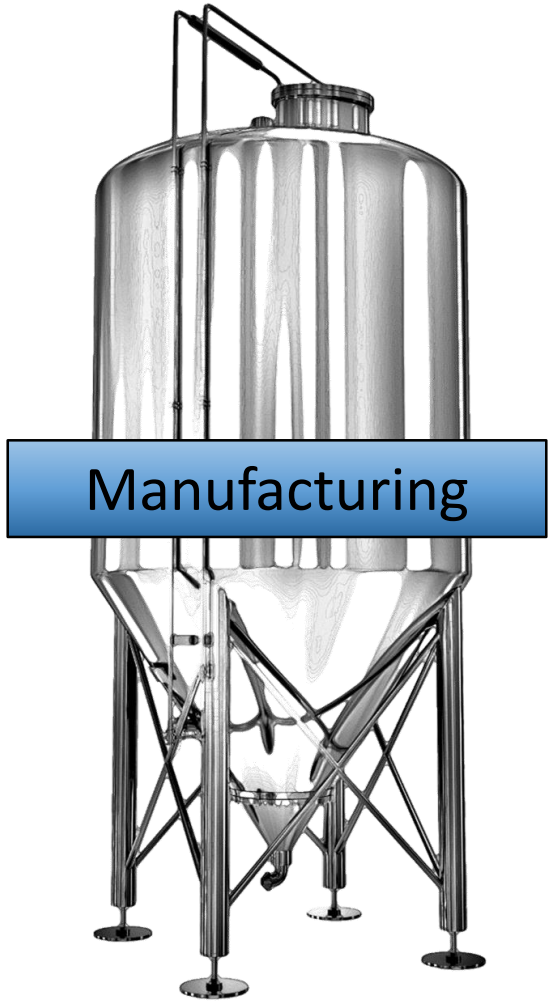
- >100 design automation publications and patents
- Director of BU Cross-disciplinary Integration of Design Automation Research

