

Where innovation starts

Robotica op afstand

Maarten Steinbuch



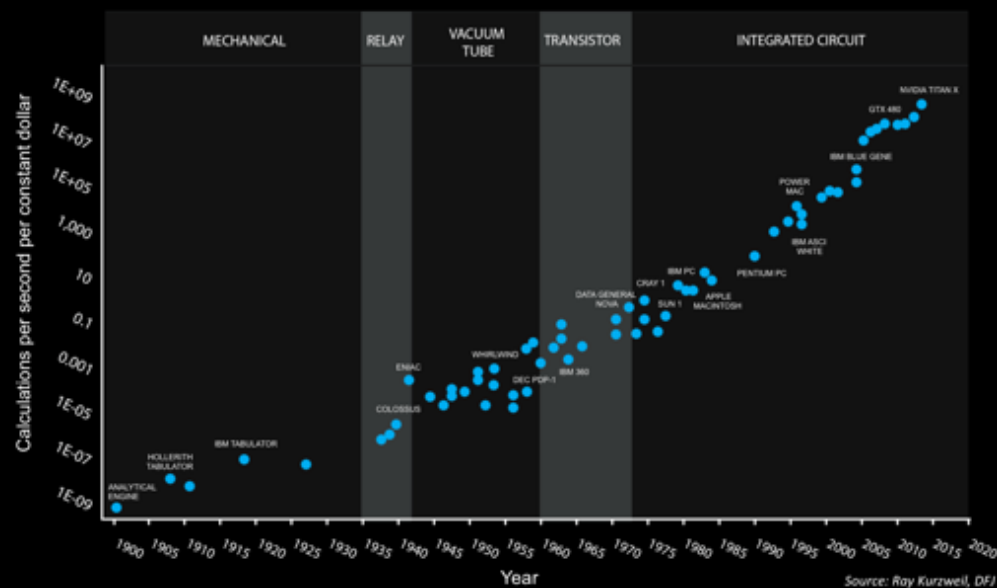
WND-conferentie



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120 Years of Moore's Law



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Logistische functie

De **logistische functie**, zo genoemd door de Belgische **wiskundige Pierre-François Verhulst**, beschrijft het verloop van de omvang $N(t)$ van een **populatie** als functie van de tijd t , als de verandering van de populatie-omvang zowel evenredig is:

- met de huidige omvang $N(t)$ van de populatie
- als met de nog voorhanden "groeiruimte" $M - N(t)$,

waarin M de maximale omvang is die de populatie kan bereiken.

Deze eisen leiden tot de **differentiaalvergelijking**:

$$N'(t) = kN(t)(M - N(t))$$

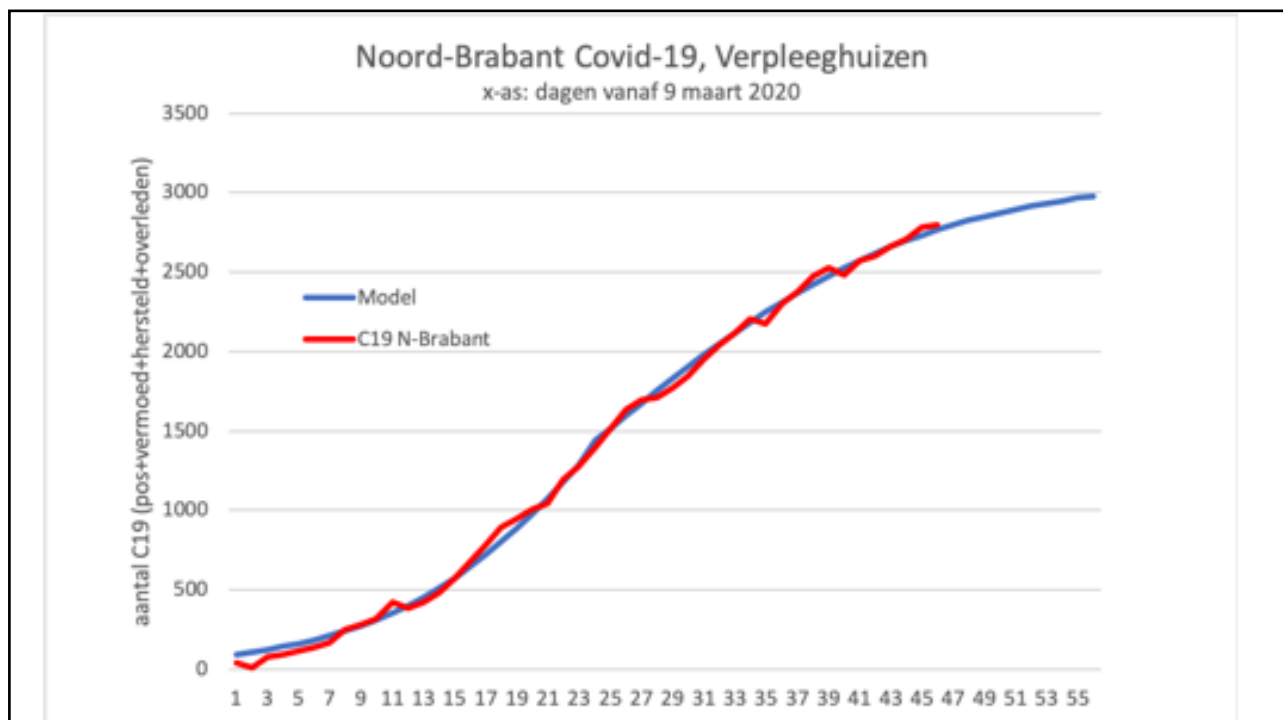
De oplossing daarvan is:

