NTNU
Fakultet for naturvitenskap
Institutt for bioteknologi og matvitenskap

Dato: 15.06.2017
Referanse:

Møtereferat

Til stede:	Kjetil Rasmussen, Alex Dykyy, Martin Gimmestad, Lisbeth Mæhli, Finn Aachmann, Eivind Almaas, Eva Falch, Turid Rustad, Rahmi Lale, Hanne Karlsen, Kari Helgetun Langfoss, Sven Olav Aastad, Marit Sletmoen, Catherine Taylor Nordgård, Helga Ertesvåg, Olav Vadstein, Ingrid Bakke, Bjørn E. Christensen, Anita Nordeng Jakobsen, Eirin Bar, Gudmund Skjåk-Bræk, Per Bruheim, Gaston Courtade, Trygve Brautaset,
Forfall:	Iht epostliste
Kopi til:	
Gjelder:	Faglærermøte IBT
Møtetid:	15.06.17 kl 09:00–11:00 Møtested: Kjemiblokk 3, rom 069
Signatur:	

O-saker:

- Internasjonal Seksjon bruker p.t. svært lang tid på å vurdere bakgrunnen til internasjonale søkere til PhD-stillinger – bør vektlegges i mindre grad, bruk heller nettverk + grundig faglig vurdering gjennom Skype-intervju e.l.
  Kommentar fra faglærermøte: NTNU bør kunne gi slike vurderinger som grunnlag for tilsetting.
- Oppfølging av PhD-evaluering v/Berit L. Strand, se vedlagt pdf
- Utsatt innleveringsfrist for masteroppgaver for perioden 15.5.17 til 15.8.17:
  - MTKJ/MIKJ: totalt 8 av 13 oppgaver (62 %) er innvilget utsatt innleveringsfrist.
  - MBIOT5/MSBIOTECH: totalt 12 av 15 oppgaver (80 %) er innvilget utsatt innleveringsfrist.

  Konklusjon: stor andel som får utsettelse, men begrunnelsene er isolert sett ok. Oppfordrer veiledere til å være obs på dette ifm utarbeidelse av oppgaveforslag samt oppfølging av studentene.

Postadresse	Org.nr. 974 767 880	Besøksadresse	Telefon	Saksbehandler
		Sem Sælands vei 6/8	+47 73593320	Jo Esten Hafsmo
7491 Trondheim	postmottak@nv.ntnu.no	Kjemiblokk 3, 139 C		jo.e.hafsmo@ntnu.no
Norway	www.ntnu.no/ibt			Tlf: 73593313

Saksliste:

1. Forberedelse til mottak av høyt antall masterstudenter de neste årene

Presentasjon av prognoser for masterstudenter de neste årene. Diskusjon hvordan vi skal sørge for at alle skal få en oppgave de trives med og god oppfølging samt unngå at ansatte blir overbelastet i form av veiledningsarbeid. Se vedlagt pdf.

Konklusjon: det er positivt med stor interesse, men praktiske utfordringer må løses.

2. Opptakskrav bachelorstudiet i matteknologi

Bachelorstudiet har i dag generell studiekompetanse som opptakskrav. Det vurderes å innføre prøveordning med realfagskrav (dvs minimum Matematikk R1 + full fordypning i et annet realfag fra vgs). Konsekvensene av økt krav må vurderes. En sannsynlig negativ konsekvens er lavere studenttall de første årene etter innføring. Mulige positive konsekvenser er redusert frafall og heving av nivå i enkelte emner. Det er store kunnskapsnivåforskjeller blant studentene i enkelte emner og følgelig må emnet undervises på et tilpasset nivå. Videre vil det være fordelaktig med realfagskrav i forhold til kandidater som skal videre på master og evt phd. Saken har vært diskutert i programråd og med industripartnere. Se vedlagte pdf.

Momenter fra diskusjonen:

- endring til realfagskrav vil trolig endre rekrutteringen, i alle fall i en periode
- Y-vei kan rekruttere via forkurs, viktig rekrutteringsvei. Må markedsføre hvordan søkere med fagbrev kan komme inn på BSc Matteknologi
- Faktorer som påvirker søknad diskutert; lukket studium, opptaksgrense, arbeidsplasser/marked
- Realfagskompetanse viktig i forhold til andre emner, feks kjemi, prosessfag, fysikk og forsøksplanlegging.

Konklusjon: faglærermøtet anbefaler innføring av realfagskrav for BSc Matteknologi

3. Nye forskningsprosjekter

Berit, Per, Finn og Eivind presenterte sine respektive Digitalt Liv-forskningsprosjekter, se vedlagte pdf'er

Oppfølging av PhD evaluering

Endringer som kommer (1 – 4 års perspektiv):

- "Trening" av veiledere og medveiledere
- Oppfølging av medarbeidersamtaler
- Mer systematisk tilnærming til rekruttering av PhD studenter
- Øke PhD studenters kompetanse innen IP håndtering, etikk, og populærvitenskapelig formidling
- Midtveisevaluering
- Utenlandsopphold (Øke andel kandidater med utenlandsopphold: 25% nå – ønske om 40% med minst 3 måneders utenlandsopphold)

					2017				2018				2019				2020
			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Item ID	**NTNU**	**Comments / proposed approach**															
1	Establish institutional standards and better procedures for data storage and managements	Initiated.Departments asked to consider involving groups/projects in pilots to gain insight and influence future standards (NV Research Committee meeting april 2017).															
2	Provide fundamental teaching training and support for PhD candidates with teaching duties as a part of their contract.	NV to participate in pilot with UNIPED.															
	Faculty/Departments																
3	Organize mandatory training of supervisor and co-supervisor including experienced supervisors.	Look to other faculties who offer this. IE and IV a.o. Develop programme in 2017 and offer first round of training in 2018.WG consisting of Vice Dean, one deputy HoD Research, one permanent scientific staff, one ph.d. candidate, one HR representative.															
4	Secure that appraisal interviews of PhD candidates are taking place annually and that they are conducted in a consistent manner.	Management responsibility. Check-list / interview guide for ph.d. appraisal interviews already exists.															
6	Increased consolidation of research areas and groups	ongoing, strategy related															
7	Strengthen international funding of research involving PhD education	ongoing, strategy related															
8	Ensure more systematic approach to recruitment of PhD students	Coordinate advertisement of ph.d. positions, running ads at certain intervals. WG to be established.															
	Research committee																
9	Continue the work to strengthen and further develop MN8000 as a tool increase the awareness of scientific integrity and ethical conduct	Task to be delegated to MN8000 team. Being a new course MN8000 will still be developed further over the next few years. Evaluation of MN8000 spring 2018. Establish evaluation committee (3 Deputy HoD Research and some ph.d. students).															
10	Establish a mandatory seminar in outreach/popular dissemination for all PhD candidates	Introduce as mandatory from the academic year 2019/2020. The seminar should be seen in connection with how this topic is included in the welcome meeting and MN8000. Until then, continue to offer as an optional seminar at least once per year as we do today.															
11	Establish a mandatory seminar in IP handling and entrepreneurship	Introduce as mandatory from the academic year 2019/2020. Run an optional seminar as a pilot in spring 2019. Vice Dean Research															
12	Create consistent career tracking of PhD graduates and to foster Alumni work	Find a simple way of gathering information on where our candidates find their first employment after completing their ph.d. Administration															
13	Ensure consistency with respect to PhD education within all PhD programmes	Partly dealt with through items 3; 5; 9; 10 and 11, as well as the administrative structure/processes implemented in 2017.															
5	Promote best practise among research groups/departments and continue to work to move away from individualistic approach to research and PhD education	Long term task. Approach: Define topics for discussion / sharing of best practice in the Research Committee (årshjul). Related to items 6;8 and 13.															
	The program councils																
14	Revise an strengthen the course portfolio with the aim to broaden the perspective and understanding and increase international (national) collaboration	Ongoing work with a clear recommendation from the Evaluation Committee. Continuous implementation of revised course portfolio. WG based on mandate from Research Committee (modul based etc). WG to be established.															
15	Introduce mandatory half way evaluation / PhD hearing	NV to introduce half way evaluation based on IFY concept.															
16	Establish external (international and industrial) advisory board	Item will not be given priority															
17	Ensure internationalization of the PhD education including courses and longer research stay abroad	Investigate current status and budgetary consequences. Implement from 2019. Vice Dean Research															
	Develop																
	Implement																