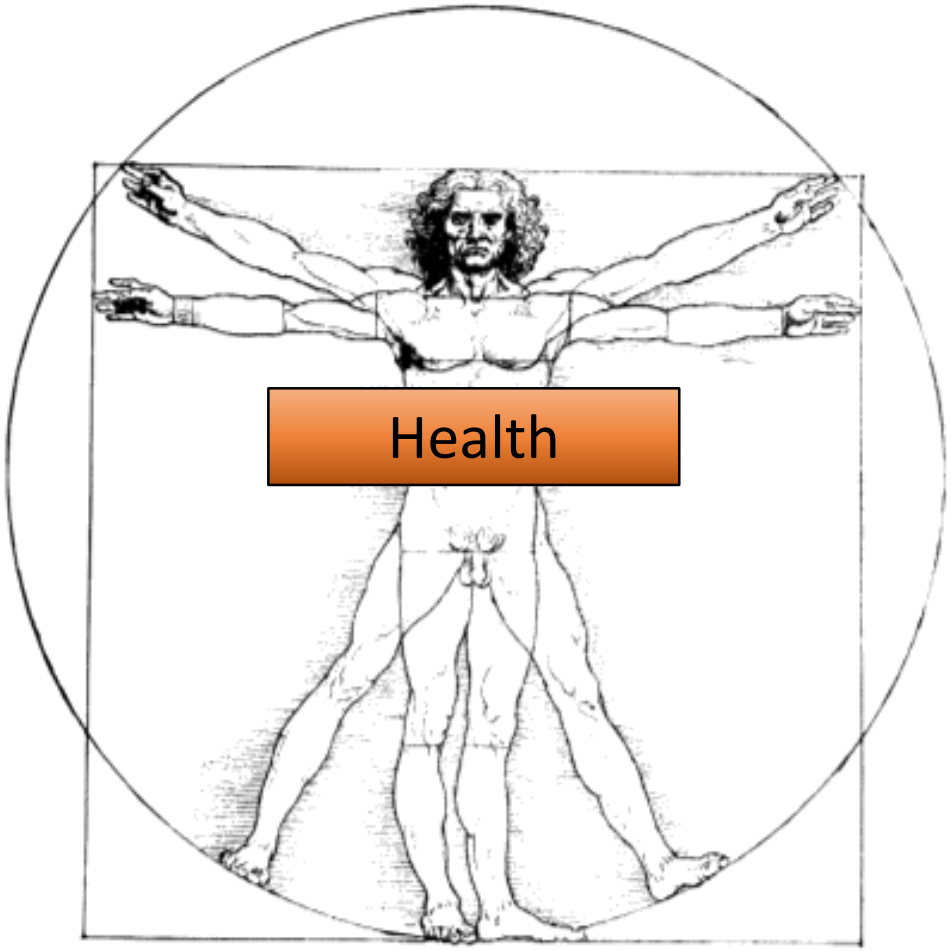
BOSTON UNIVERSITY

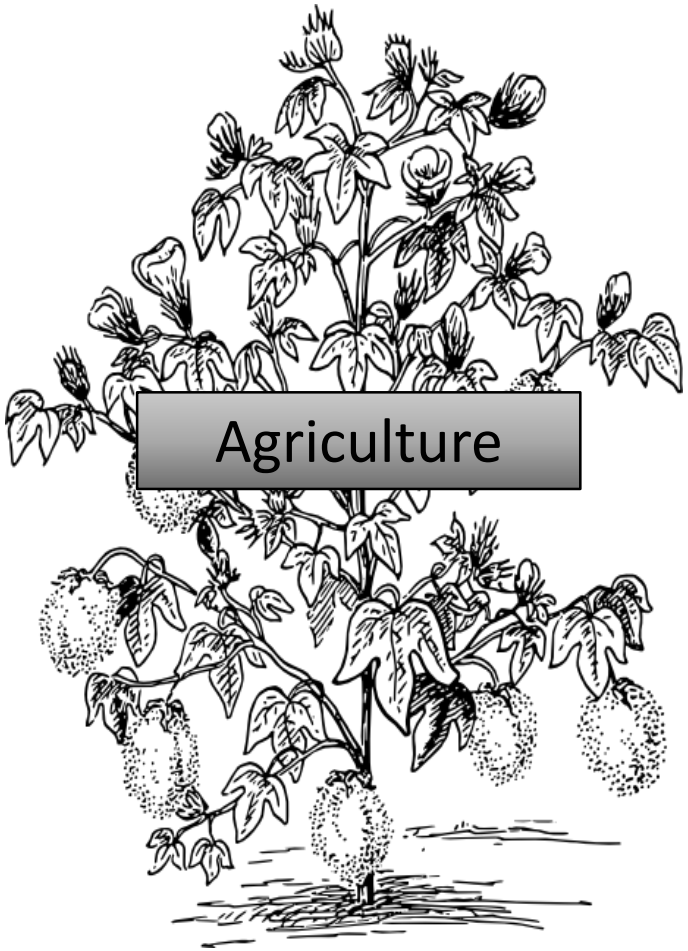
# In nature, cells perform tasks using biochemical computation

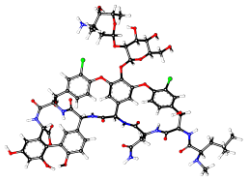
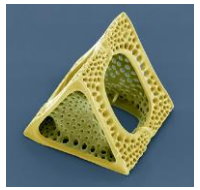
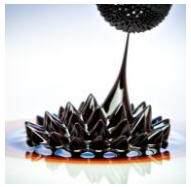
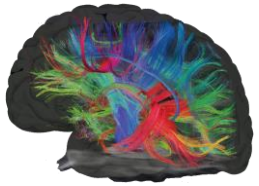
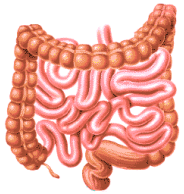
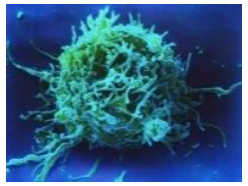


