Patterns Boosting Adaptivity in ACM

AdaptiveCM 2013, OTM 2013
Graz 10-11 September 2013

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Steinar Carlsen, Gunnar John Coll
Computas AS, Norway

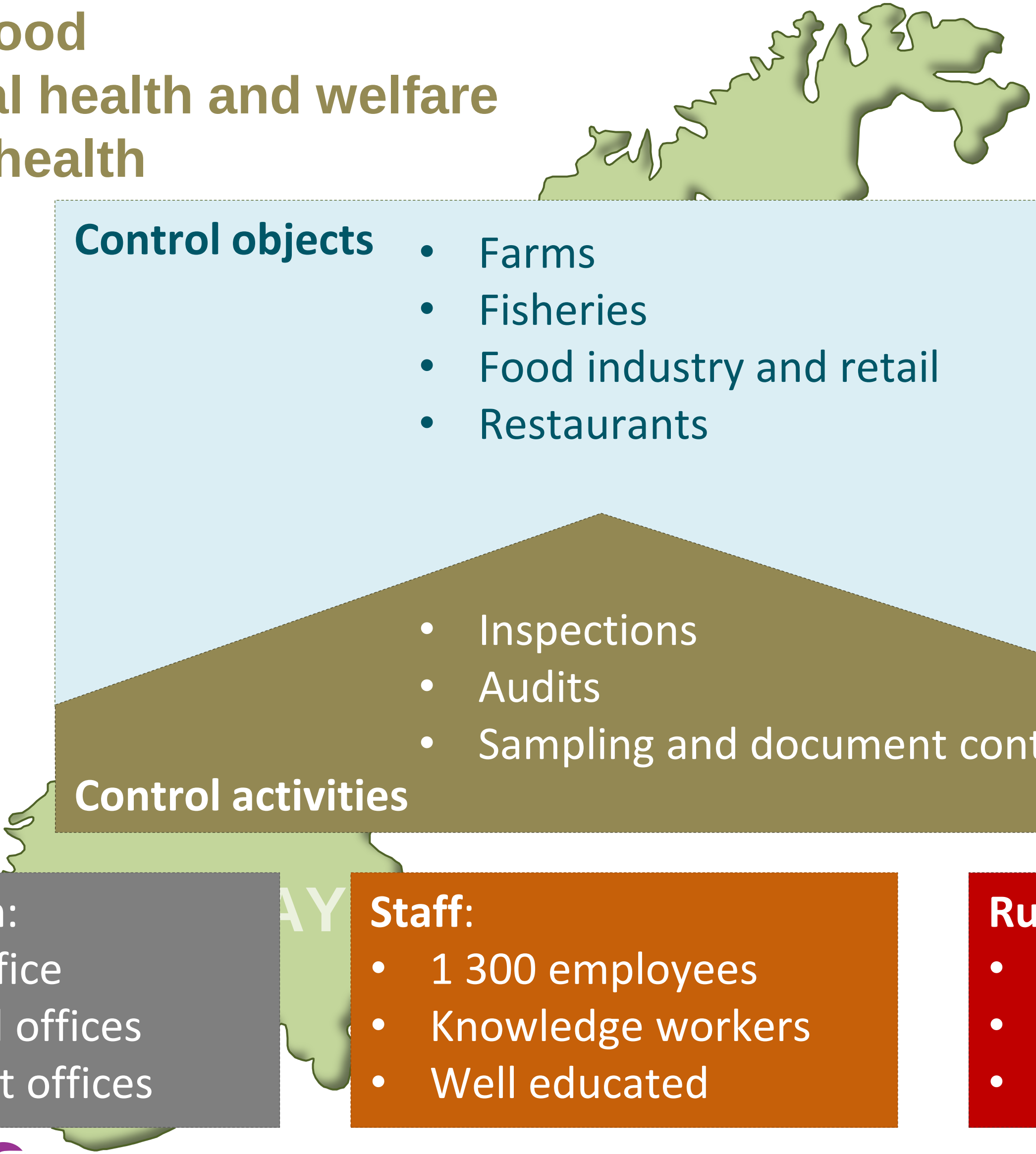
Background

- 3 award-winning operational ACM solutions
  - MATS – Norwegian Food Safety Authority
    - Decision support for audits / control activities
    - Self-service for farmers, fisheries, restaurants,…
  - LOVISA – Norwegian Courts Administration
    - Handling all cases in first and second instance courts
    - Judicial collaboration hub
  - GTS – CargoNet
    - Freight train logistics – from client to final delivery
- All based on the same ACM framework
- Focus: Means for achieving adaptivity

Norwegian Food Safety Authority (NFSA) business context

2012 ACM Global Excellence in Adaptive Case Management

- ✓ Safe food
- ✓ Animal health and welfare
- ✓ Plant health



Control objects

- Farms
- Fisheries
- Food industry and retail
- Restaurants

Control activities

- Inspections
- Audits
- Sampling and document control

Organization:

- 1 head office
- 8 regional offices
- 54 district offices

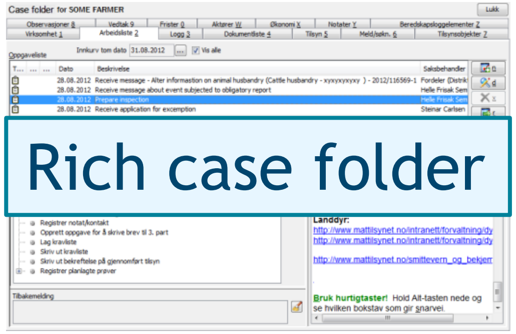
Staff:

- 1 300 employees
- Knowledge workers
- Well educated

Rules and regulations:

- Thousands of rules
- National legislation
- EU harmonised

NFSA’s MATS - control activity module



Case folder for SOME FARMER

Oppgaveliste

Innkurv tom dato 31.08.2012 ☑ Vis alle

T...	...	...	Dato	Beskrivelse	Saksbehandler
			28.08.2012	Receive message - Alter informastion on animal husbandry (Cattle husbandry - xyxyxyxyxy) - 2012/116569-1	Fordeler (Distrik
			28.08.2012	Receive message about event subjected to obligatory report	Helle Frisak Sem
			28.08.2012	Prepare inspection	Helle Frisak Sem
			28.08.2012	Receive application for excemption	Steinar Carlsen

- Registrer notat/kontakt
- Opprett oppgave for å skrive brev til 3. part
- Lag kravliste
- Skriv ut kravliste
- Skriv ut bekreftelse på gjennomført tilsyn
- Registrer planlagte prøver

Tilbakemelding

Landdyr:

http://www.mattilsynet.no/intranett/forvaltning/dy

http://www.mattilsynet.no/intranett/forvaltning/dy

http://www.mattilsynet.no/smittevern_og_bekjem

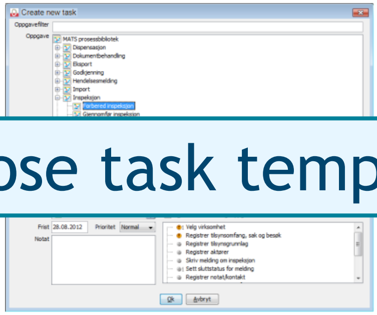
Bruk hurtigtaster! Hold Alt-tasten nede og se hvilken bokstav som gir snarvei.

Rich case folder

Event

Application

Planned action



Create new task

Oppgavefilter

Oppgave

- MATS prosessbibliotek
  - Dispensasjon
  - Dokumentbehandling
  - Eksport
  - Godkjenning
  - Hendelsesmelding
  - Import
  - Inspeksjon
    - Forbered inspeksjon
    - Gjennomfør inspeksjon

Frist 28.08.2012 Prioritet Normal

Notat

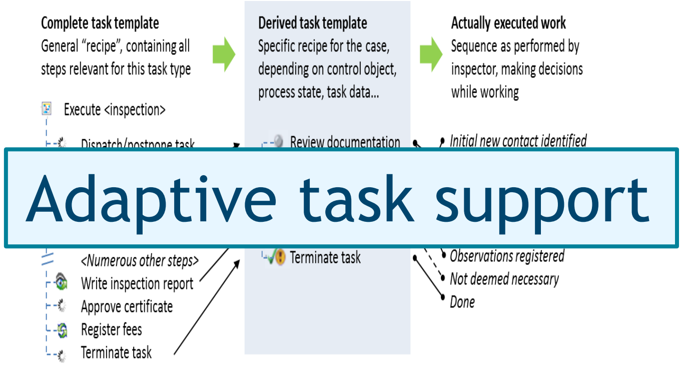
- Velg virksomhet
- Registrer tilsynsomfang, sak og besøk
- Registrer tilsynsgrunnlag
- Registrer aktører
- Skriv melding om inspeksjon
- Sett sluttstatus for melding
- Registrer notat/kontakt

Choose task template

Data maintained in a rich and uniform domain model giving basis for NFSA’s overall planning and governance

Each step contributing to the case folder

Perform task by means of adaptive task template



Complete task template
General “recipe”, containing all steps relevant for this task type

Derived task template
Specific recipe for the case, depending on control object, process state, task data...