NTNU
Kunnskap for en bedre verden

Prognose veiledning master

Sett spor

- Opplevd økning av søknad / studenter på de fleste program
- Opplevd økning av studenter som tar emner ved IBT

- Behov for prognose på veiledningsbehov master (+ lesesaler)

- To scenario; ett konservativt, ett moderat

Forutsetning:

- master leveres og sensureres i vårsemesteret
- På to-årige program brukes rammetall
- Øvrige tall er registrerte, aktive studenter per dd - det kan være studenter som ikke er reelt aktive studenter

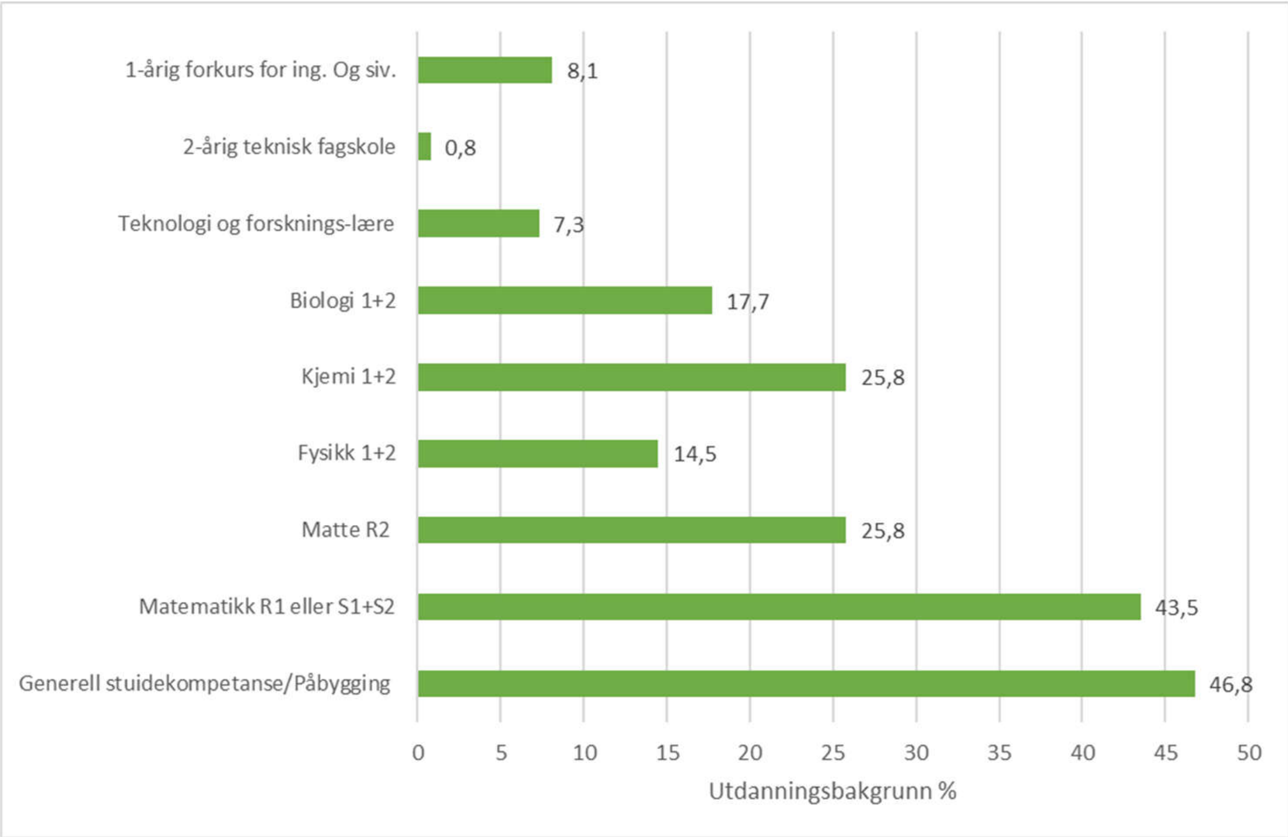
Program, kull	**Høst 2017**	**Vår 2018**	**Høst 2018**	**Vår 2019**	**Høst 2019**	**Vår 2020**
MTKJ-BT ≤ 2012						
MTKJ-BT 2013		11				
MTKJ-BT 2014				24		
MTKJ-BT 2015						38
MIKJ-BT 2016		3		1		
MIKJ-BT 2017				*5*		
MIKJ-BT 2018						*5*
FTMAMAT 2016		12				
FTMAMAT 2017				*20*		
FTMAMAT 2018						*20*
MSAQFOOD ≤ 2015						
MSAQFOOD 2016		1				
MSAQFOOD 2017				*2*		
MSAQFOOD 2018						*2*
MSBIOTECH ≤ 2015		2		1		
MSBIOTECH 2016		13				
MSBIOTECH 2017				*20*		
MSBIOTECH 2018						*20*
MBIOT5 ≤ 2012		2				
MBIOT5 2013		22				
MBIOT5 2014				39		
MBIOT5 2015						**51**
SUM		**66**		**112**		**136**