$$N(t) = N(0) \frac{M}{N(0) + e^{-Mt} (M - N(0))}$$

die door scheiding van variabelen gevonden kan worden.

De grafiek van deze functie heeft een S-vorm (**sigmoïde**). Deze vorm laat zich als volgt interpreteren: in het begin (t klein) stijgt de populatie laag is. Aan het eind (t groot), stijgt de populatie-omvang ook nog maar langzaam en nadert **asymptotisch** het maximum M , omdat dan de de populatiegrootte de helft van het maximum bereikt heeft, is de stijging het grootst: daar heeft de exponentiële groei de overhand.

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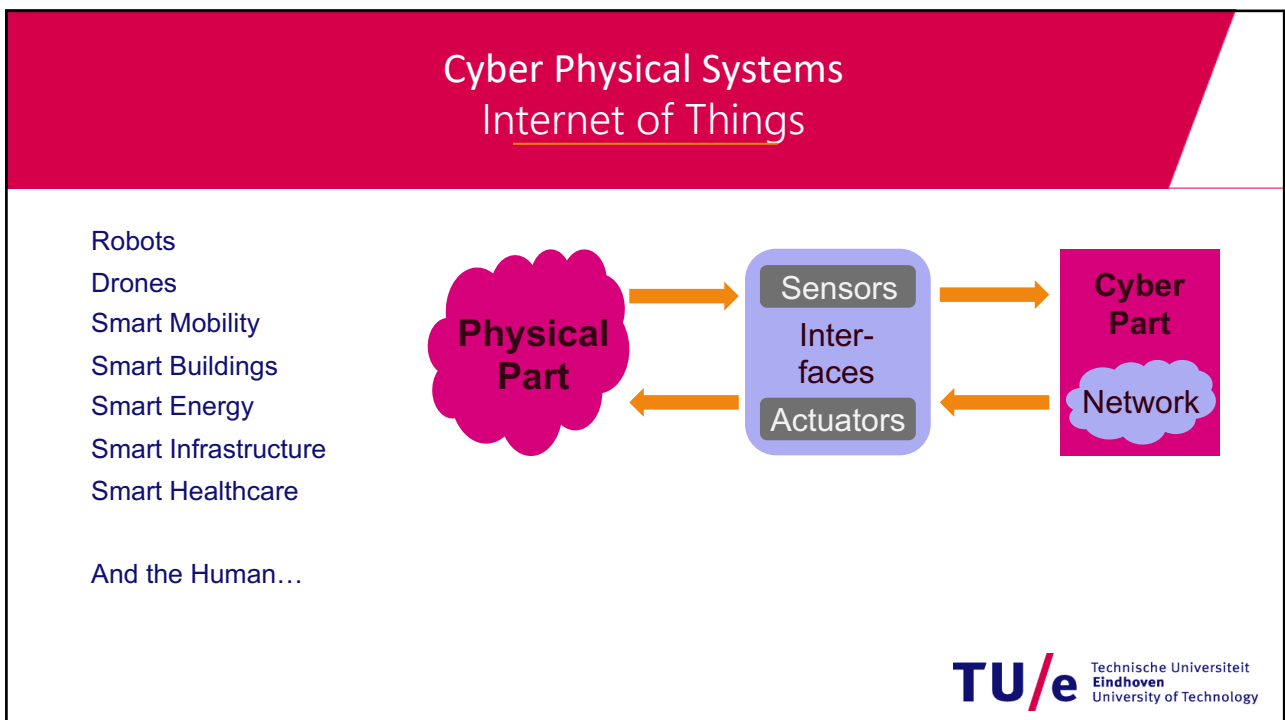
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SOFIE: Gen 1
PhD thesis
van den Bedem 2010, TU/e