Actually executed work
Sequence as performed by inspector, making decisions while working

Adaptive task support

Emergent flow

Data, actions, events, rules

Category: Legal and Courts

The Norwegian Courts Administration *nominated by* Computas AS

Olav Berg Aasen – Deputy Director General
Astrid Irene Eggen – Senior Advisor
Endre Helgesen Skjetne – Senior Advisor

lovisa

Situation

- Case handling and court management for all 1st and 2nd instance courts
- High-quality uniform case handling in accordance with procedural law
- Improve service-level for parties / actors / public
- Improve efficiency and effectiveness of the Norwegian courts
- Improve integration with other judicial actors

Winner 2013

WfMC Awards for Case Management
Global Excellence Awards

The Norwegian Courts Administration

lovisa

Implementation & Innovation

- Adaptive task support for judges and staff
- Context- and user-sensitive task templates
- A personal worklist for every user, a work folder for every case
- Judicial collaboration hub – police, prosecutors, correctional services
- Communication external stakeholders
- 200 case types, 700 task templates
- 1 200 daily users, 200 000 yearly legal cases, 7 000 docs produced daily

Benefits

- From sequential to parallel case processing
- Cross-organizational scheduling and resource management
- Built-to-change, adapting to business changes
- Document production and merging based on case data
- Adopting LOVISA and electronic archives
  - Mutually synergetic
  - Hide archiving nitty-gritty
- Work performance focus simplifies training
- Can be used directly in courts or in office

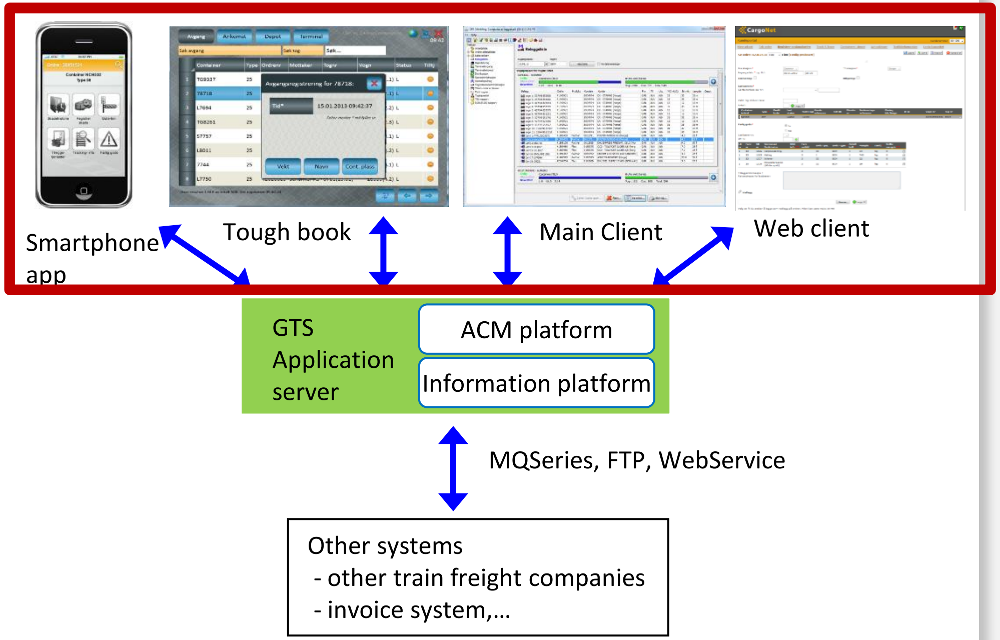
Technology

- Built on the ACM framework FrameSolutions™ Java from Computas AS
- Task engine, rule engine, organization model, shared information platform
- Declarative representation of business logic

Category: Shipping and Logistics

CargoNet AS *nominated by* Computas AS

CargoNet



Other systems
- other train freight companies
- invoice system,…

Situation

- CargoNet AS is the primary Norwegian freight train operator
- Limited infrastructure capacity & increased competition from road based transport
- From train-production to order-based intermodal transportation

Winner 2013

WfMC Awards for Case Management

Global Excellence Awards

CargoNet AS

Implementation & Innovation

- Dynamic task templates rather than static end-to-end processes
- Case work folder for
    - Freight train planning
    - Carriage / container booking
- Focus shifted from “error handling” to adaptive handling of situations
- Process snippets over shared information platform enables rapid system adaptation
- Built-to-change

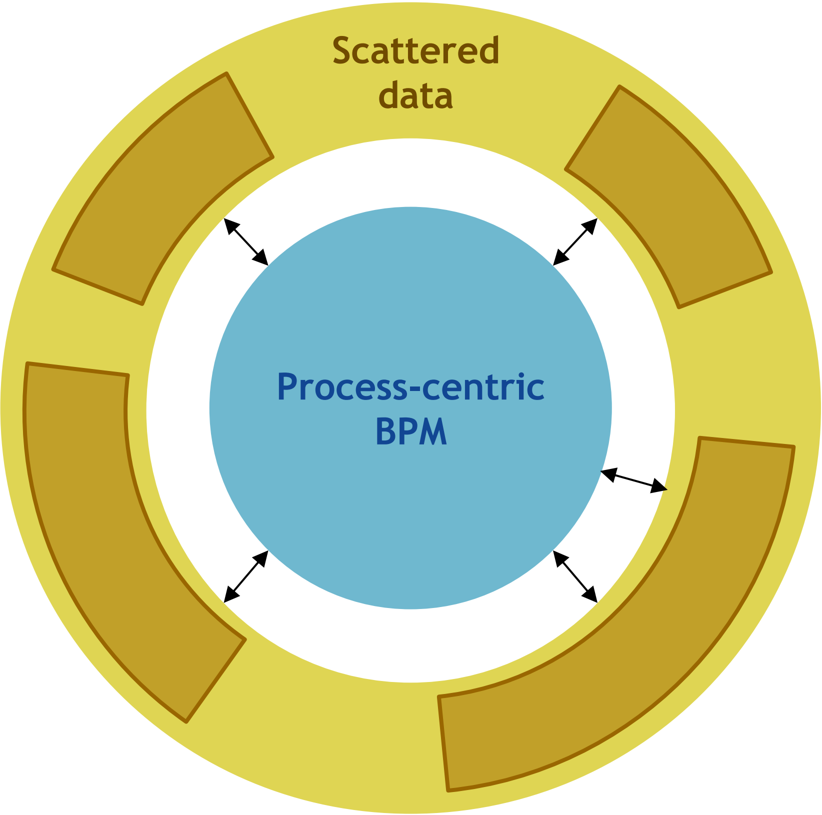
Benefits

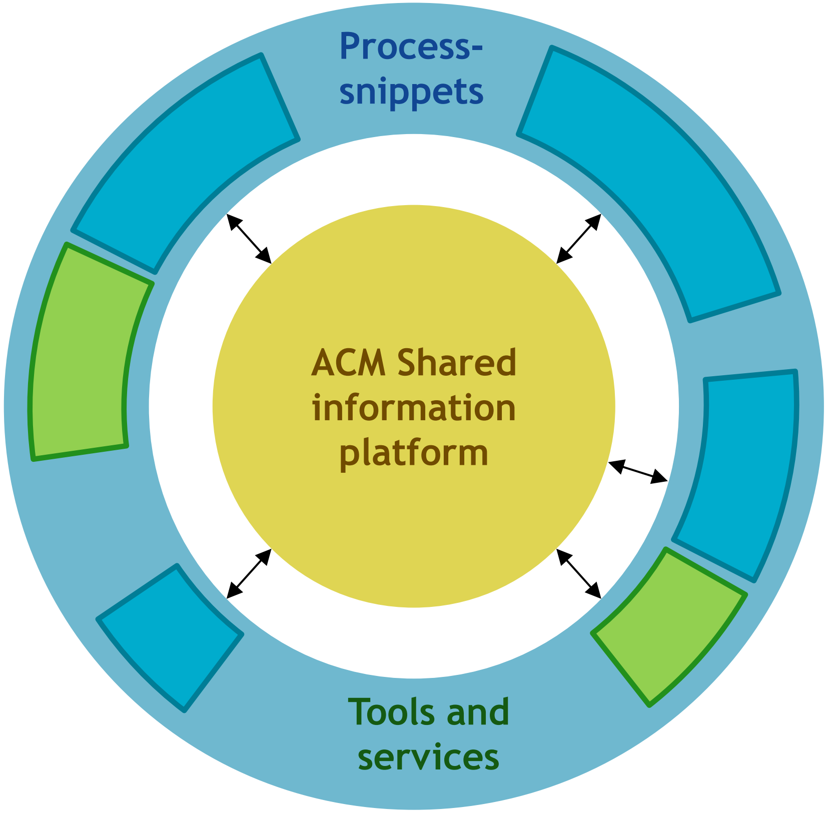
- Considerable cost reductions related to customer handling
- Knowledge based & “real-time” driven customer handling
- Managing physical reality - new mobile clients gives proximity from event to recording
- Shared information platform increases data quality across business operations
- User-centric task support operating on real-time data

Technology

- Built on the ACM framework FrameSolutions™ Java from Computas AS
- Task engine, rule engine, organization model, shared information platform
- Toughbooks in trucks, smartphone mobile client, self-service web portal