Scenario 1

Program, kull	**Høst 2017**	**Vår 2018**	**Høst 2018**	**Vår 2019**	**Høst 2019**	**Vår 2020**	
MTKJ-BT ≤ 2012							
MTKJ-BT 2013		11					
MTKJ-BT 2014				19			20 % frafall
MTKJ-BT 2015						30	20 % frafall
MIKJ-BT 2016		3		1			
MIKJ-BT 2017				*5*			
MIKJ-BT 2018						*5*	
FTMAMAT 2016		12					
FTMAMAT 2017				*12*			"Steady state", ref vår 18
FTMAMAT 2018						*12*	"Steady state", ref vår 18
MSAQFOOD ≤ 2015							
MSAQFOOD 2016		1					
MSAQFOOD 2017				*2*			
MSAQFOOD 2018						*2*	
MSBIOTECH ≤ 2015		2		1			
MSBIOTECH 2016		13					
MSBIOTECH 2017				*13*			"Steady state", ref vår 18
MSBIOTECH 2018						*13*	"Steady state", ref vår 18
MBIOT5 ≤ 2012		2					
MBIOT5 2013		22					
MBIOT5 2014				29			25 % frafall per år fra høst 18
MBIOT5 2015						29	25 % frafall per år fra høst 18
SUM		**66**		**82**		**91**	

Scenario 2

Realfagsundersøkelse, matteknologi



Svarprosent 86 %

Grupper	**Antall studenter**
1 klasse 2016-2019	57
2 klasse 2015-2018	37
3 klasse 2014-2017	38
Masterklassen 2016-2018	12
SUM	**144**

Fordeler

- Bedre rustet for akademisk løp innen teknologi og naturvitenskap
- Grunnlag for bedre prosessforståelse
- Økonomisk fordel: samkjøring av emner, frigir lærekrefter, mer tid til forskning
- Høyere status
- Kan bruke mindre tid på «svake» studenter
- Flere?

Ulemper

- Mister vi kandidater? Spesielt de med yrkesfaglig bakgrunn
- Få realfagskandidater fra vgs, hard konkurranse
- Omlegging av emneinnhold
- Flere?

- Studieprogramråd: Anbefaler krav til realfag som opptakskrav. Eksterne representanter fra Mattilsyn og Norske Sjømatbedrifters Landsforening
- TINE Organisasjonsutvikling gjør det samme, men er opptatt av å markedsføre y-veien inn i høyere utdanning.

CENTRE FOR
DIGITAL LIFE
NORWAY

3DLife: Emulating life in 3D with digital and experimental tissue models

Financed by Norwegian Research Council, Biotek2021 Program: DigitalLife

3DLife – Emulating Life in 3D with digital and experimental tissue models

In vitro cell models are playing an important role for our understanding of Biology and for disease models (cancer, etc), therapy (immunetherapy, etc.), and toxicology studies. Better in vitro models, moving from 2D to 3D and from cells to tissue and organs is expected to

- Increase the precision of the models as research tools and for the prediction of action of therapy in e.g. toxicology studies.
- Higher precision of in vitro studies may lead to less use of animal research
- Increase the understanding of tissue development important for tissue engineering and regenerative medicine
- Deliver materials and tissue relevant for tissue engineering

3DLife aims to develop novel strategies for microtissue engineering in 3D, to provide model systems of organ function and bridge the gap to in vivo conditions

