Model-Based Decision-Making (Forskerprosjekt)

Applicant

Institution/company responsible for the project

Institution / company (norwegian name) *	Norwegian University of Science and Technology
Faculty	Information Technology, Mathematics and Electrical
Institute	
Departement	Department of Ecngineering Cybernetics
Address*	Department of Engineering Cybernetics
City code*	N-7491
City*	Trondheim
Country*	Norway
E-mail*	morten.hovd@itk.ntnu.no
Website	www.itk.ntnu.no
Enterprise number	
Auditor	Office of the auditor general

Administrative responsibility

First name*	Anna-Ma
Last name*	Hogstad
Position/title	Fakulty director
Phone*	+47 73596002
E-mail*	Anne-M.Hogstad@ime.ntnu.no
Confirmation*	☑ The application has been approved by the Institution/company responsible for the project

Project manager

First name*	Morten
Last name*	Hovd
Institution / company (norwegian name)	Morwegian University of Science and Technology
Faculty	Information Technology, Mathematics and Electrical
Institute	
Departement	Department of Engineering Cybernetics
Address*	O. S. Bragstads plass 2d
City code*	N-7491
City*	Trondheim
Country*	Norway
Position/title	Professor
Academic degree	Dr. Ing.
Preferred language	Bokmål
Phone*	+47 73591426

E-mail*	morten.hovd@itk.ntnu.no

Project info

Project title

Project title*	Model-Based Decision-Making for Large-Scale Systems

Principal objective and sub-goals

-To make significant contributions to optimal decision-making in large-scale, hierarchical systems.
-To educate 7 PhD candidates and offer 6 man-years of post-doctoral training during 4 years of operation.
-The results of the research will be published in at least 20 papers in top international peer-reviewed journals.
-To expand and strengthen our research team through collaboration with top international institutions and incorporation of researchers from Industrial Economics at NTNU.
-To maintain the level of activity in highly active research groups at NTNU.

Project summary

The project will contribute to the understanding of optimal decision-making in large-scale systems. Many real-world systems are so large and complex that centralized, simultaneous and perfectly coordinated decision-making is infeasible and in practice impossible. Examples include electricity and natural gas distribution networks and industrial supply chains. Decomposition in both time (speed of response) and space (geographically) is used to convert an unmanageable operational problem (or design problem) into more manageable sub-problems. This decomposition results in a hierarchical decision-making structure, with limited communication between the layers of the hierarchy.
Methodology for how to perform the tasks at each layer of the hierarchy is reasonably well developed. However, very little is done on how to ensure cooperation between the layers, how to account for uncertainty at other layers, and how to design the interfaces between layers to minimize performance loss due to imperfect coordination between the layers.
The project will have two focus areas:
1) How to ensure the use of consistent models at different layers. A model is the natural way to encapsulate our knowledge about the system, but the different scope of the different layers of the decision-making hierarchy necessitates the use of different models. Inconsistencies between models at different layers is a prime cause for poor coordination between layers.
2) How to account for unceratinty at different layers and from different sources. Uncertainty may come from such different sources as market demand and equipment degradation. Accounting for uncertainty is very challenging, in particular if it primaily occurs at a different layer of the hierarchy, and has no natural representation in the model used at the layer under study.
The project thus addresses problems of a fundamental nature that are relevant to a variety of large-scale systems.

Placement

Research Council funding division - supplementary info from applicant

Program / activity	STORFORSK
Application type	Forskerprosjekt
Other relevant programmes/activities	
Discipline (s)/specialist field*	Basic research in systems technology
If applying for additional funding, specify project number	
Have any related applications been submitted to the Research Council and/or any other public financing scheme	No
If yes, enter	

further information

Applicationform version: v3.3

Project timetable

Timetable

| Project period | From date (yyyymmdd)* | 20050101 | To date (yyyymmdd)* | 20081231 |

Main activities and milestones in the project period (year and quarter)

	From	To
PhD activities	2005 1	2008 4
PostDoc training	2005 3	2008 4
Project management	2005 1	2008 4

Project publication plan
-The project shall result in 7 PhD theses.
-Research results will be published in at least 20 papers in top international peer-reviewed journals.
-At least 30 presentations are expected at international conferences.
-National dissemination through the extensive networks of the project participants, the Gas Technology
Center NTNU-SINTEF and the Norwegian Research Bulletin Modeling, Identification and Control

Budget

Cost plan (in NOK 1000)

	2004	2005	2006	2007	2008	2009	2010	2011	Sum
Personnel costs and indirect costs		2192	5533	6044	3074				16843
Purchase of R&D services									0
Equipment									0
Other operating costs		733	1117	981	876				3707
Totals	0	2925	6650	7025	3950	0	0	0	20550

Specifications — Each PhD is estimated to cost on average 1.95 MNOK, including personnel costs, computing equipment, 6 months visit at an international collaborator, and travel to conferences.