# Advanced biotechnologies require cell computation

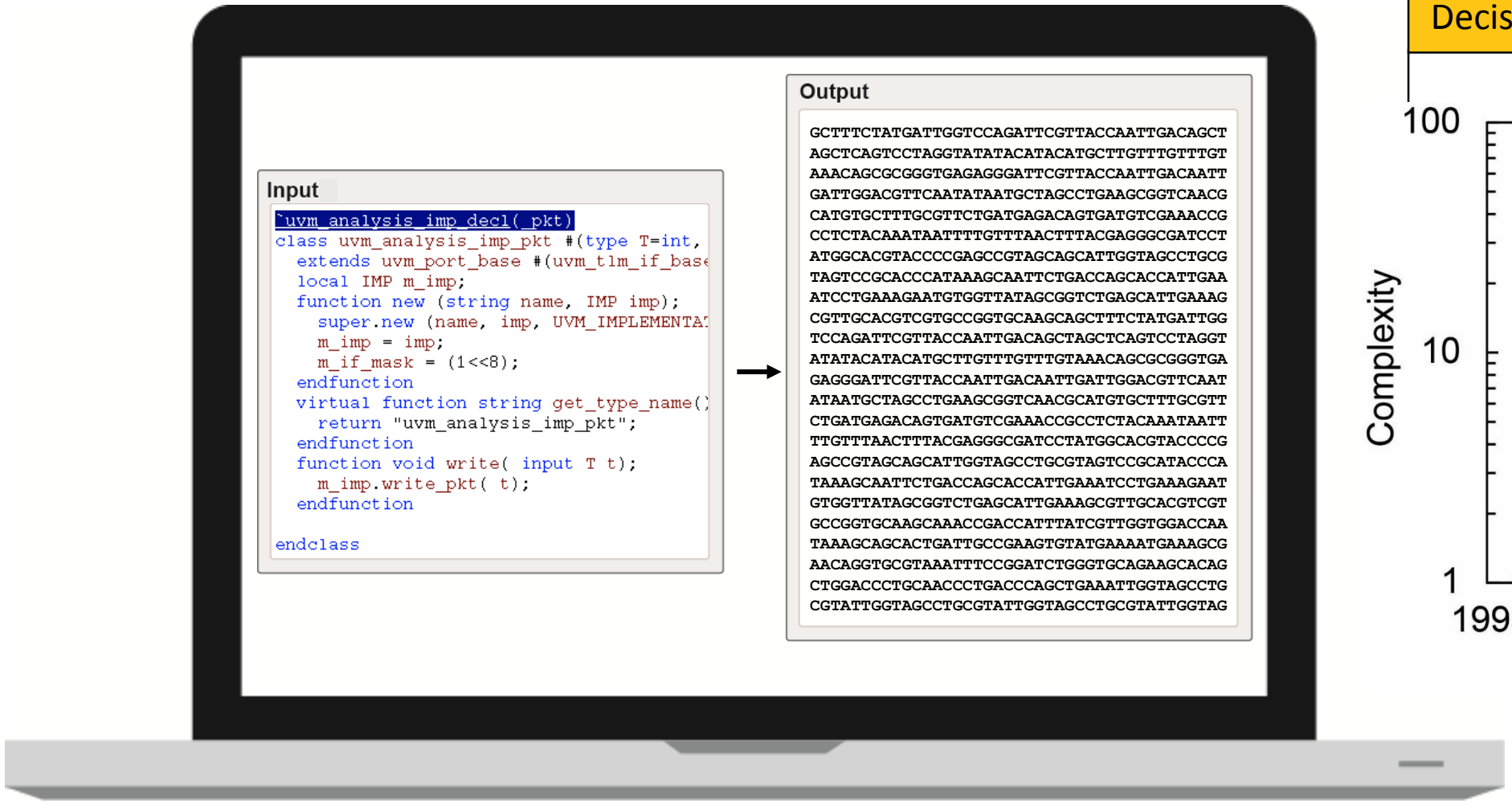


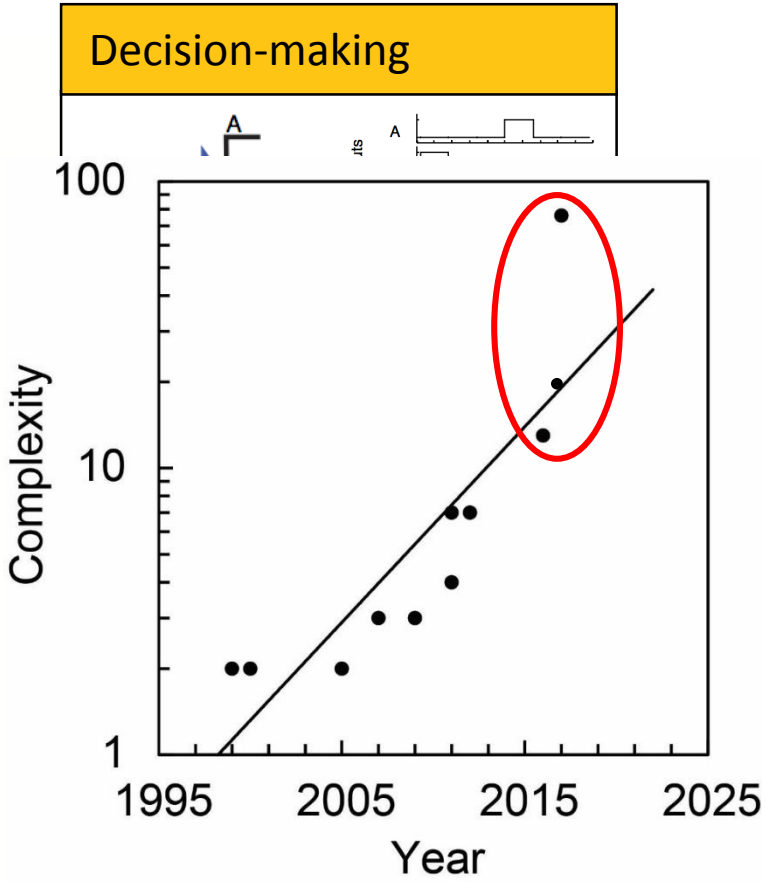



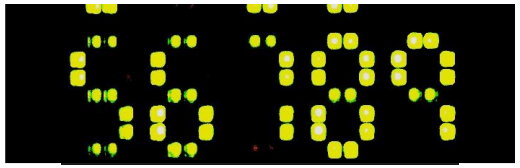




# A programming language for living cells



**Genetic circuit design automation**

Alec AK Nielsen, *et al.*

Science 352, 6281 (2016)