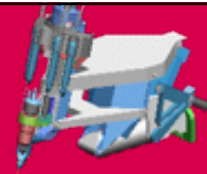
Awarded STW 2011
Simon Stevin Gezelprijs

With: Ivo Broeders



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PRECEYES



PhD thesis
Meenink 2011, TU/e

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Super human precision for surgeons

Unmet need:
Lymfoedeem
and other applications



Solution: Robot assisted micro surgery



PhD Raimondo Cau

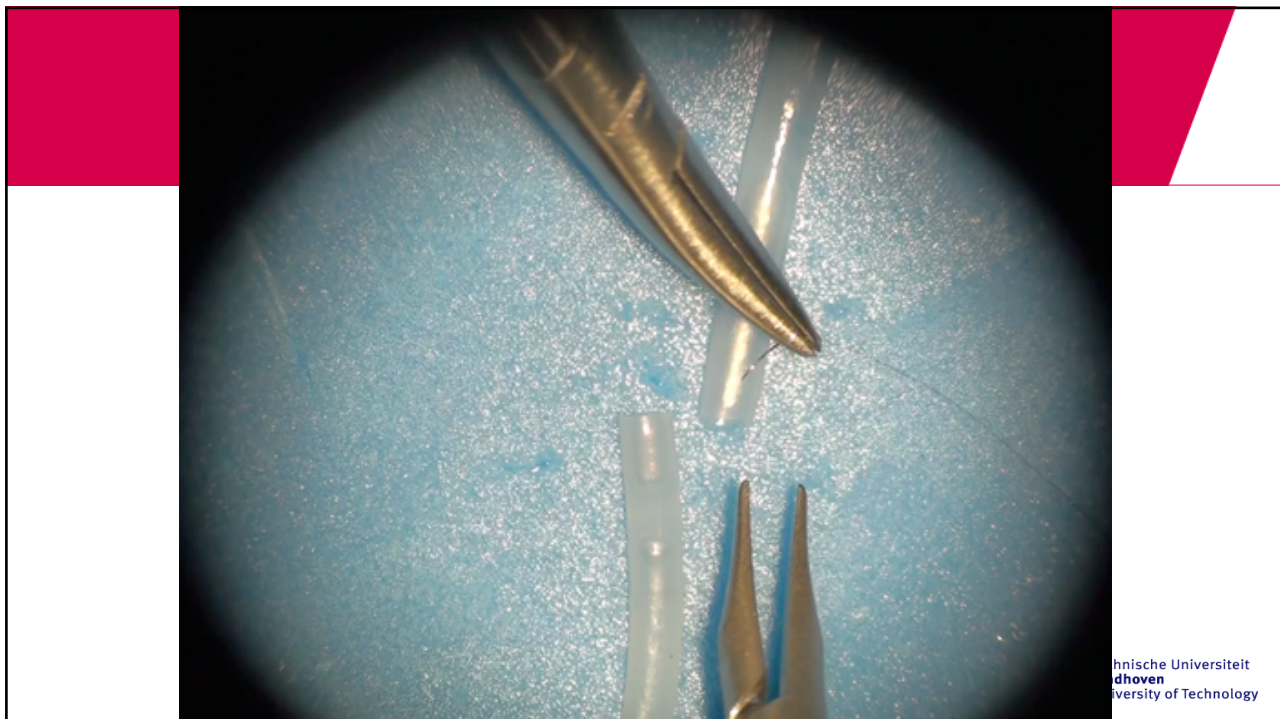
microsure
robot assisted microsurgery



With MUMC
Rene van der Hulst
Tom van Mulken

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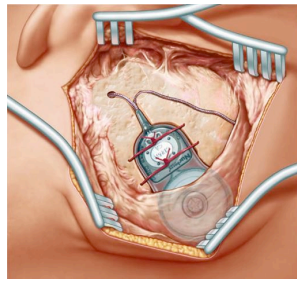
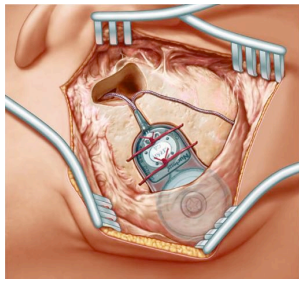


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Decades of making improved sensors for surgeons

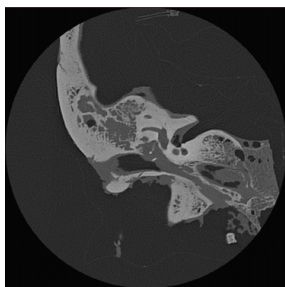


But how about improvements of their hands???

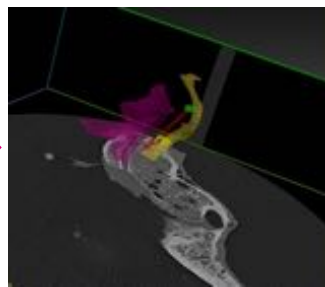


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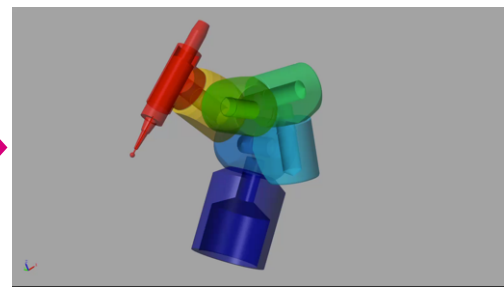
EMR product approach