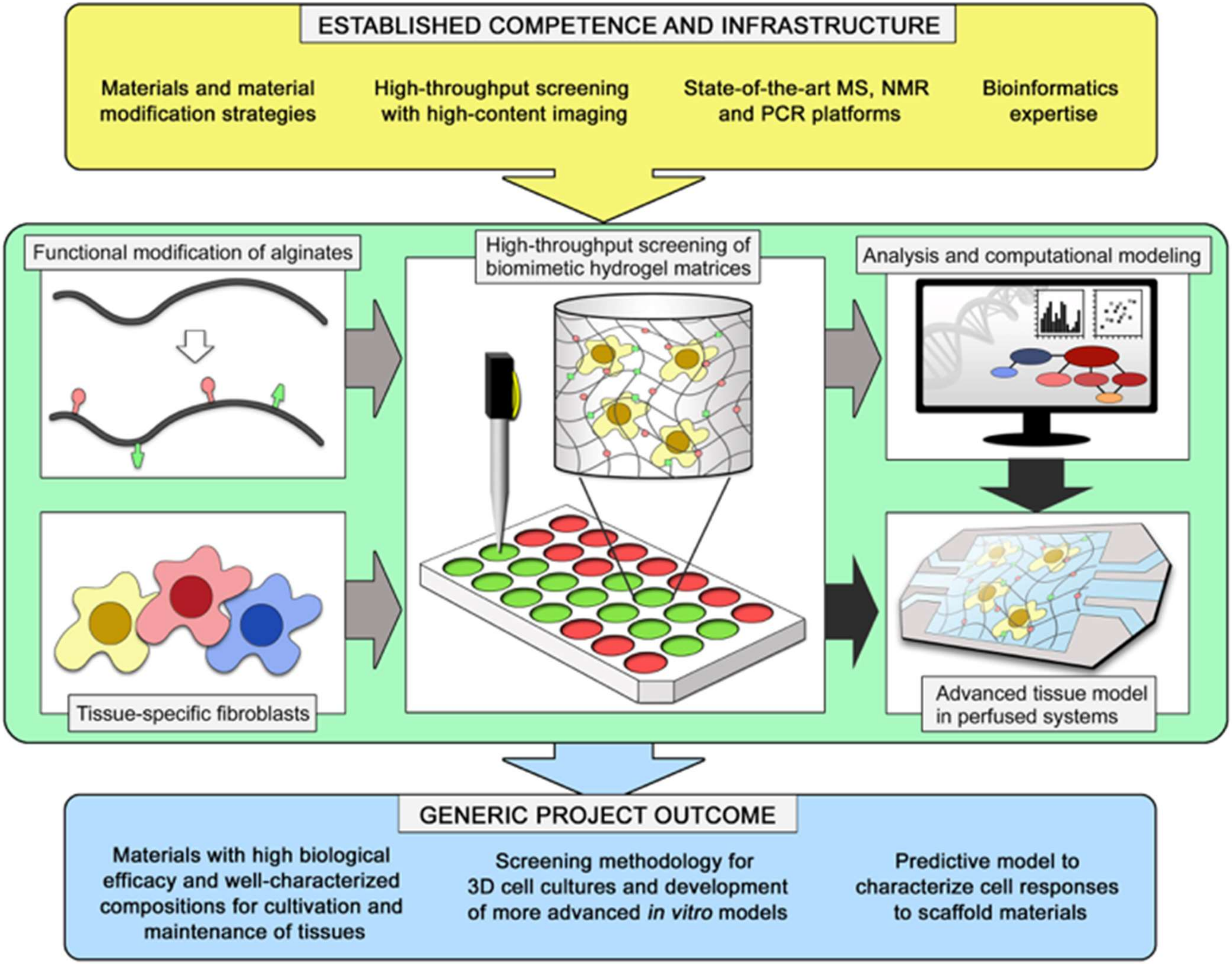
CENTRE FOR DIGITAL LIFE NORWAY

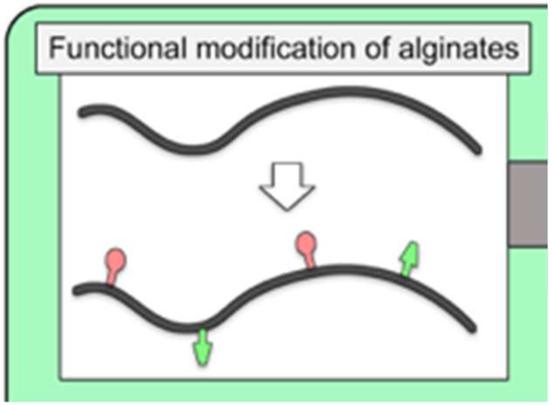
Forskningsrådet

The Research Council of Norway

SINTEF

NTNU


ESTABLISHED COMPETENCE AND INFRASTRUCTURE
Materials and material modification strategies
High-throughput screening with high-content imaging
State-of-the-art MS, NMR and PCR platforms
Bioinformatics expertise
Functional modification of alginates
High-throughput screening of biomimetic hydrogel matrices
Analysis and computational modeling
Tissue-specific fibroblasts
Advanced tissue model in perfused systems
GENERIC PROJECT OUTCOME
Materials with high biological efficacy and well-characterized compositions for cultivation and maintenance of tissues
Screening methodology for 3D cell cultures and development of more advanced in vitro models
Predictive model to characterize cell responses to scaffold materials



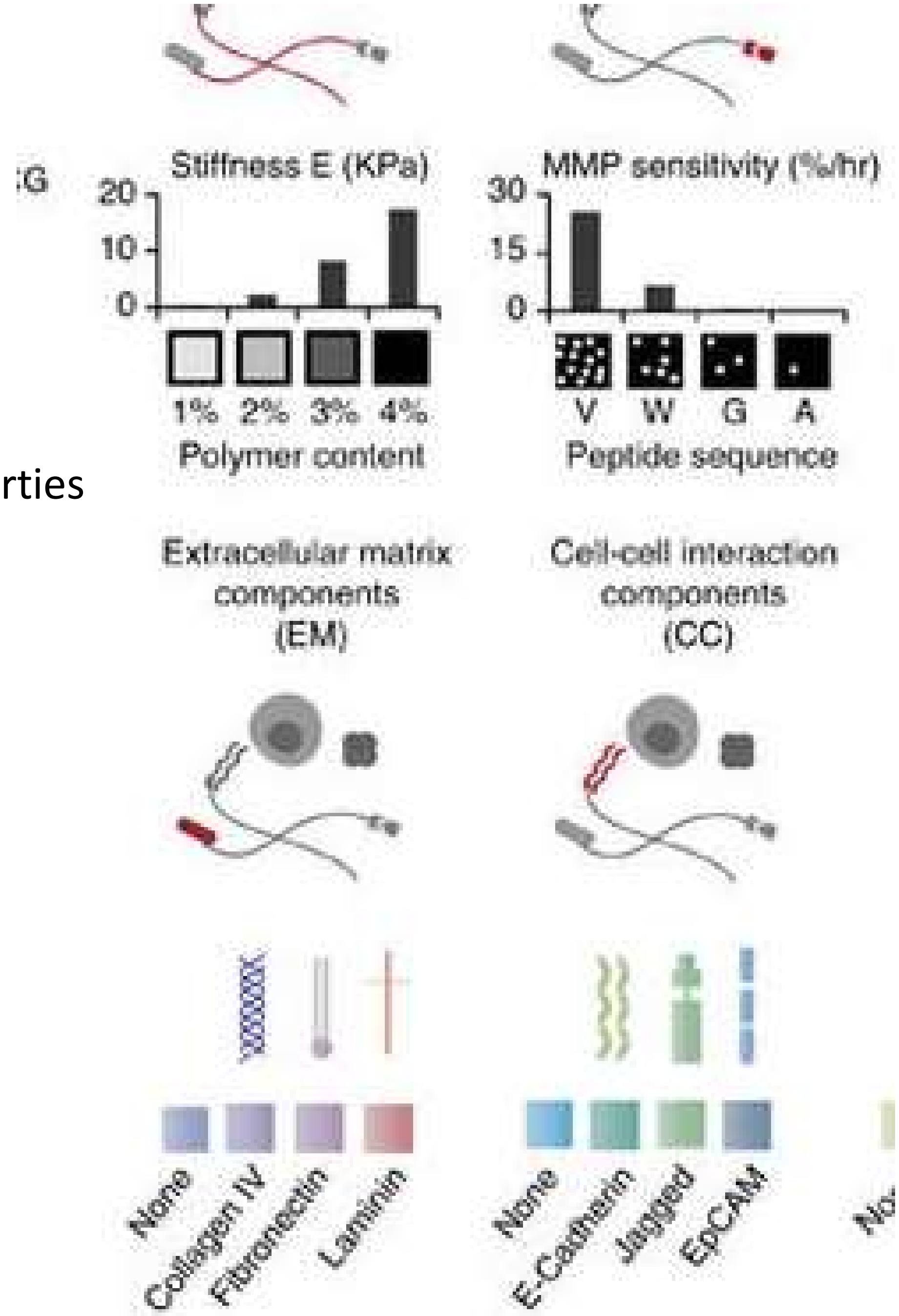
Controlling biological and mechanical properties of alginate hydrogels:

Biological properties:

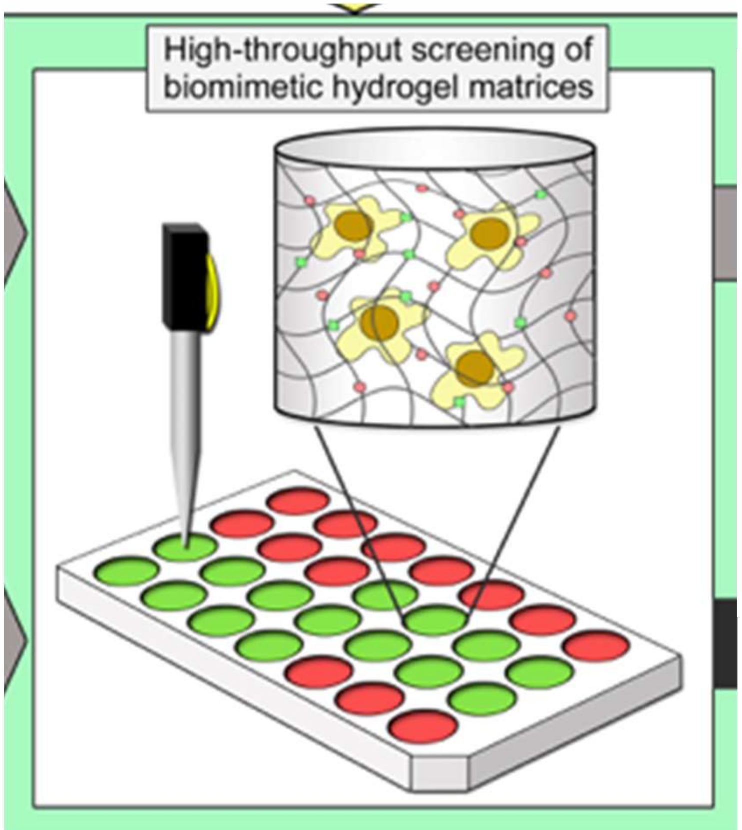
- Sulfation
- Peptide grafting (e.g. RGD)

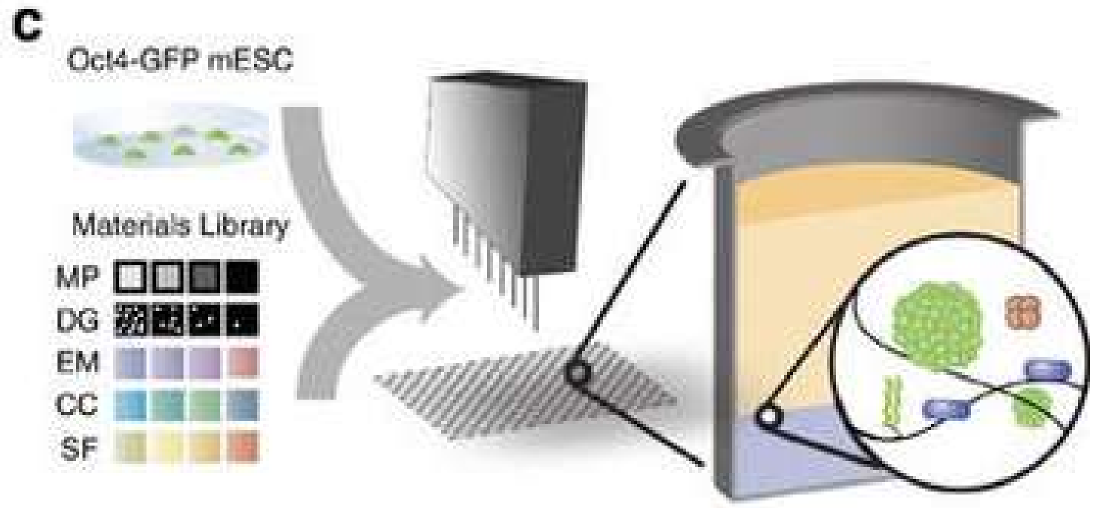
Mechanical properties (stiffness, stability):

- Block structure (G-content)
- Concentration
- Gelling ions
- Epimerisation

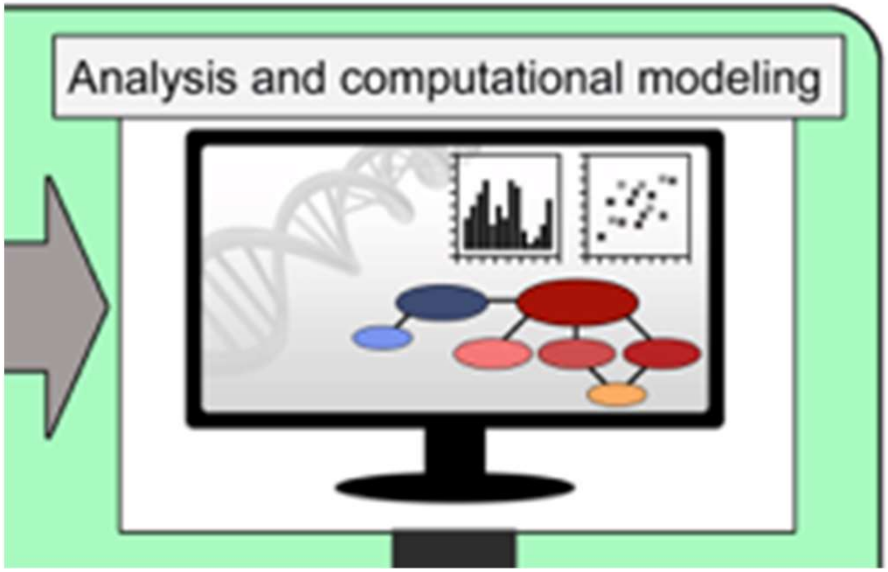
Lutolf et al. Nature Communication 5, 2014





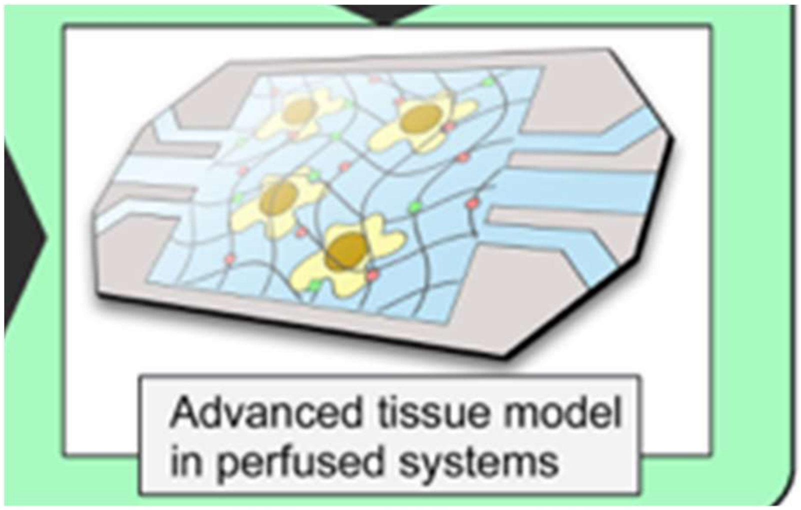
Lutolf et al. Nature Communication 5, 2014

Screening output:
- Viability
- Cell morphology (area)
- RNA screening of selected samples

Connecting material properties (biological and mechanical) with cell viability and phenotype

Predict preferred materials for different phenotypes (primary cells)



Combining optimal materials with primary fibroblasts in perfused bioreactors (on chip) as tissue models.