Enterprise ACMs are inherently information centric

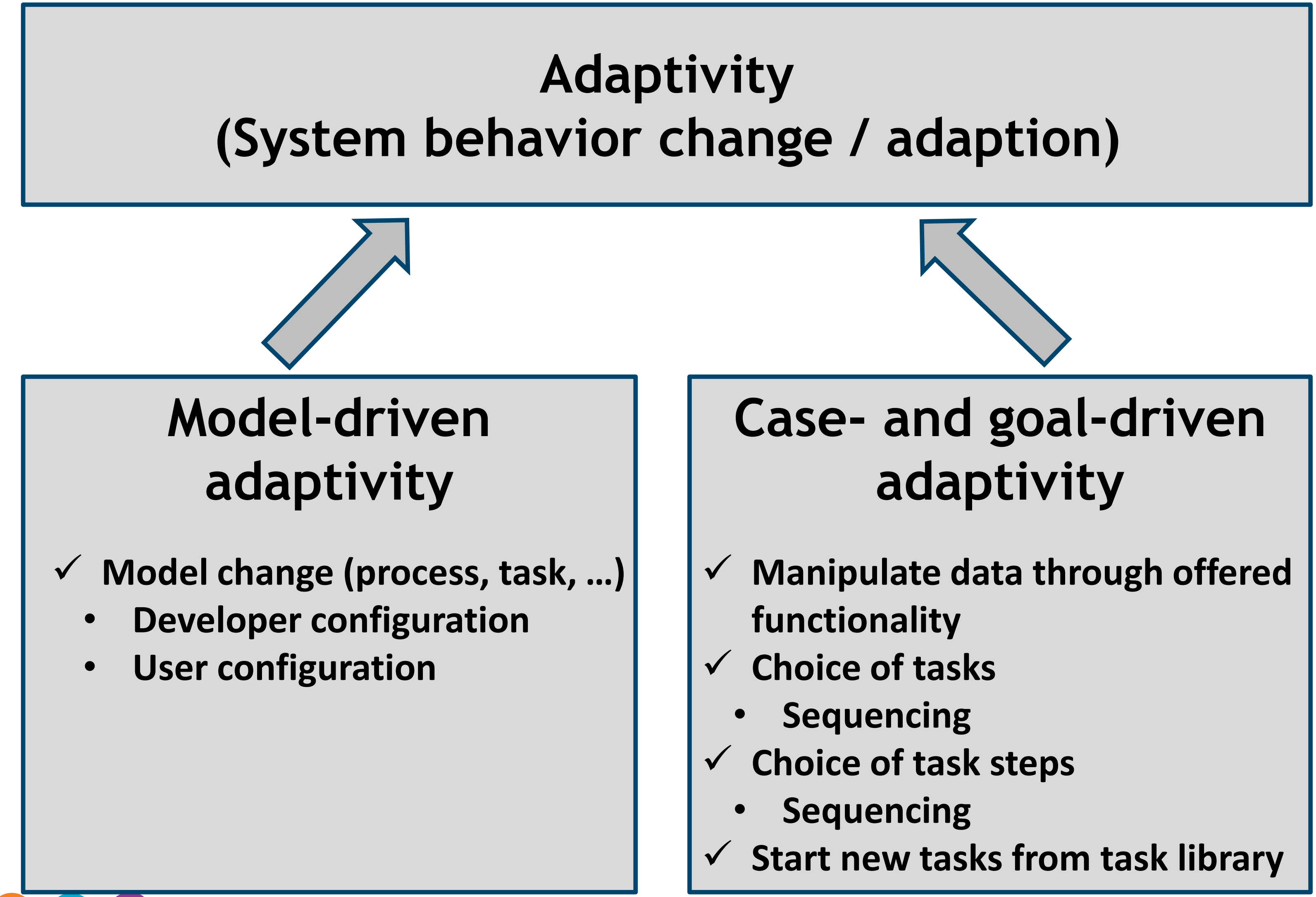




Means for Providing Adaptivity

- **Goal-oriented task pattern libraries**
- **Context-sensitive task patterns**
- **User-sensitive task patterns**
  - User-driven combination of process snippets
  - Real-time composition of process snippet sequences
- **Business rules**
- **Domain model patterns**
  - Soft typing
  - Business objects

Case- and goal-driven adaptivity



Adaptivity
(System behavior change / adaption)

Model-driven adaptivity

✓ Model change (process, task, …)
- Developer configuration
- User configuration

Case- and goal-driven adaptivity

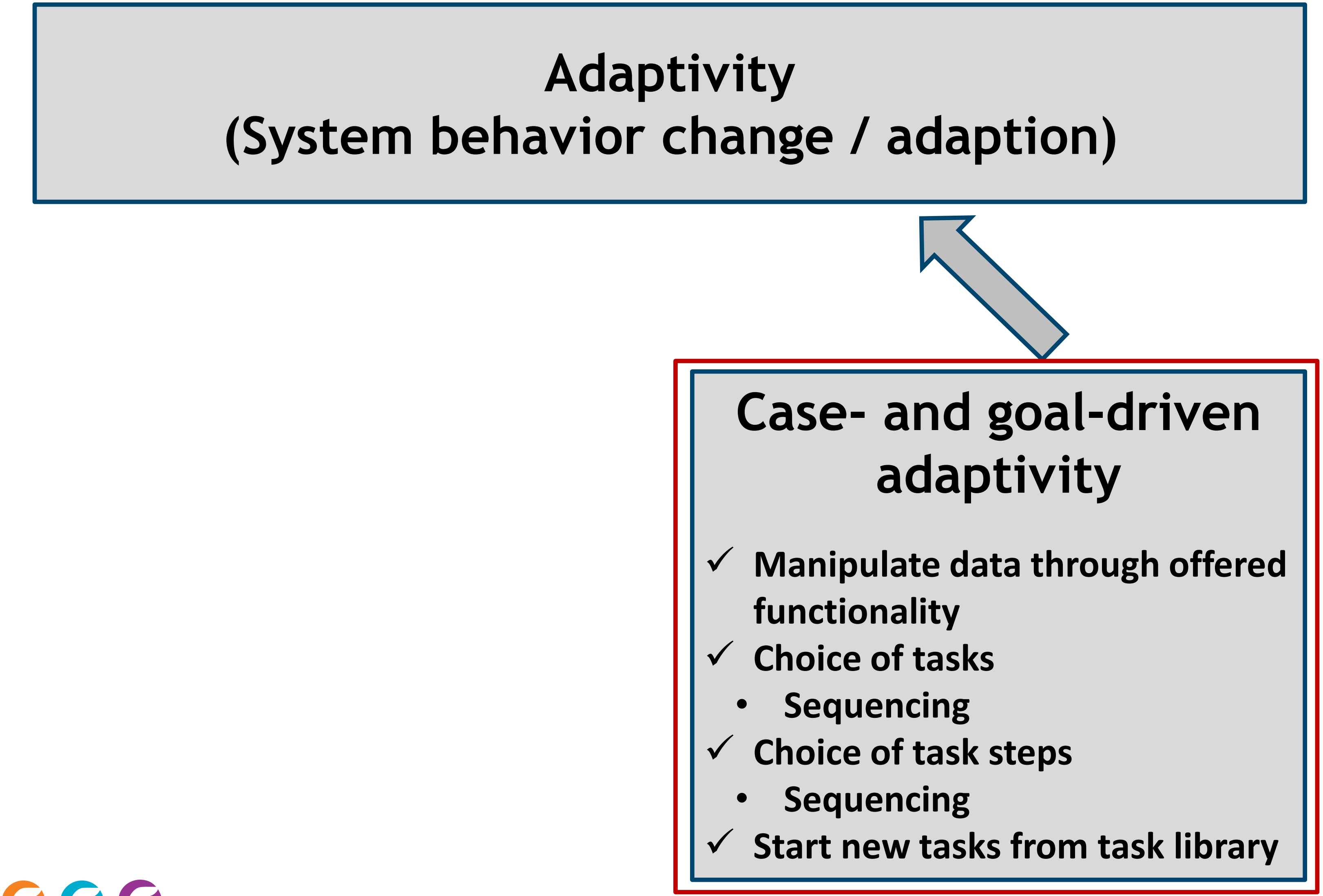
✓ Manipulate data through offered functionality

✓ Choice of tasks
- Sequencing

✓ Choice of task steps
- Sequencing

✓ Start new tasks from task library

Case- and goal-driven adaptivity



Adaptivity
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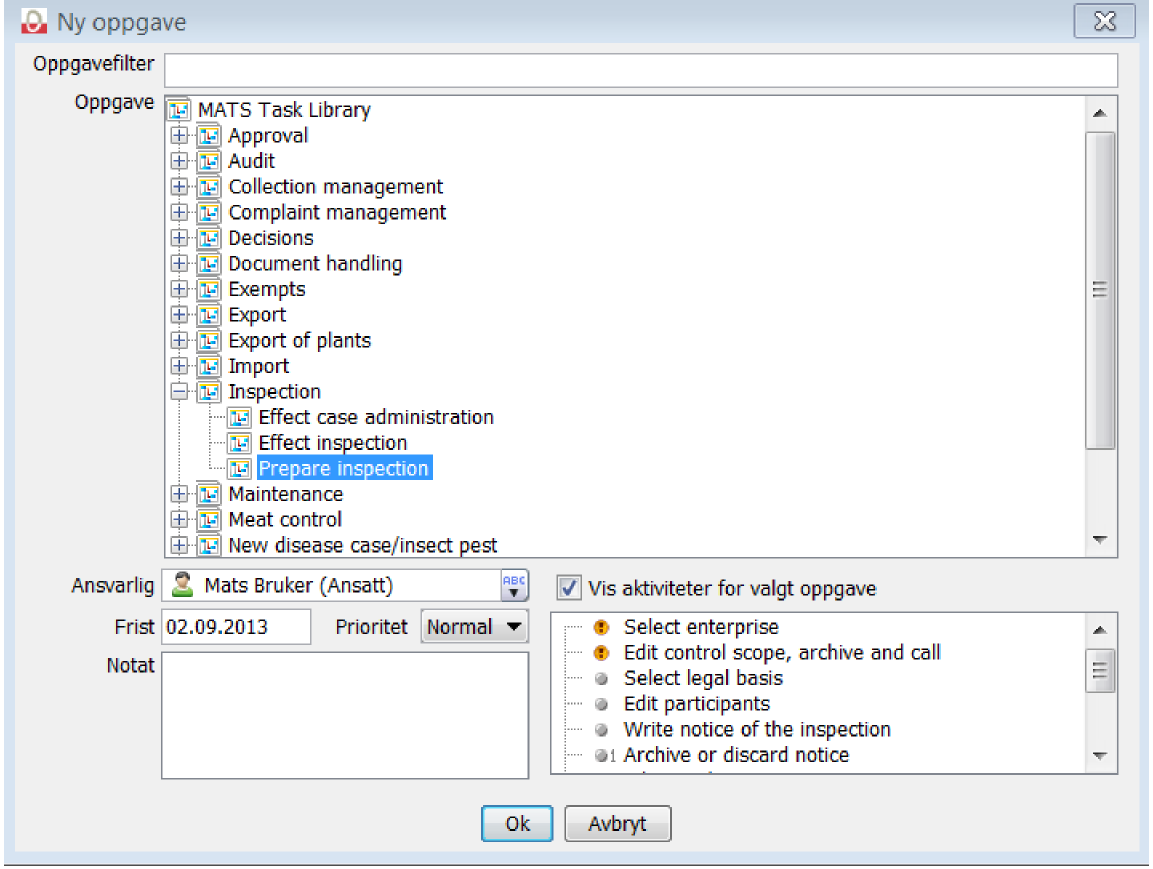
Case- and goal-driven adaptivity

- ✓ Manipulate data through offered functionality
- ✓ Choice of tasks
  - Sequencing
- ✓ Choice of task steps
  - Sequencing
- ✓ Start new tasks from task library