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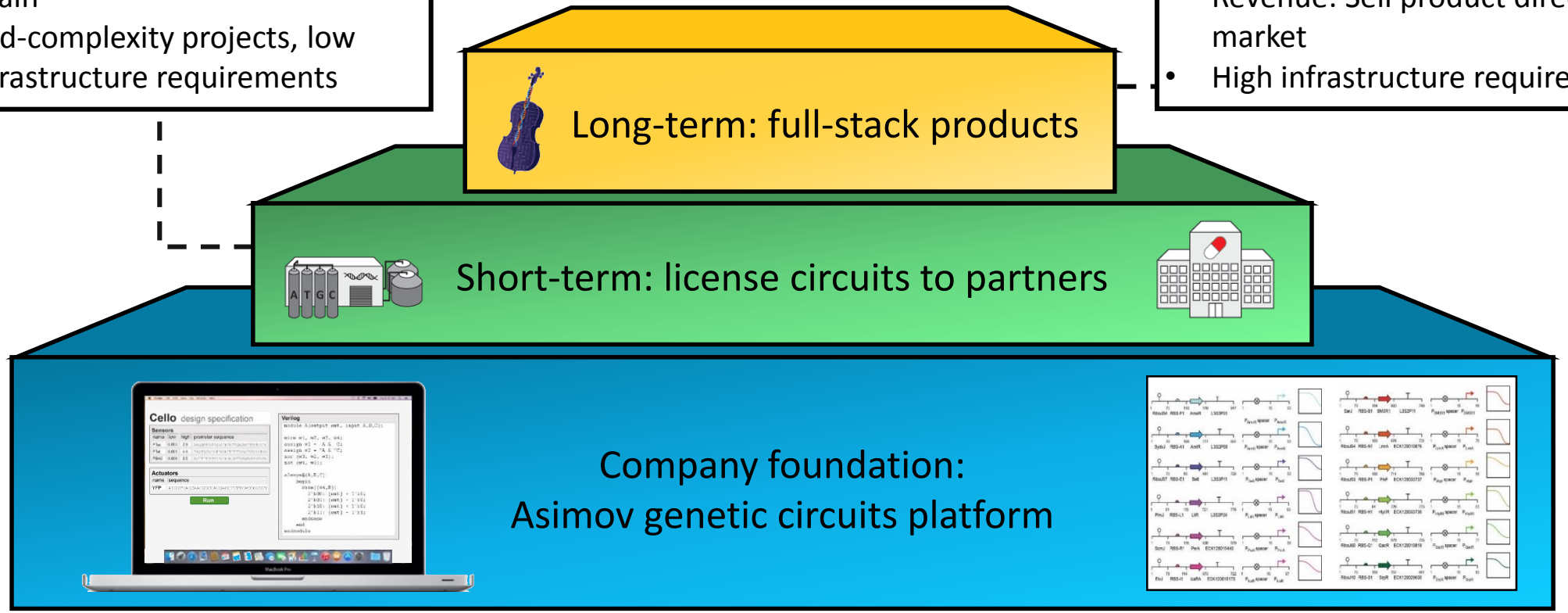
# Our goal is to enable previously impossible biotechnologies

**Partnership licensing model**

- Partner with external biotech, incorporate circuits into their strain
- Mid-complexity projects, low infrastructure requirements

**Full-stack model**

- Use genetic circuits to develop complete applications in-house
- Revenue: Sell product directly into market
- High infrastructure requirements