CT image



Define mill path

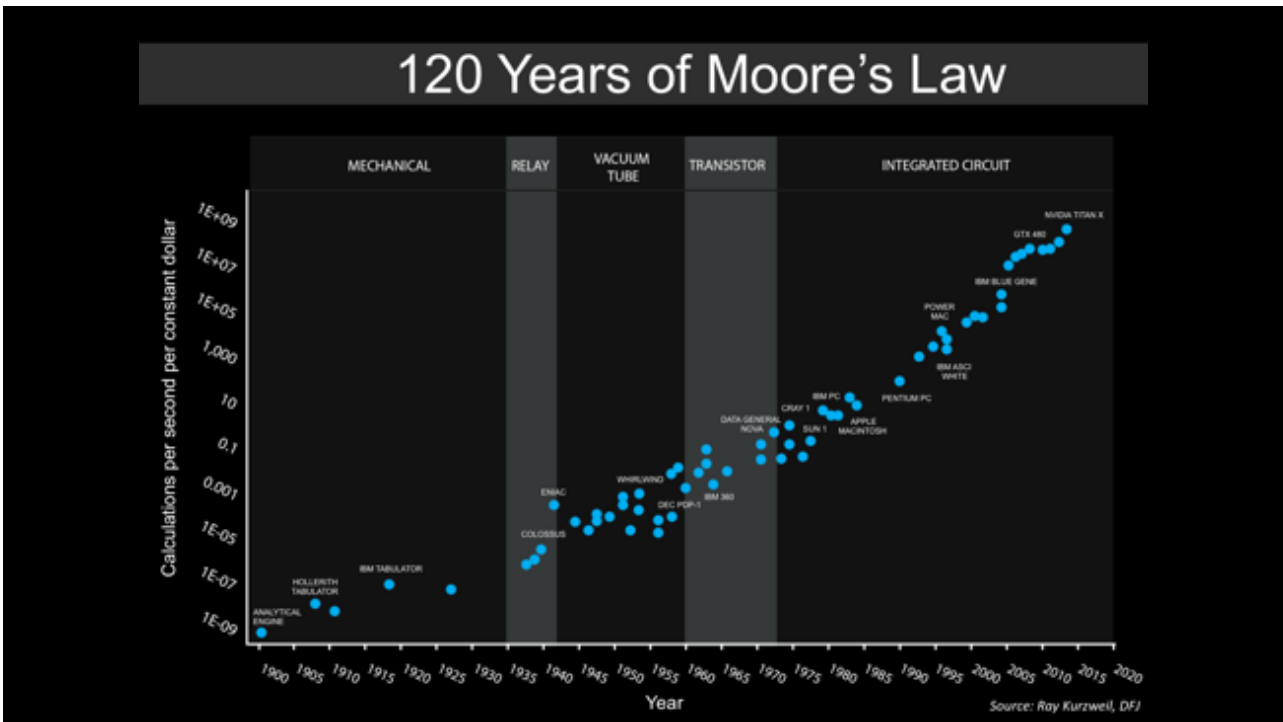


Mill

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**In an exponential world,
should the research still be linear?**

And education?

Ervaring wordt belangrijker dan kennis

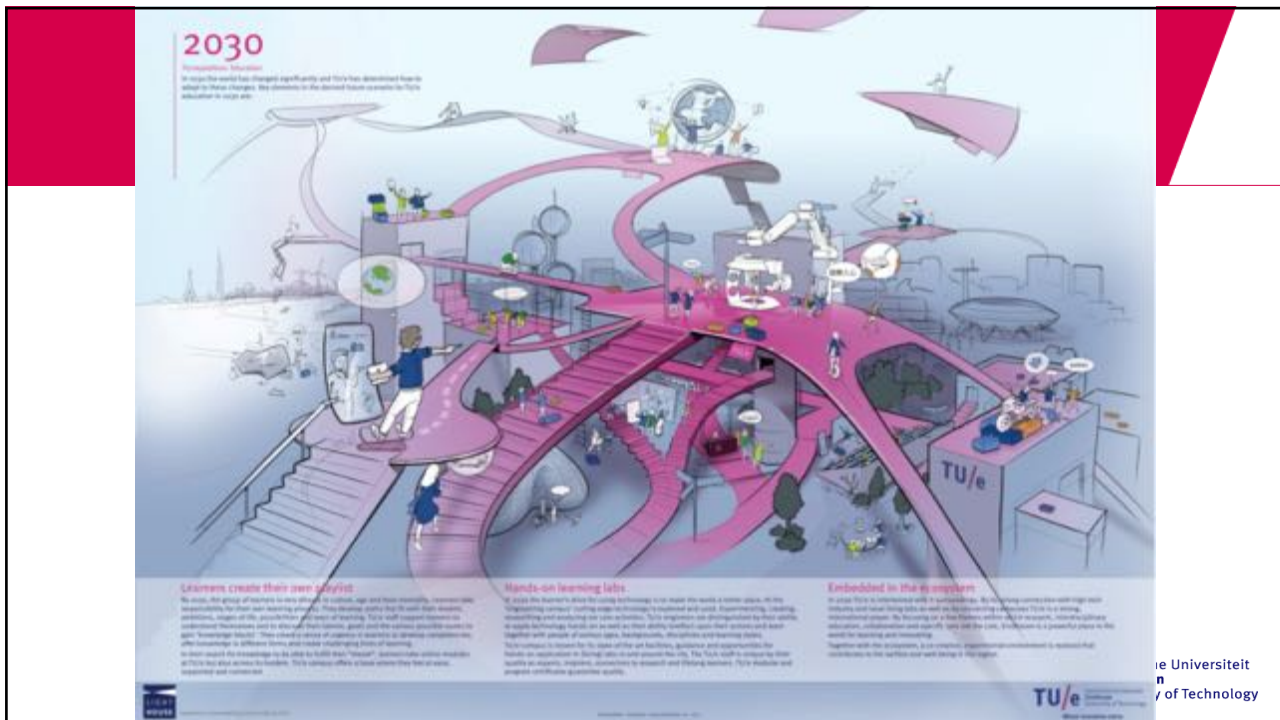
Systeemdenken, holisme, is key

Core aspects 2030 (TU/e vision)

- all study programs get at least 50% 'hands on' education.
- all (theoretical) knowledge will be offered online
- All students are part of student teams
- Highly individualized
- Systems thinking is instrumental to solve modern complex challenges



Lit: Meijers, A.W.M. e.a. (2013). Engineers for the future: an essay on education at TU/e in 2030



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Towards a 4th generation University....