Project timeline

4 year project, from July 2017 to July 2021

Gantt chart with Work packages (WP) and milestones (M)																
WPs and tasks	**2017**		**2018**				**2019**				**2020**				**2021**	
WP1. Project management, dissemination, responsible Research and Innovation																
WP2. Material synthesis, characterization and structuring				**M1**												
WP3. High throughput 3D screening in fibroblast cell lines in new scaffolds								**M2**								
WP4. Developing predictive computational model of cell response to material properties																**M4**
WP5. In-depth screening of primary fibroblast function in selected scaffolds												**M3**				
WP6. Sustaining differential cell function in advanced 3D-models with optimal scaffolds																**M5**

Main milestones:

M1: Scaffold library generated

M2: HTS data generated

M3: RNA markers identified

M4: Predictive computer model generated

M5: Functional perfused microtissue model

Pål Sætrom, Professor
Department of
Computer Science (IDI)
Department of Cancer
Research and Molecular
Medicine (IKM)

+ one post doc

Vidar Beisvår, Genomics
Core Facilities
IKM

Øyvind Halaas, Professor i
nanomedisin
Institutt for kreftforskning og
molekylær medisin

+ Cecilie Lund (PhD candidate)
+ one new PhD candidate

SINTEF: Hanne Haslene-Hox,
Øystein Arlov,
Geir Klinkenberg, Håvard Sletta

+ Anita Akbarzadeh (PhD candidate)
+ one new post doc
+ technical support (Wenche)

+ 20% PhD RRI (w/Heidrun Åm)

CENTRE FOR DIGITAL LIFE NORWAY

Systems analysis and fundamental control of bacterial processes in the production of bio-concrete for construction purposes (BioZEment 2.0)

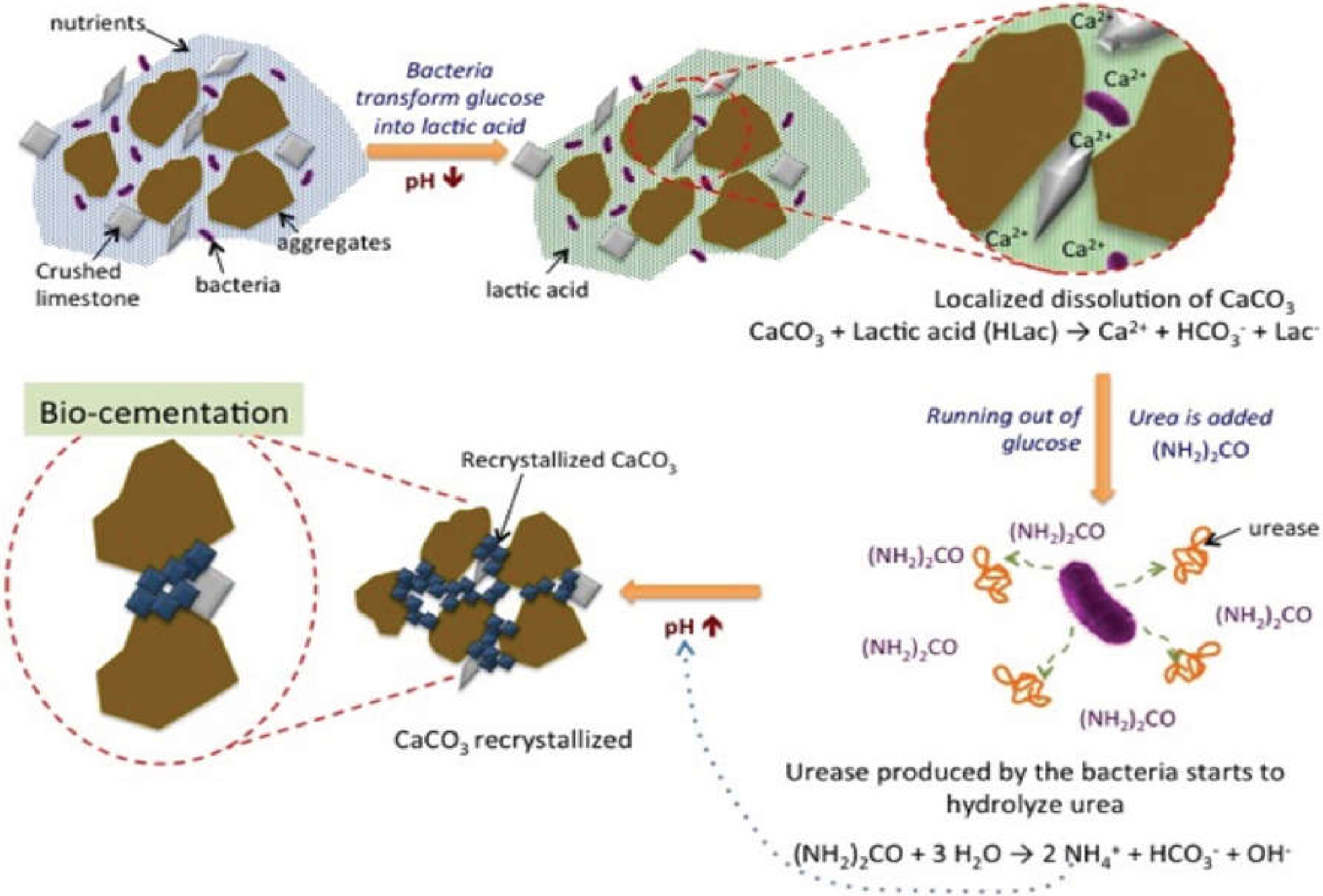
Prof. Eivind Almaas
Network Systems Biology


www.WALLTIES.com

Motivation of BioZEment 2.0

- Approx. 10 km^3 of concrete produced every year
- Concrete cannot be recycled, only downgraded
- Local raw materials & low cost → used everywhere
- Made from (A) Water, (B) Aggregate, and (C) Cement as binder
- Main ingredient in cement: CaO, from crushed limestone $CaCO_3$
- **The making of cement: responsible for 5-10% of global CO_2 emissions**

Bio-cement: use bio-catalytic dissolution & precipitation of calcium carbonate



Par

Partner/ Competence	Microbiology, Molecular Biology	'Omics analyses, Systems Biology	Geochemical modelling	Micro-scale experimental verification	Life-cycle assessment, environ. impact	Techno-economic evaluations	Societal aspects, RRI
UiO			X	X			
SINTEF	X	X					
NTNU/Sikorski				X			
NTNU/Almaas		X					
SIFO							X
IRIS			X				
SP					X		
OO, subcontr.						X	

[redacted]

WP1: Systems Biology of bacterial processes

- **Generate high-quality genome-scale metabolic reconstruction for** *Bacillus safensis* (strain AP-004)**.**
- **Identify strain modifications that will optimize lactic acid production**
- **Test model quality & predictions against experimental data**