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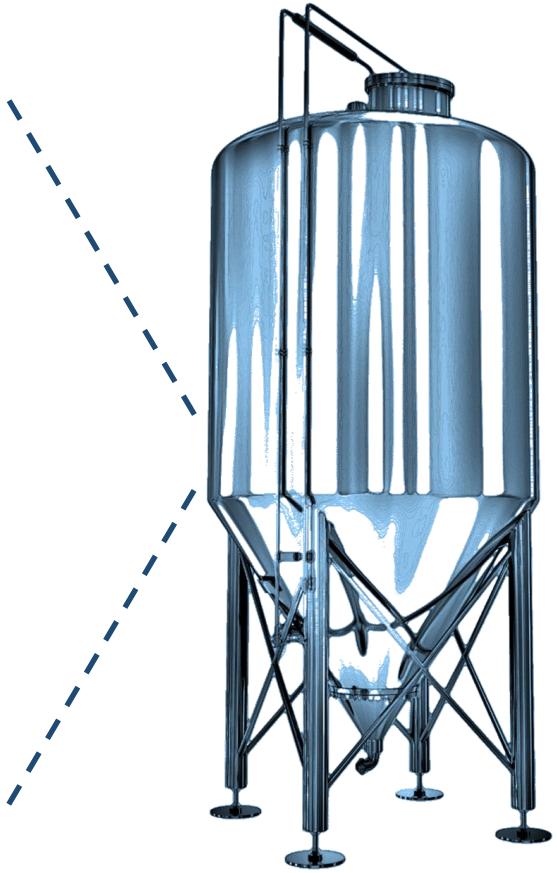
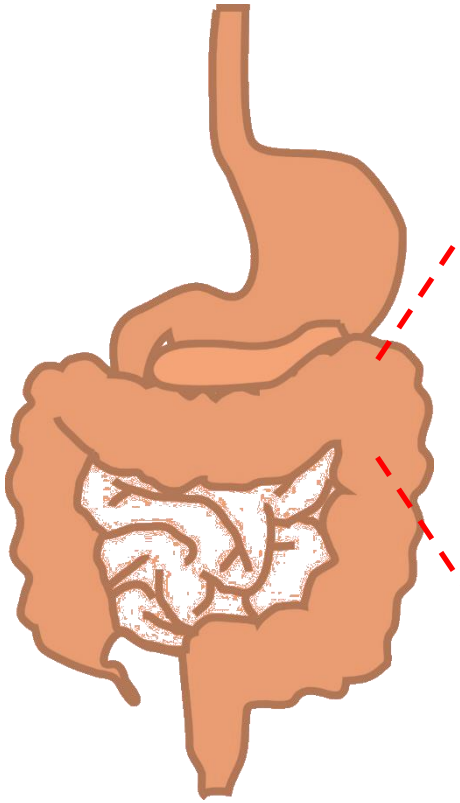
# Therapeutics manufacturing & microbiome applications

**Drug manufacturing pain point**

- Concurrent growth and production
- High biochemical quality variance
- Polygenic metabolic burden
- Side-product accumulation



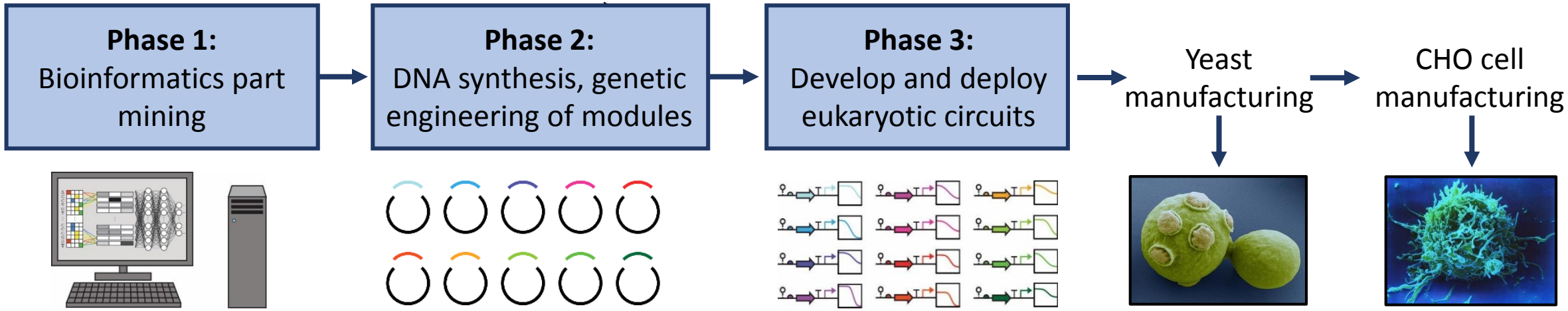


**Microbial therapeutic pain point**

- Gene toxicity impacts manufacturability
- Mismatched expression dynamics
- Potential microbe safety issues
- Molecular payload delivery in gut

# Next steps: eukaryotic platform development

- Cello is currently for bacteria
- Yeast and CHO cells are more industrially relevant
- Initial validation of platform biochemistry in yeast and CHO cells
- Next step: eukaryote circuit prototypes

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