Goal-oriented task template libraries

- Users may initiate new tasks any time
  - Role-based permissions
- New task instances connect to case data (context)



Ny oppgave

Oppgavefilter

Oppgave

- MATS Task Library
  - Approval
  - Audit
  - Collection management
  - Complaint management
  - Decisions
  - Document handling
  - Exempts
  - Export
  - Export of plants
  - Import
  - Inspection
    - Effect case administration
    - Effect inspection
    - Prepare inspection
  - Maintenance
  - Meat control
  - New disease case/insect pest

Ansvarlig: Mats Bruker (Ansatt)

☑ Vis aktiviteter for valgt oppgave

Frist: 02.09.2013

Prioritet: Normal

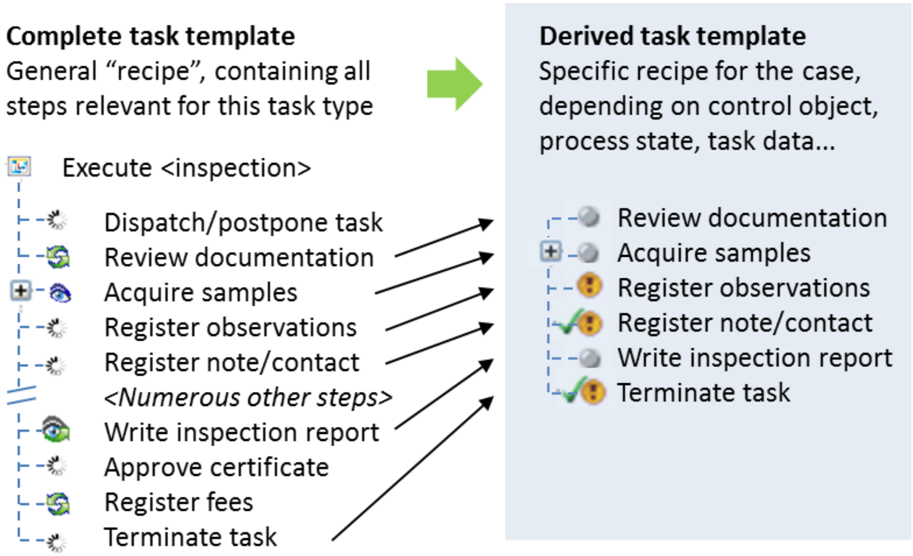
Notat

- Select enterprise
- Edit control scope, archive and call
- Select legal basis
- Edit participants
- Write notice of the inspection
- Archive or discard notice

Task templates

- Context-sensitive task patterns
  - Pre Condition
  - Post Condition
  - Include Condition
  - Repeatable Condition
  - Mandatory Condition

Referring case, context and performance data.
May use rules.



Complete task template
General "recipe", containing all steps relevant for this task type

- Execute <inspection>
  - Dispatch/postpone task
  - Review documentation
  - Acquire samples
  - Register observations
  - Register note/contact
  - *<Numerous other steps>*
  - Write inspection report
  - Approve certificate
  - Register fees
  - Terminate task

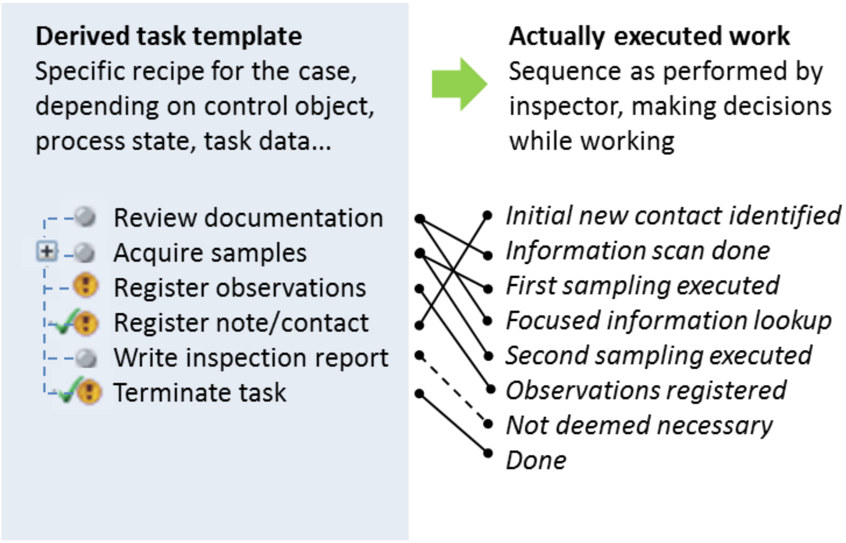
Derived task template
Specific recipe for the case, depending on control object, process state, task data...

- Review documentation
- Acquire samples
- Register observations
- Register note/contact
- Write inspection report
- Terminate task

Task templates

- User-sensitive task patterns
  - Decides step sequencing
  - Verifies step correctness
  - Repeats steps as necessary
  - Changes case & context data

Case worker in control
- Active task support



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- Terminate task

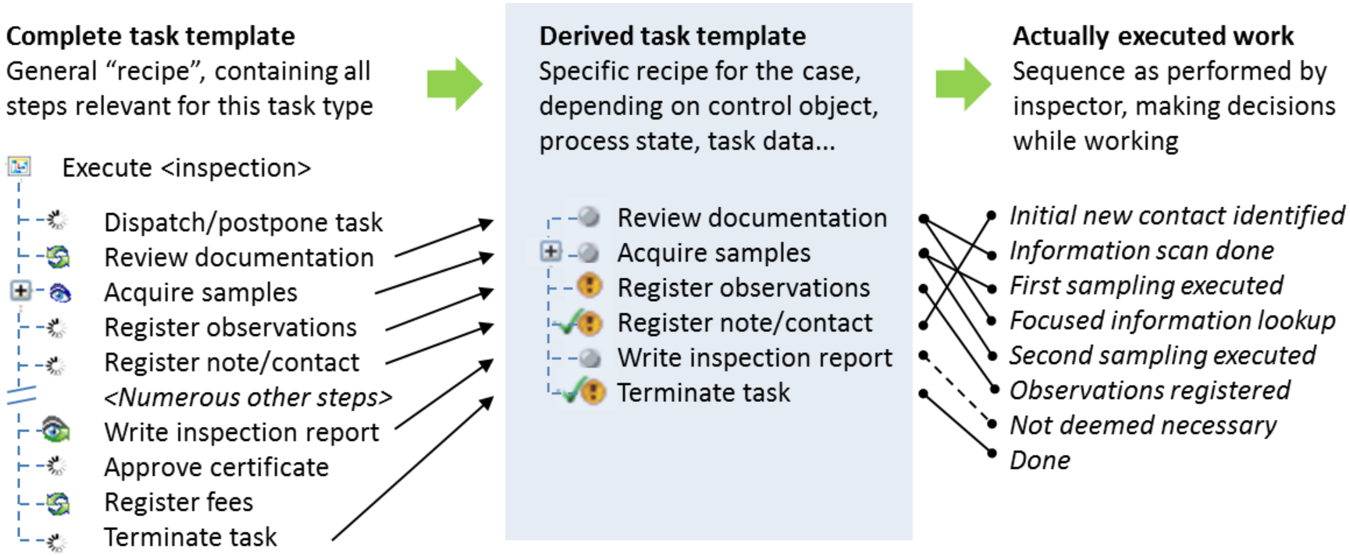
Actually executed work
Sequence as performed by inspector, making decisions while working

Initial new contact identified
Information scan done
First sampling executed
Focused information lookup
Second sampling executed
Observations registered
Not deemed necessary
Done

Task templates - Active task support

- Context-sensitive task patterns
- User-sensitive task patterns

- Offer appropriate task steps, while ensuring that the work is performed «correctly»



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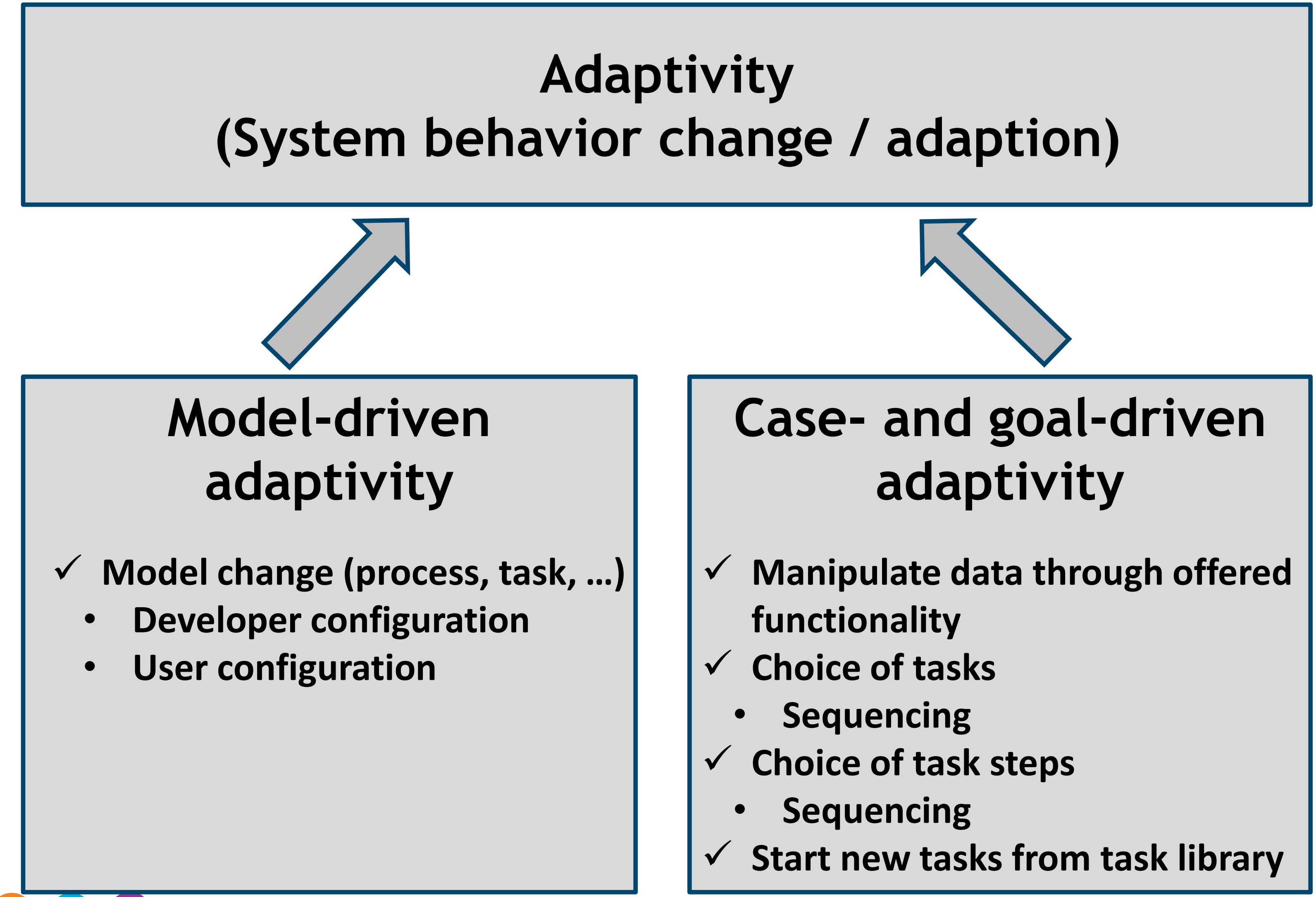
Actually executed work
Sequence as performed by inspector, making decisions while working