Each Post Doc activity is estimated at 0.75 MNOK/year, on the same basis as above.

Project management is included in the personnel costs above, with 0.2 MNOK/year.

Support for the infrastructure of the research team as a whole is allocated 0.4 MNOK/year, to cover software licenses, travel to conferences and visits made by senior members of the team, inviting visitors and guest lecturers, publication, etc.

Cost code (in NOK 1000)

	2004	2005	2006	2007	2008	2009	2010	2011	Sum
Business and industry									0
R&D Institute sector									0
University sector		2925	6650	7025	3950				20550
Other sectors									0
Abroad									0
Totals	0	2925	6650	7025	3950	0	0	0	20550

Funding plan (in NOK 1000)

	2004	2005	2006	2007	2008	2009	2010	2011	Sum
Own funding									0
International funding									0
Other public-sector funding									0
Other private funding									0
From Research Council		2925	6650	7025	3950				20550
Totals	0	2925	6650	7025	3950	0	0	0	20550
Specifications									

Person for whom a fellowship/position is being sought

First name   Last name   Personal number
PhD1

Documentation for calculation of position

Type of fellowship   From date (yyyymmdd)   To date (yyyymmdd)
Doctoral fellowship   20050101   20071231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%		100	100	100				

Documentation for calculation of overseas fellowships and guest researcher fellowship

		Travelling with family	Travelling expenses
		No	8000
Name	Imperial College London		**Period**
Address			From date (yyyymmdd)
City code			20060701
City	London		To date (yyyymmdd)
Country	United Kongdom		20061231

First name   Last name   Personal number
PhD2

Documentation for calculation of position

Type of fellowship   From date (yyyymmdd)   To date (yyyymmdd)
Doctoral fellowship   20050101   20071231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%		100	100	100				

Documentation for calculation of overseas fellowships and guest researcher fellowship

		Travelling with family	Travelling expenses
		No	12000
Name	Carnegie Mellon University		**Period**
Address			From date (yyyymmdd)
City code			20060701
City	Pittsburgh		To date (yyyymmdd)
Country	USA		20061231

First name   Last name   Personal number
PhD3

Documentation for calculation of position

	2004	2005	2006	2007	2008	2009	2010	2011

Type of fellowship   **From date (yyyymmdd)**   **To date (yyyymmdd)**
Doctoral fellowship   20050701   20080630

Position-%	2004	2005	2006	2007	2008	2009	2010	2011
		50	100	100	50			

Documentation for calculation of overseas fellowships and guest researcher fellowship

Name   Brno University of Technology
Address
City code
City   Brno
Country   Czech Republic

Travelling with family
No

Travelling expenses
8000
Period
From date (yyyymmdd)
20070101
To date (yyyymmdd)
20070630

First name   Last name   Personal number
PhD4

Documentation for calculation of position

Type of fellowship   From date (yyyymmdd)   To date (yyyymmdd)
Doctoral fellowship   20050701   20080630

Position-%	2004	2005	2006	2007	2008	2009	2010	2011
		50	100	100	50			

Documentation for calculation of overseas fellowships and guest researcher fellowship

Name   Imperial College London
Address
City code
City   London
Country   United Kingdom

Travelling with family
No

Travelling expenses
8000
Period
From date (yyyymmdd)
20070101
To date (yyyymmdd)
20070630

First name   Last name   Personal number
PhD5

Documentation for calculation of position

Type of fellowship   From date (yyyymmdd)   To date (yyyymmdd)
Doctoral fellowship   20060101   20081231

Position-%	2004	2005	2006	2007	2008	2009	2010	2011
			100	100	100			

Documentation for calculation of overseas fellowships and guest researcher fellowship

Name   Carnegie Mellon University
Address
City code
City   Pittsburgh
Country   USA

Travelling with family

Travelling expenses
12000
Period
From date (yyyymmdd)
20070701
To date (yyyymmdd)
20071231

First name | Last name | Personal number
PhD6

Documentation for calculation of position

Type of fellowship | From date (yyyymmdd) | To date (yyyymmdd)
Doctoral fellowship | 20060101 | 20081231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%			100	100	100			