	1 st Generation	2 nd Generation	3 rd Generation
Objective	Education	Education & research	Education, research & know-how exploitation
Role	Defending the truth	Discovering nature	Creating value
Method	Scholastic	Mono-disciplinary science	Inter-disciplinary science
Human capital development	Professionals	Professionals & scientists	Professionals, scientists & entrepreneurs
Orientation	Universal	National	Global
Language	Latin	National languages	English
Organization	Colleges	Faculties	Institutes & centers
Management	Rector & Chancellor	Part-time academics	Professional management

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Towards a 4th generation University....

	3 rd Generation	4 th Generation
Objective	Education, research & know-how exploitation	Education, open innovation (research)
Role	Creating value	Enabling value creation
Method	Inter-disciplinary science	Multi-actor innovation
Human capital development	Professionals, scientists & entrepreneurs	Professionals, scientists entrepreneurs, artists, customers, ecosystem participants
Orientation	Global	Ecosystem
Language	English	English
Organization	Institutes & centers	Innovation spaces
Management	Professional management	Disruptors

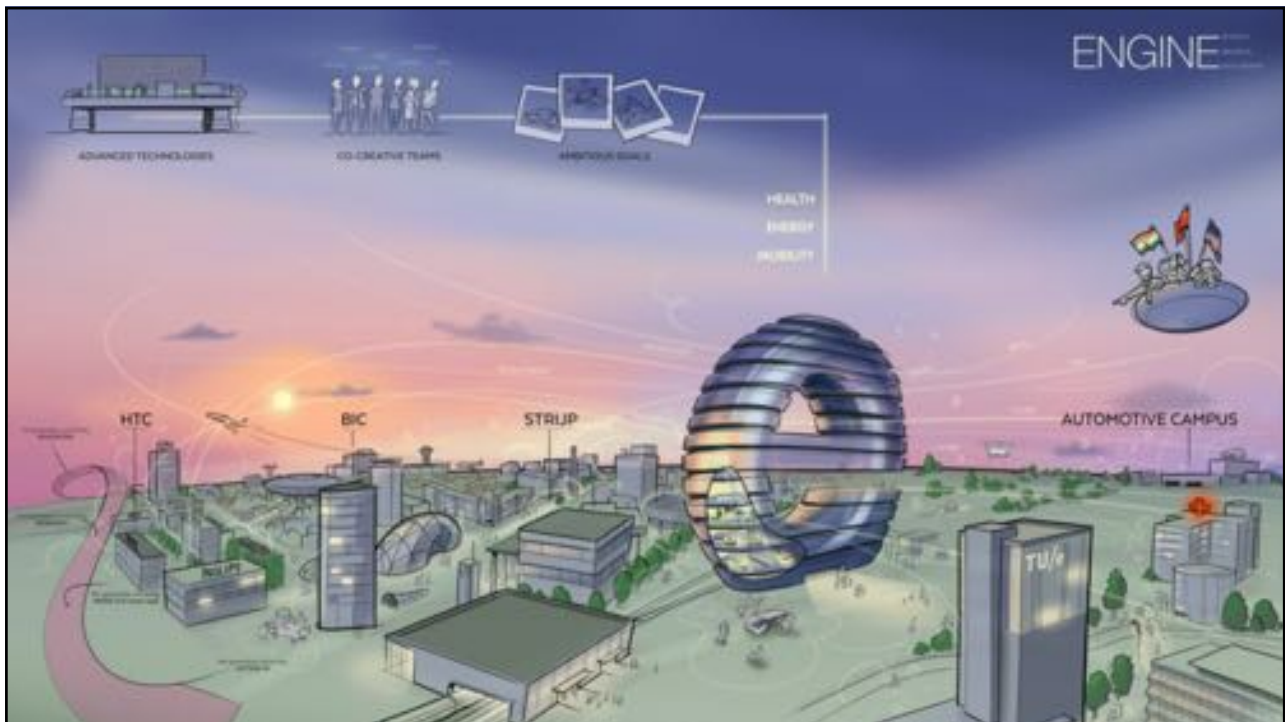


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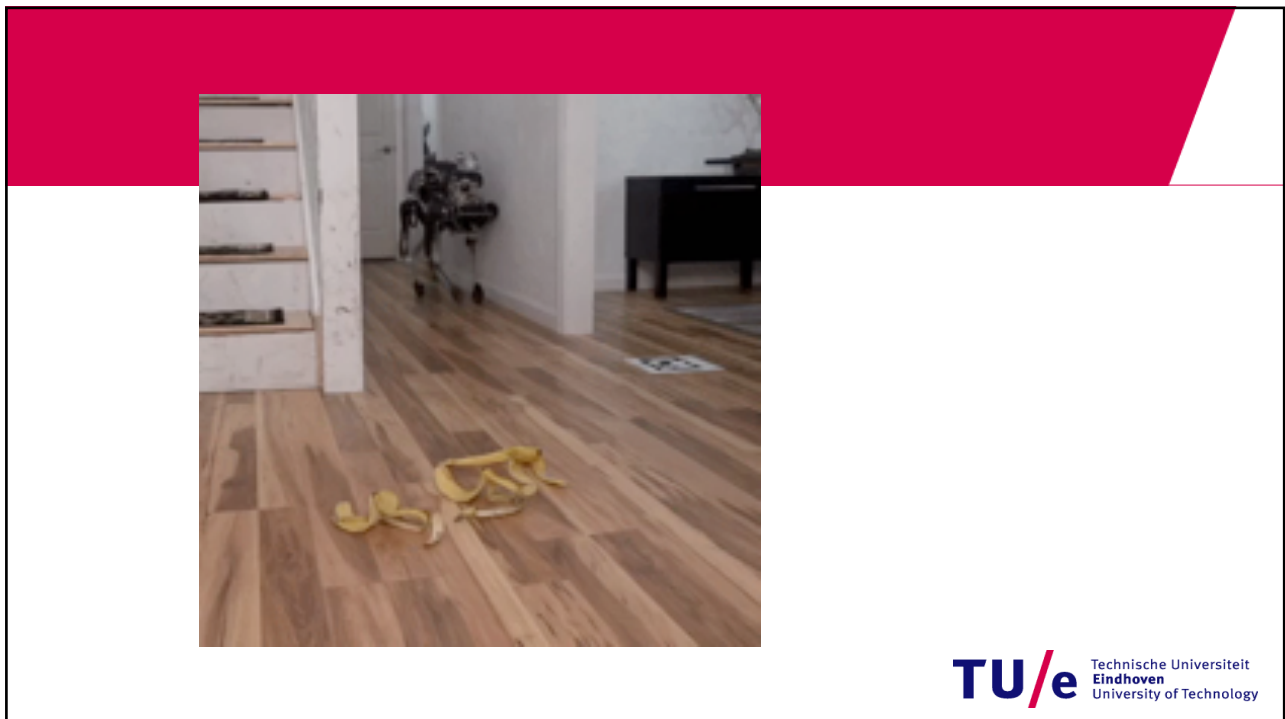


Connecting innovative minds

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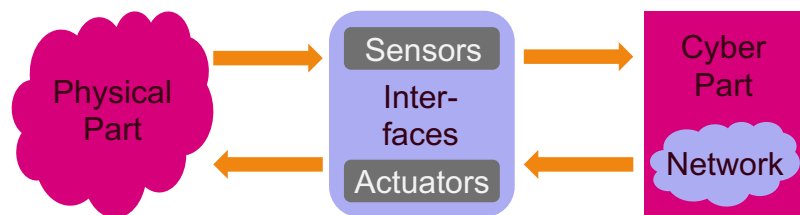
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Contact:
@m_steinbuch
maartensteinbuch.com
m.steinbuch@tue.nl

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