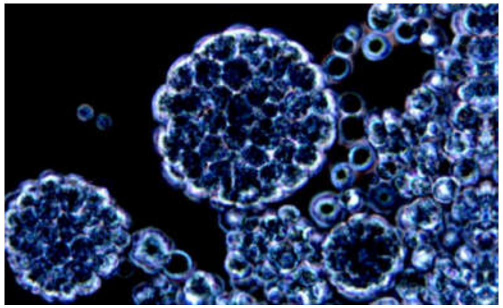
- **T1.1:** Genome-scale metabolic reconstruction of strain *Bacillus AP-004/029*
- **T1.2:** Dynamic flux-balance analysis
- **T1.3:** Verification of metabolic models

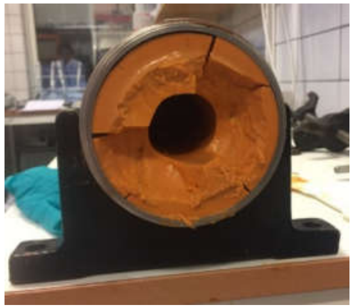
Milestones / Deliverables

- **D1.1/2/3:** Genome-scale model of AP-004 (AP-029), M12/M24/M36
- **M1.1:** dFBA performed, M24
- **M1.2:** dFBA predictions tested, M41

AurOmega

Microbial production of omega-3 fatty acids – a model based approach





Microbial fat research projects at NTNU and SINTEF

- bacteria, microalgae, thraustochytrids (unicellular, eukaryote, heterotrophic, obligate marine microorganisms commonly found in seawater and sediments)

PROJECTS (2000 2005 2010 2015 2020)	Aims and achievements
NFR Bioteknologi i primærnæringene "DHA from marine single cell organisms (thraustochytrids)"	Establishment and initial screening of ~ 100 thraustochytride strain collection, up to 10 with interesting lipid accumulating properties
NFR Bioprospektering "Efficient bioprospecting of marine microorganisms"	
NFR Havbruk "Marine microorganisms as source of DHA for use in first-feeding of cod larvae"	
Ertesvåg, H. , IBT: Strategic report	"Scientific evaluation of bioprocess alternatives for production of marine fatty acids"
IBT/ NTNU Marine satseområdet: 2 PhDstipends, 1 post doc	Microalgae: Lipid synthesis and photosynthesis, Gene editing
Era CoFasp Microfeed "Microbial raw materials as source for protein and EPA and DHA for use in aquafeed"	Digestability tests of microalgae and thraustochytrids
NFR Bionær/ Biotek2021 ThraustoEng "Novel microbes for high level production of the omega3-fatty acid DHA and astaxanthin from biomass feedstocks"	Draft genome sequence *Aurantiochytrium* T66 and S61, Protocols for plasmid transfer and homologous recombination established, transcriptome time series
NFR Biotech/ Havbruk MIRA "Microbially produced raw materials for aquafeed"	Microalgae, *Rhodococcus opacus*
NFR DLN AurOmega "Microbial production of omega-3 fatty acids – a model based approach"	Systems Biology on *Aurantiochytrium*

AurOmega project team:

Partners: Department of Biotechnology and Food Science (IBT), NTNU and SINTEF Department of Biotechnology and Nanomedicine

Project leader: Professor Per Bruheim (IBT)

Key scientific personnel:

Senior scientist/ Adjunct professor Helga Ertesvåg (IBT) – responsible for strain engineering

Senior scientist Inga Marie Aasen (SINTEF) – responsible for strain cultivations

Professor Eivind Almaas (IBT) – responsible for modelling and simulation

Professors Olav Vadstein and Trygve Brautaset (IBT)

IBT recruited personnel: 1 PhD candidate, 1 post doc (3 years), 1 research scientist/ post doc (2 years), 1 senior scientist (50% 3.5 years)

The primary objective of AUROMEGA

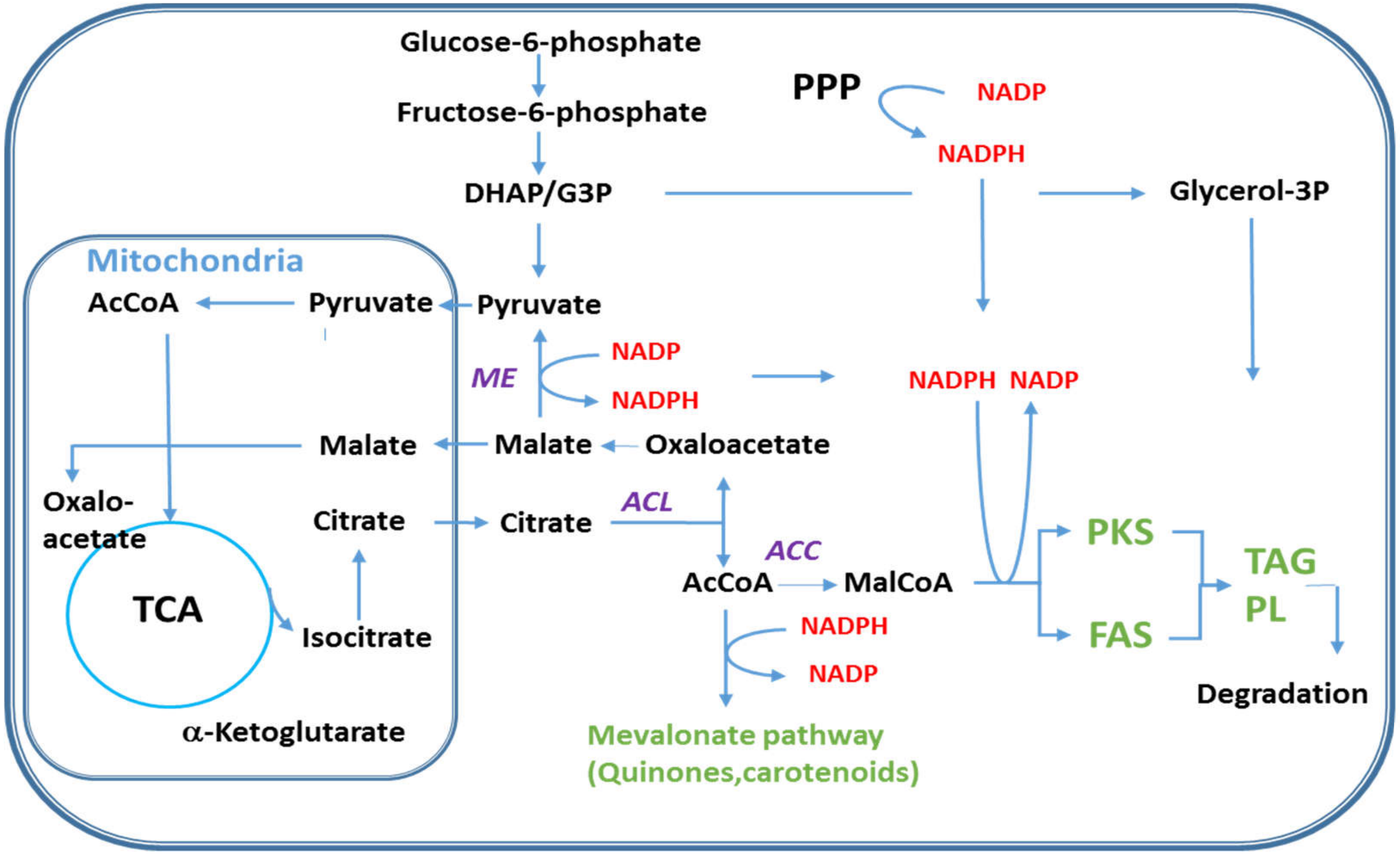
- ✓ is to establish a knowledge platform on DHA synthesis and lipid accumulation in the native DHA-producing thraustochytrids, and to develop these into high productivity omega-3 fatty acid producing cell factories.