- *Initial new contact identified*
- *Information scan done*
- *First sampling executed*
- *Focused information lookup*
- *Second sampling executed*
- *Observations registered*
- *Not deemed necessary*
- *Done*

Model-driven adaptivity



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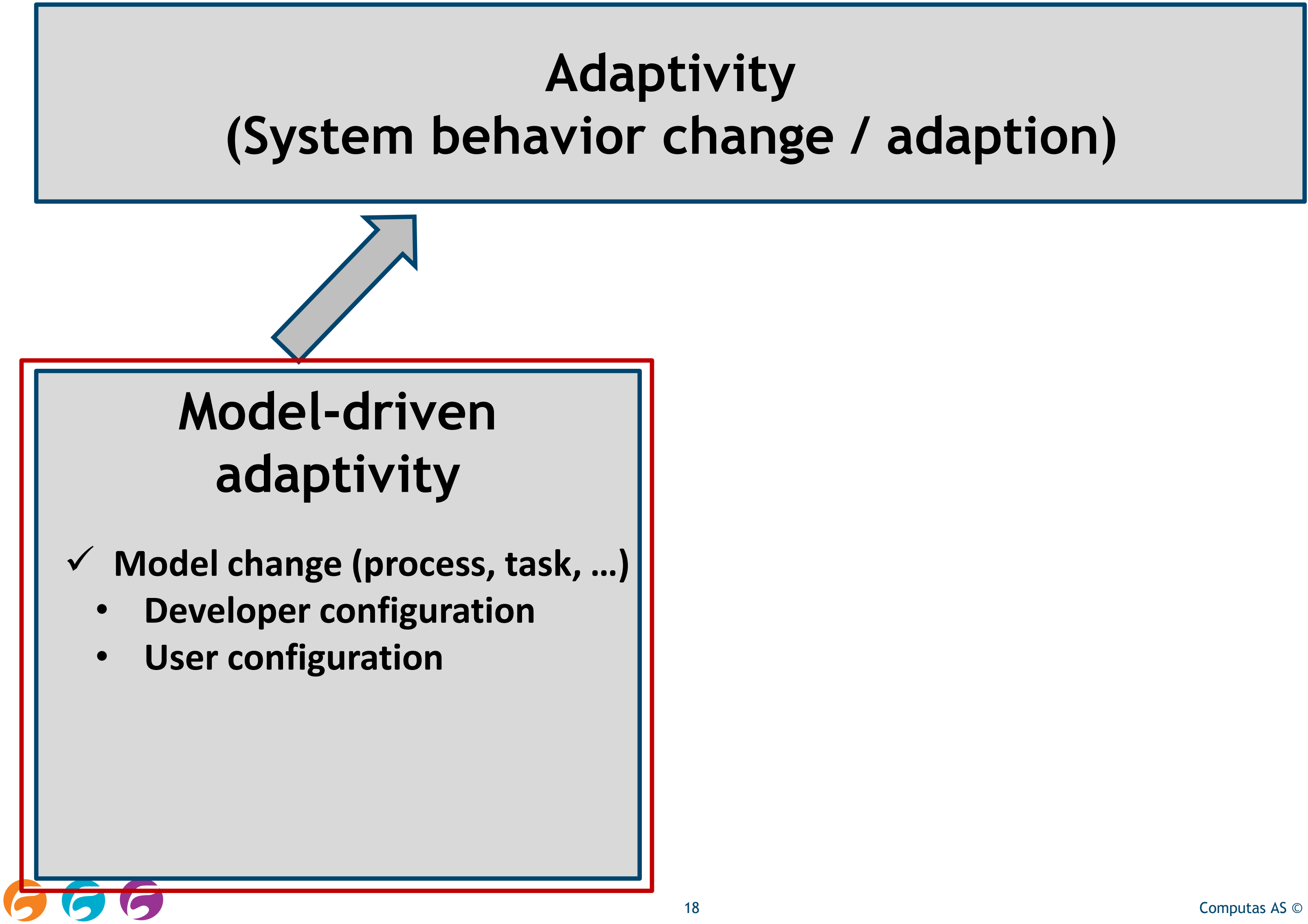
Model-driven adaptivity



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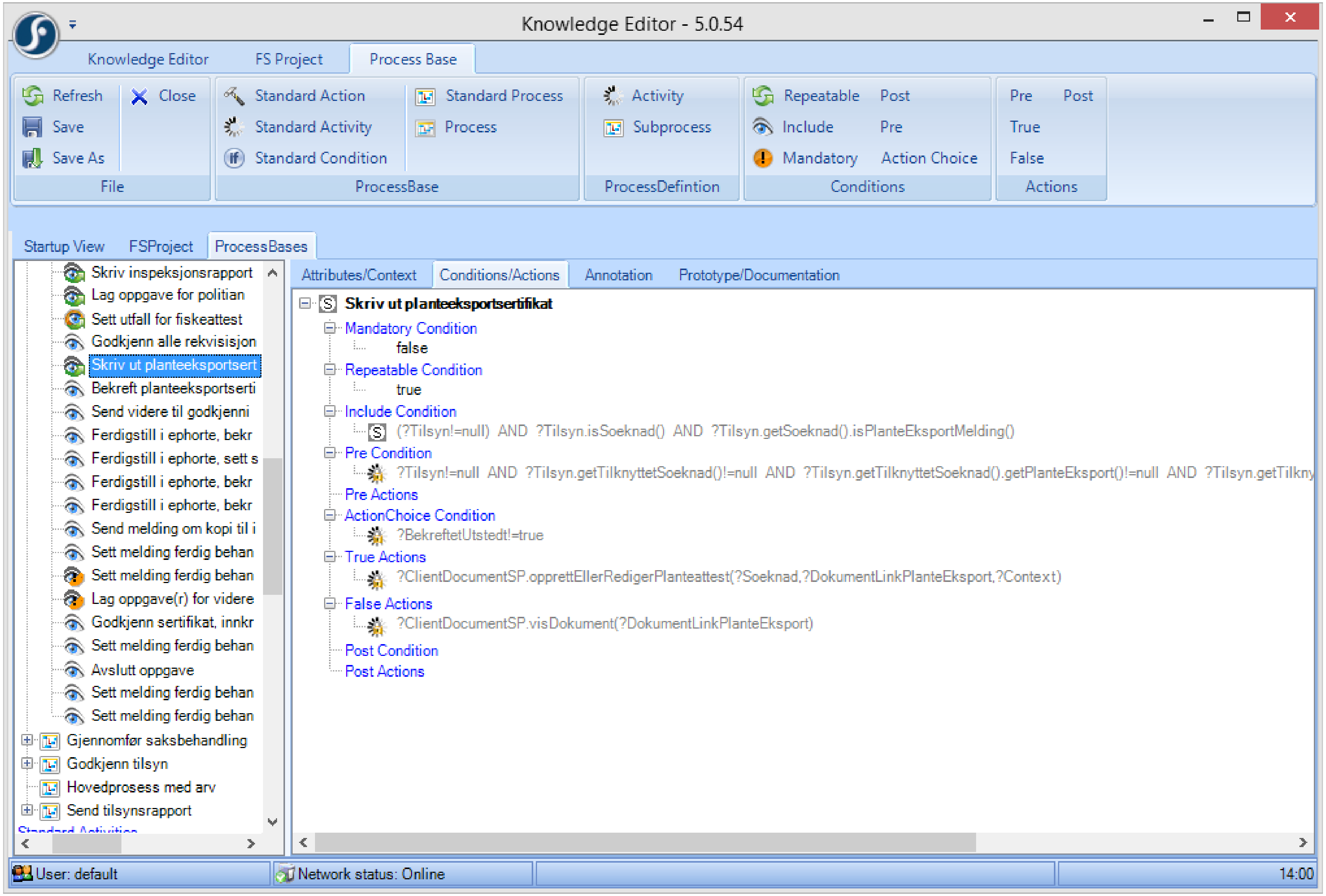
Model-driven adaptivity

✓ Model change (process, task, …)