Documentation for calculation of overseas fellowships and guest researcher fellowship

		Travelling with family	Travelling expenses 8000
Name	Brno University of Technology	No	**Period**
Address			From date (yyyymmdd)
City code			20070701
City	Brno		To date (yyyymmdd)
Country	Czech Republic		20071231

First name | Last name | Personal number
PhD7

Documentation for calculation of position

Type of fellowship | From date (yyyymmdd) | To date (yyyymmdd)
Doctoral fellowship | 20060101 | 20081231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%			100	100	100			

Documentation for calculation of overseas fellowships and guest researcher fellowship

		Travelling with family	Travelling expenses 12000
Name	Carnegie Mellon University	No	**Period**
Address			From date (yyyymmdd)
City code			20070701
City	Pittsburgh		To date (yyyymmdd)
Country	USA		20071231

First name | Last name | Personal number
PostDoc 1

Documentation for calculation of position

Type of fellowship | From date (yyyymmdd) | To date (yyyymmdd)
Post-doctoral fellowships | 20050701 | 20070630

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%		50	100	50				

Documentation for calculation of overseas fellowships and guest researcher fellowship

	Travelling with family	Travelling expenses
Name		
Address		**Period**
City code		From date (yyyymmdd)
City		
Country		

First name | Last name | Personal number
PostDoc 2

Documentation for calculation of position

Type of fellowship | From date (yyyymmdd) | To date (yyyymmdd)
Post-doctoral fellowships | 20060101 | 20071231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%			100	100				

Documentation for calculation of overseas fellowships and guest researcher fellowship

	Travelling with family	Travelling expenses
Name		**Period**
Address		From date
City code		(yyyymmdd)
City		
Country		To date
		(yyyymmdd)

First name | Last name | Personal number
PostDoc 3

Documentation for calculation of position

Type of fellowship | From date (yyyymmdd) | To date (yyyymmdd)
Post-doctoral fellowships | 20070101 | 20081231

	2004	2005	2006	2007	2008	2009	2010	2011
Position-%				100	100			

Documentation for calculation of overseas fellowships and guest researcher fellowship

	Travelling with family	Travelling expenses
Name		**Period**
Address		From date
City code		(yyyymmdd)
City		
Country		To date
		(yyyymmdd)

Allocations from the Research Council (in 1000 NOK)

	2004	2005	2006	2007	2008	2009	2010	2011	Sum
Student fellowships									0
Doctoral fellowships		1665	3885	3885	2220				11655
Post-doctoral fellowships		327	1308	1635	654				3924
Fellowships for visiting researchers									0
Overseas fellowships			140	324					464
Researcher									0

positions									
Hourly-based salary including indirect costs		200	200	200	200				800
Sum personnel costs and indirect costs	0	2192	5533	6044	3074	0	0	0	16843
Purchase of R&D services									0
Equipment type									0
Other operating expenses		733	1117	981	876				3707
From Research Council	0	2925	6650	7025	3950	0	0	0	20550

Active partners

Active partners

	Institution/ company*	Responsible name	Responsible phone	Responsible email	Partners role*
1	CPSE, Imperial College London	Stratos Pistikopoulos	+44 20 7594 662	e.pistikopoulos@imperial.ac.uk	executive
2	Dept. of Chem. Eng.,Carnegie Mellon University	B. Erik Ydstie	+1 412 268 2235	ydstie@andrew.cmu.edu	executive
3	Inst. of Mathematics, Brno University Technology	Pavel Popela	+420 5411 42722	popela@um.fme.vutbr.cz	executive

Attachments

Project description*
Filename	MLSST.pdf
Reference	ES96174_001_1_Prosjektbeskrivelse_20040616.pdf

Curriculum vitae (CV) with list of publications*
Filename	CVpubl.pdf
Reference	ES96174_002_1_CV_20040616.pdf

Course marks (grades) (Doctoral and student fellowships)
Filename	
Reference	

Experts
Filename	Reviewers.pdf
Reference	ES96174_005_1_Fageksperter_20040616.pdf

Recommendation and invitation (overseas fellowship)
Filename	Partners.pdf
Reference	ES96174_006_1_AnbefalingInvitasjon_20040616.pdf

Confirmation from active partner(s)
Filename	Partners.pdf
Reference	ES96174_008_1_AktiveSamarbeidspartnere_20040616.pdf

Other items
Filename	
Reference	