Secondary objectives

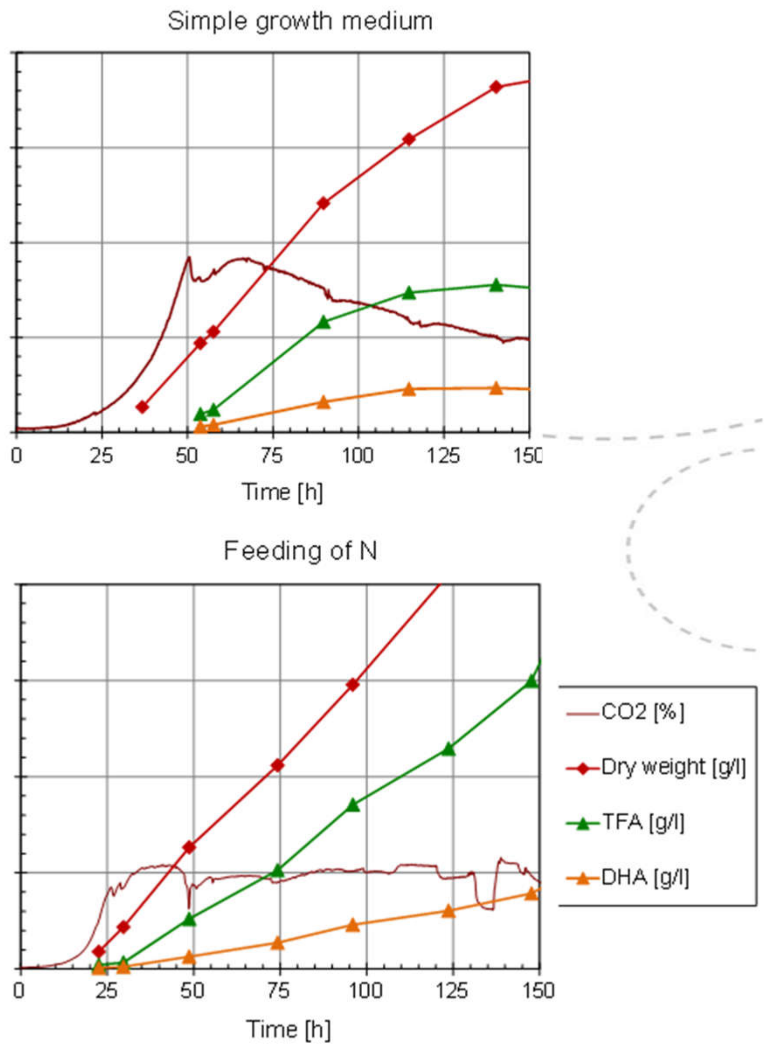
- ✓ Establish a genome scale model for *Aurantiochytrium* sp. T66/ S61 with predictive capabilities.
- ✓ By model prediction identify and rank metabolite and enzymatic steps and branch points that potentially limit the carbon flow through PKS to DHA
- ✓ Test model predictions for improved DHA production rates by targeted engineering using genome editing and process engineering.
- ✓ Understand how to maintain maximum fatty acid production rates through the lipid accumulation phases
- ✓ Active dialogue with the feed- and fish-farming industry on their needs, limitations and possibilities in conjunction with other aspects and tasks on responsible research and innovation

Project plan with timetable for Tasks and Milestones (in italics):

	Description	2017	2018				2019				2020				2021
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
T1	Deep Phenotyping of wild type strains														
M1	*Phenotype for selected cultivation conditions characterized*														
T2	Development of genome scale metabolic model and predict strain optimization strategies														
M2	*Draft genome scale metabolic model ready*														
M3	*Genome scale metabolic model validated*														
T3	Identification of co-regulated gene clusters central to DHA-synthesis and onset of lipid accumulation														
M4	*Gene regulatory network described*														
T4	Identification of rate limiting step(s) in the DHA-synthesis														
M5	*Marker free genome editing demonstrated*														
M6	*Ranked list of potential rate limiting step(s)*														
T5	Maintenance of high DHA and TAG production rate														
M7	*Prolonged DHA production obtained*														
T6	Identification of targets for strain engineering based on the output from T1-5														
M8	*Mutants with improved properties obtained*														
T7	Modelling-based optimization of the overall volumetric productivity of DHA														
M9	*Process with improved DHA productivity demonstrated*														
T8	Project management, RRI and dissemination														



Glucose-6-phosphate
Fructose-6-phosphate
PPP
NADP
NADPH
DHAP/G3P
Glycerol-3P
Mitochondria
AcCoA
Pyruvate
Pyruvate
ME
NADP
NADPH
NADPH NADP
Malate
Malate
Oxaloacetate
Oxalo-
acetate
Citrate
Citrate
ACL
ACC
TCA
Isocitrate
AcCoA
MalCoA
NADPH
NADP
PKS
FAS
TAG
PL
Degradation
α-Ketoglutarate
Mevalonate pathway
(Quinones,carotenoids)



Simple growth medium
0
25
50
75
100
125
150
Time [h]
Feeding of N
0
25
50
75
100
125
150
Time [h]
CO2 [%]
Dry weight [g/l]
TFA [g/l]
DHA [g/l]

Present situation on the global marked for microbially produced omega-3 fatty acids

- ✓ Untill now controlled by DSM (after acquiring US-based Martek) but early patents are expiring
- ✓ ADM is entering the marked now with "algal" derived DHA process?
- ✓ Evonnik and DSM press release Feb17 – marine algae process, capacity 15% of global marked
- ✓ Reported productivities and current prices of products for human nutraceutical marked show high profit, and techno-economic assessment indicate profit for current processes still down to 15-20 €/ kg EPA/DHA. (Martek info 0.55 g DHA/l-h)
- ✓ Current fish oil prices: 2-2.5 €/ kg, corresponding to 8-10 €/kg EPA/DHA