- Developer configuration
- User configuration

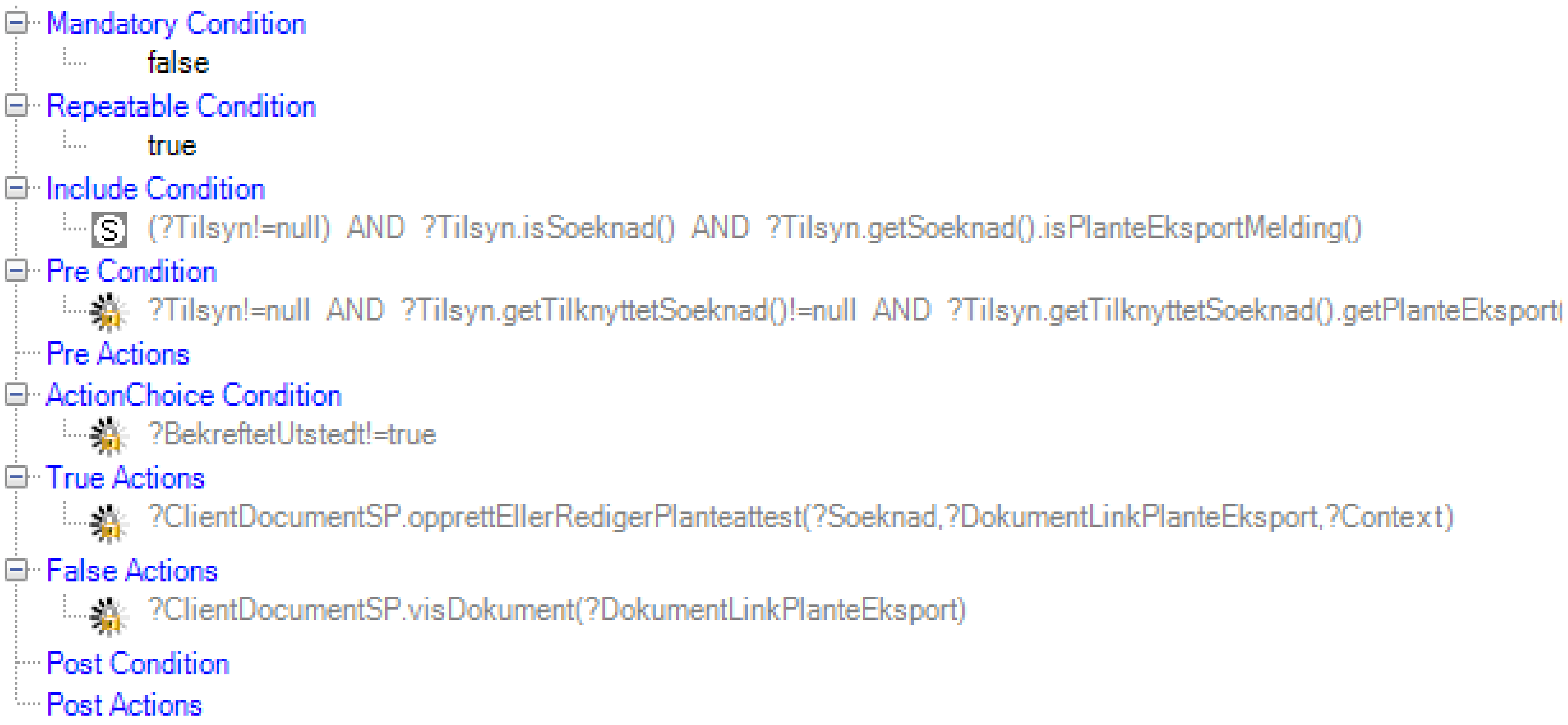
Anatomy of Tasks and Steps



```
Skriv inspeksjonsrapport
Lag oppgave for politian
Sett utfall for fiskeattest
Godkjenn alle rekvisisjon
Skriv ut planteeksportsert
Bekreft planteeksportserti
Send videre til godkjenni
Ferdigstill i ephorte, bekr
Ferdigstill i ephorte, sett s
Ferdigstill i ephorte, bekr
Ferdigstill i ephorte, bekr
Send melding om kopi til i
Sett melding ferdig behan
Sett melding ferdig behan
Lag oppgave(r) for videre
Godkjenn sertifikat, innkr
Sett melding ferdig behan
Avslutt oppgave
Sett melding ferdig behan
Sett melding ferdig behan
Gjennomfør saksbehandling
Godkjenn tilsyn
Hovedprosess med arv
Send tilsynsrapport
```

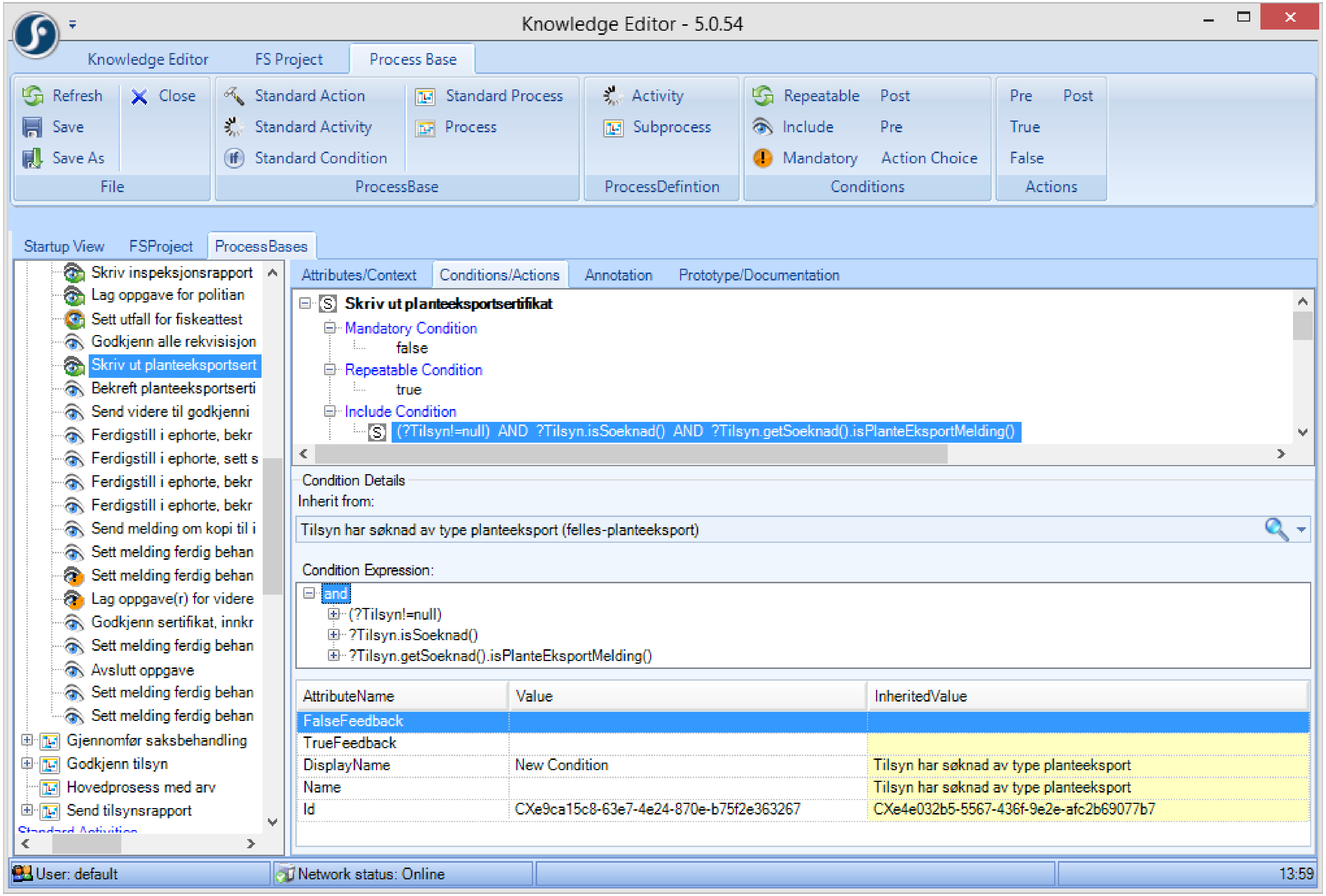
```
Skriv ut planteeksportsertifikat
    Mandatory Condition
        false
    Repeatable Condition
        true
    Include Condition
        (?Tilsyn!=null) AND ?Tilsyn.isSoeknad() AND ?Tilsyn.getSoeknad().isPlanteEksportMelding()
    Pre Condition
        ?Tilsyn!=null AND ?Tilsyn.getTilknyttetSoeknad()!=null AND ?Tilsyn.getTilknyttetSoeknad().getPlanteEksport()!=null AND ?Tilsyn.getTilkny
    Pre Actions
    ActionChoice Condition
        ?BekreftetUtstedt!=true
    True Actions
        ?ClientDocumentSP.opprettEllerRedigerPlanteattest(?Soeknad,?DokumentLinkPlanteEksport,?Context)
    False Actions
        ?ClientDocumentSP.visDokument(?DokumentLinkPlanteEksport)
    Post Condition
    Post Actions
```

Anatomy of Tasks and Steps



- Mandatory Condition
  - false
- Repeatable Condition
  - true
- Include Condition
  - S (?Tilsyn!=null) AND ?Tilsyn.isSoeknad() AND ?Tilsyn.getSoeknad().isPlanteEksportMelding()
- Pre Condition
  - ?Tilsyn!=null AND ?Tilsyn.getTilknyttetSoeknad()!=null AND ?Tilsyn.getTilknyttetSoeknad().getPlanteEksport
- Pre Actions
- ActionChoice Condition
  - ?BekreftetUtstedt!=true
- True Actions
  - ?ClientDocumentSP.opprettEllerRedigerPlanteattest(?Soeknad,?DokumentLinkPlanteEksport,?Context)
- False Actions
  - ?ClientDocumentSP.visDokument(?DokumentLinkPlanteEksport)
- Post Condition
- Post Actions

Anatomy of Tasks and Steps - Inheritance



- Skriv inspeksjonsrapport
- Lag oppgave for politian
- Sett utfall for fiskeattest
- Godkjenn alle rekvisisjon
- Skriv ut planteeksportsert
- Bekreft planteeksportserti
- Send videre til godkjenni
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- Sett melding ferdig behan
- Gjennomfør saksbehandling
- Godkjenn tilsyn
- Hovedprosess med arv
- Send tilsynsrapport
- Standard Activities

Skriv ut planteeksportsertifikat
- Mandatory Condition
  - false
- Repeatable Condition
  - true
- Include Condition
  - (?Tilsyn!=null) AND ?Tilsyn.isSoeknad() AND ?Tilsyn.getSoeknad().isPlanteEksportMelding()

Condition Details

Inherit from:

Tilsyn har søknad av type planteeksport (felles-planteeksport)

Condition Expression:

- and
  - (?Tilsyn!=null)
  - ?Tilsyn.isSoeknad()
  - ?Tilsyn.getSoeknad().isPlanteEksportMelding()

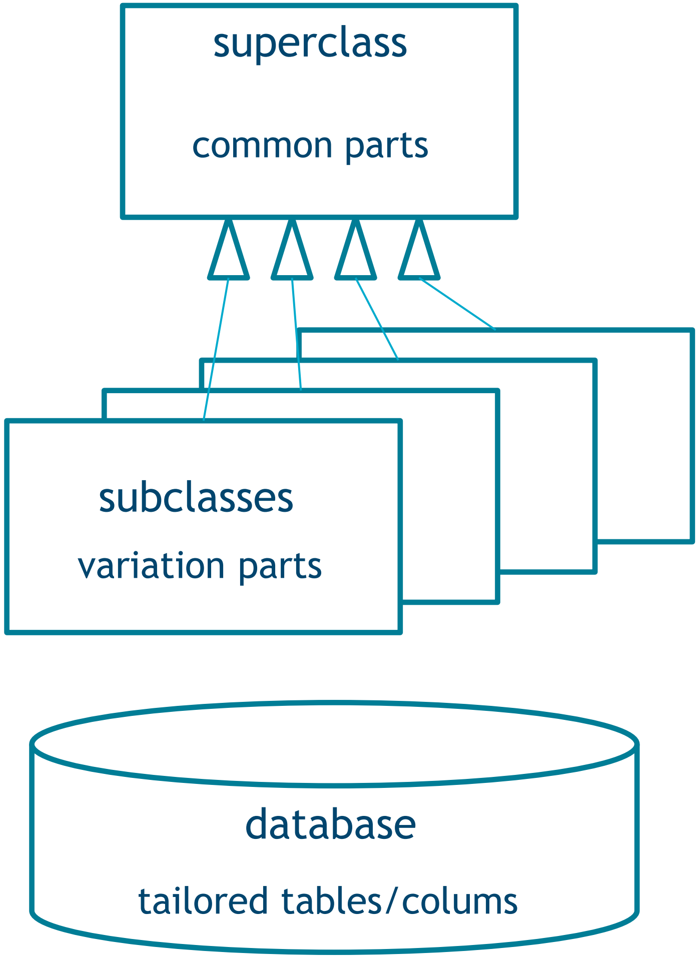
AttributeName	Value	InheritedValue
FalseFeedback		
TrueFeedback		
DisplayName	New Condition	Tilsyn har søknad av type planteeksport
Name		Tilsyn har søknad av type planteeksport
Id	CXe9ca15c8-63e7-4e24-870e-b75f2e363267	CXe4e032b5-5567-436f-9e2e-afc2b69077b7

Business Rules

- Declaratively represented, first-order logic
- Business rules can be used for:
  - Describing the various task conditions
  - Defining permitted data relationships
  - Driving complex rule-based calculations
  - Deciding the value of any boolean…
- Runtime rule engine

Domain Model Patterns: Business Objects

Class hierarchy:



superclass

common parts

subclasses

variation parts

database

tailored tables/colums

Domain Model Patterns: Business Objects

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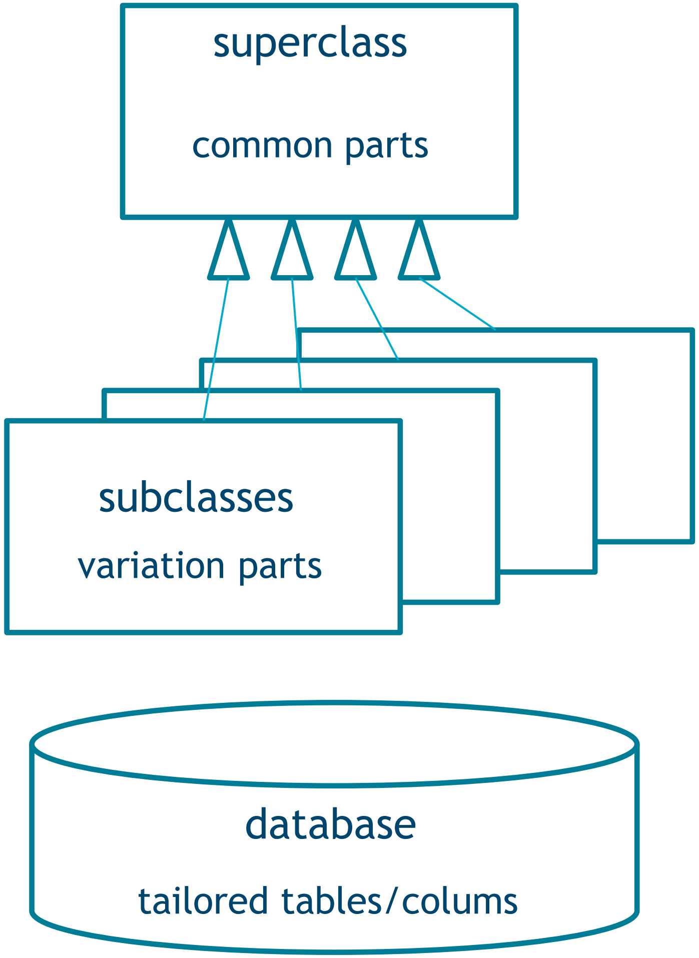

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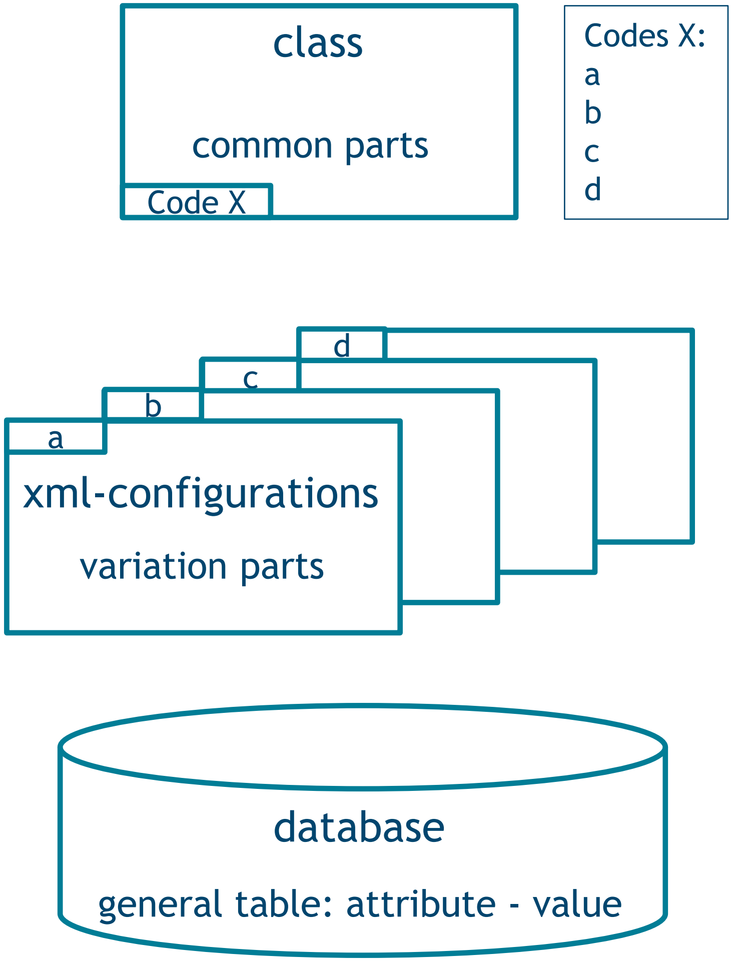
Soft typing and declarative variation:



class

common parts

Code X

Codes X:
a
b
c
d

a

b

c

d

xml-configurations

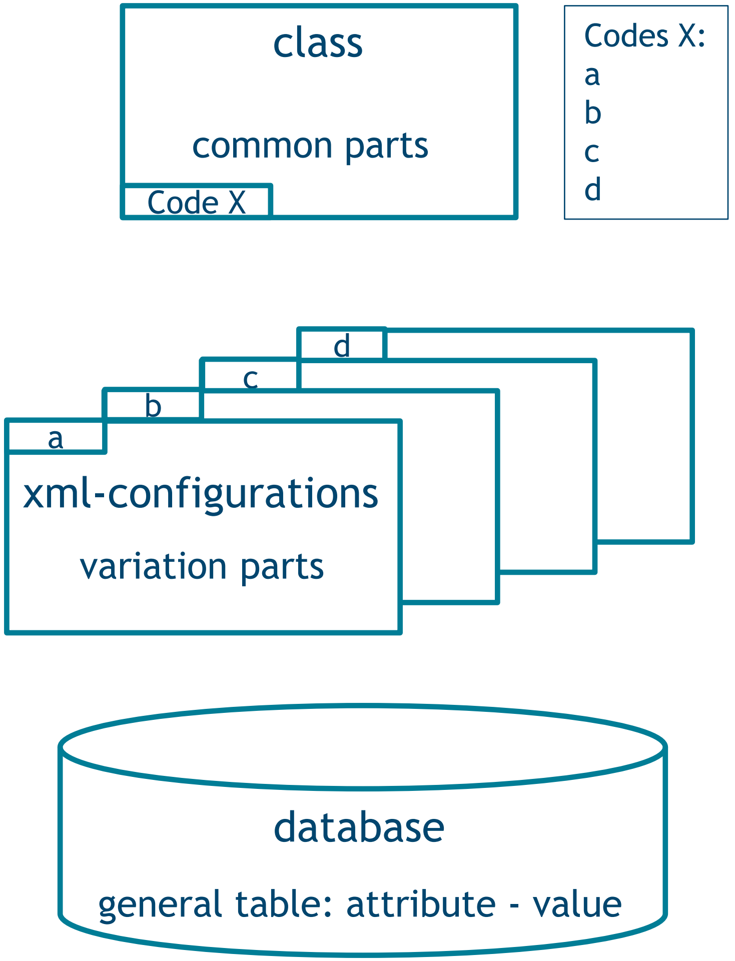
variation parts

database

general table: attribute - value

Domain Model Patterns: Business Objects

Soft typing and declarative variation:

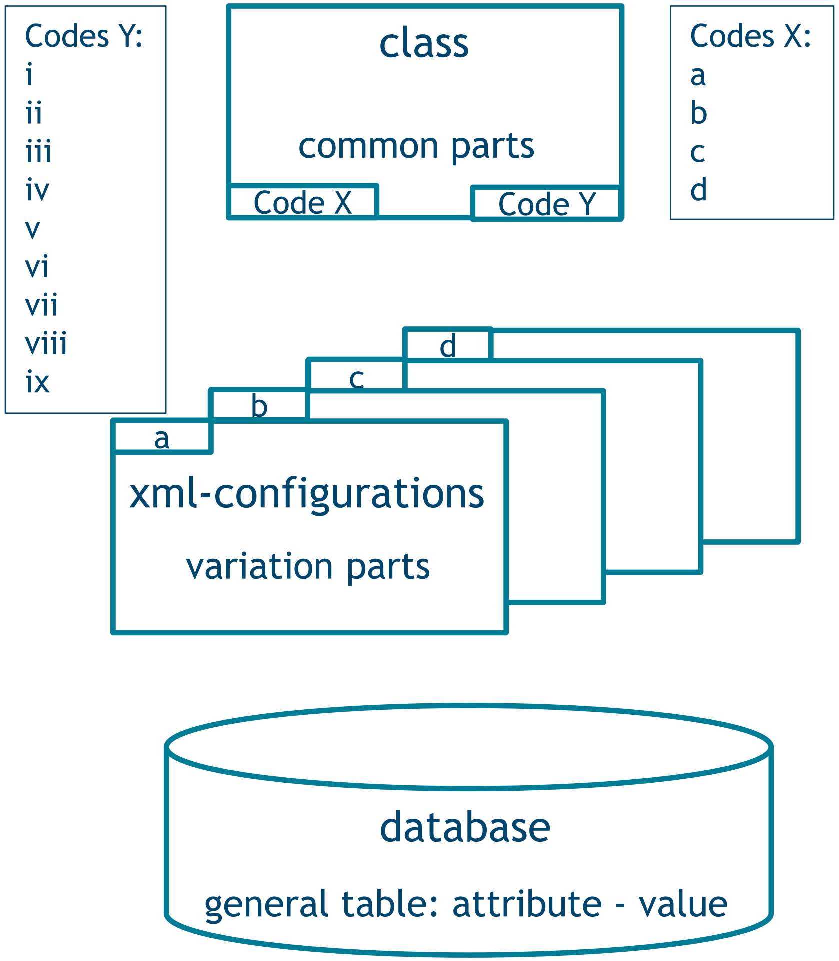


Domain Model Patterns: Code relations

Code relation X-Y:
a – i, ii, iii, ix
b, c – v, vi, vii, ix, x
d – v, vi, viii

Configurable relations for
- choice possibilities for user
- choice possibilities for program
- legal combinations of values
- …

Soft typing and declarative variation:


Codes Y:
i
ii
iii
iv
v
vi
vii
viii
ix

Codes X:
a
b
c
d

Example from MATS

- Company A is engaged in
  - Cattle husbandry
  - Poultry keeping
  - Small scale farm products
  - Café
  - Has its own water supply

Example from MATS

- Company A is engaged in
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  - Café
  - Has its own water supply

Business object:
•Milk production
•cowshed, matresses,...

Regulations:
•On cattle husbandry
•On animal wellfare

Example from MATS

- Company A is engaged in
  - Cattle husbandry
  - Poultry keeping
  - Small scale farm products
  - Café
  - Has its own water supply

Business object:
•Rincing and treatment
•Pipe network,...

Regulations:
•On drinking water

Example from MATS

- Company A is engaged in
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Business object:
•Rincing and treatment
•Pipe network,...

Regulations:
•On drinking water

Easy to extend to a new control object type – all the basics are **configurable**.

Dealing with variation through configuration

- Careful identification of which parts are best coded in (imperative) programming language and class models, and which parts should be configurable

- Configurable parts for business logic or business representation need to be under control of the subject matter experts (SMEs)

Dealing with variation through configuration

- Soft typing by means of controlled vocabularies gives you the possibility to type one object along several dimensions
- Defining relations between controlled vocabularies gives you the possibility to declaratively define connections
- Defining object variation by means of declarative definitions externalised from programming code gives you the possibility to configure rather than program later change and extensions

Why use practical declarative representations of business logic?

- Maximize configuration to enhance flexibility
  - Development time: Configuration by developers / SMEs.
  - Runtime: Configuration by SMEs or end-users
- Declarative, versioned business logic separated from application to enhance flexibility and control
  - Improve SME responsibility for business rules and representation
  - Enable different behaviour where old cases follow old rules
  - Easy to plan for known changes to business logic

Configurations may be hot deployed,
separating business lifecycle from application lifecycle

Methodology - Working with SMEs

- Teaming up with Subject Matter Experts (SMEs)
  - Establishing common language, toolbox
- Knowledge engineering – KA patterns
  - Organizational context -> Actor identification
  - Process discovery & design
    - For all actors, identify
      - Reason to start work (event)
      - Response task with steps
      - Resulting state change

Methodology - Working with SMEs

- Growing task template fragments, domain model & shared vocabulary in collaboration with SMEs
- Discovering reusable components
  - «Standard» elements
  - Steps, Conditions, Actions, Sub-tasks
- Start from anywhere
  - Choose actor / goal
  - End-to-end processes *may* emerge
- Value-driven extensions to solutions

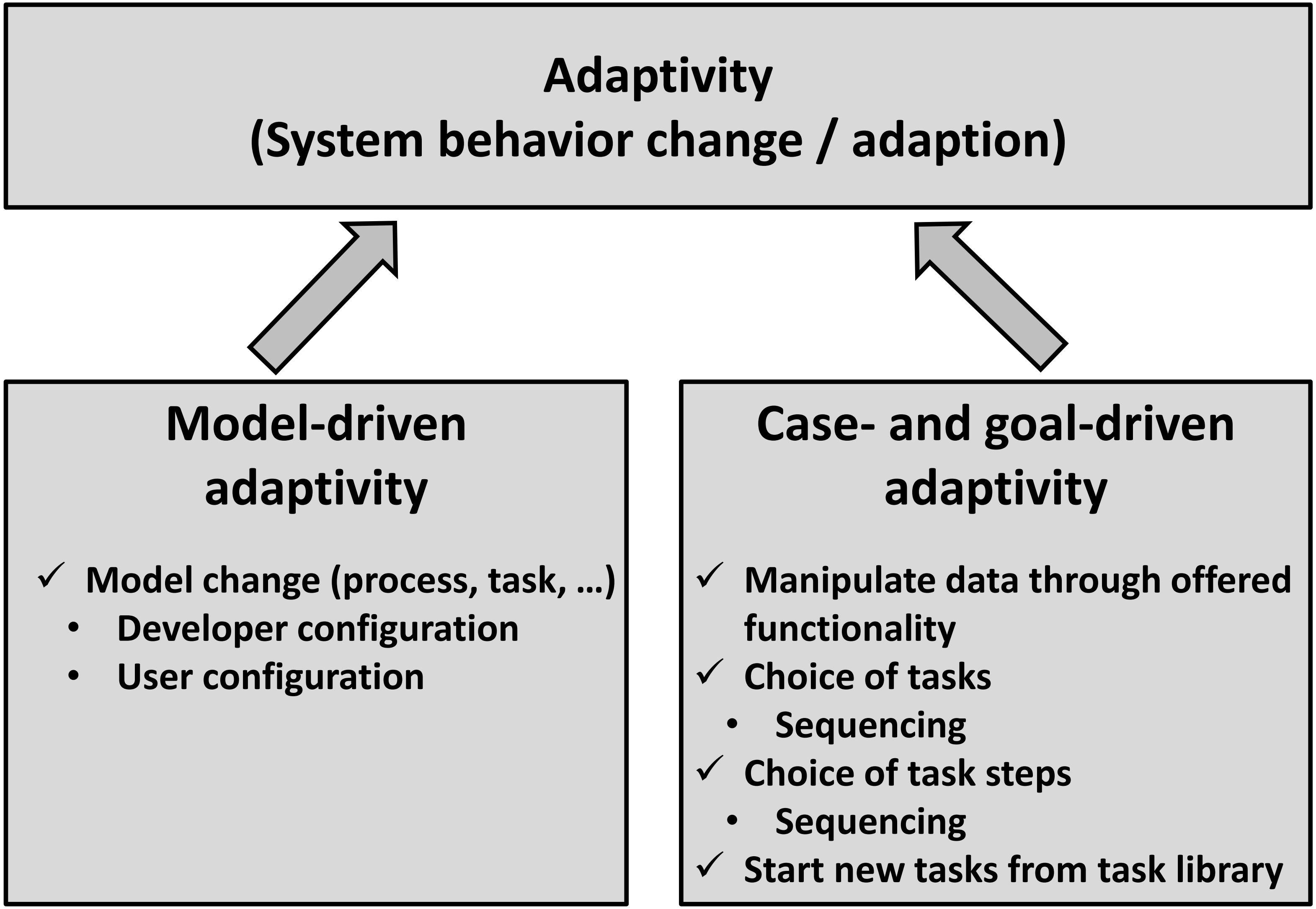
Shared vocabulary

Standard elements

Domain model

Task template fragments

Patterns Boosting Adaptivity in ACM



Adaptivity
(System behavior change / adaption)

Model-driven adaptivity

- ✓ Model change (process, task, …)
  - Developer configuration
  - User configuration

Case- and goal-driven adaptivity

- ✓ Manipulate data through offered functionality
- ✓ Choice of tasks
  - Sequencing
- ✓ Choice of task steps
  - Sequencing
- ✓ Start new tasks from task library

Questions and discussion

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