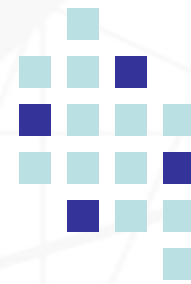


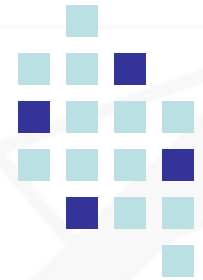
Dever Goodwin, LLC



Sample Design Document
Service Application Design
October 21, 2004

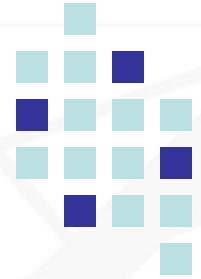


Table of Contents

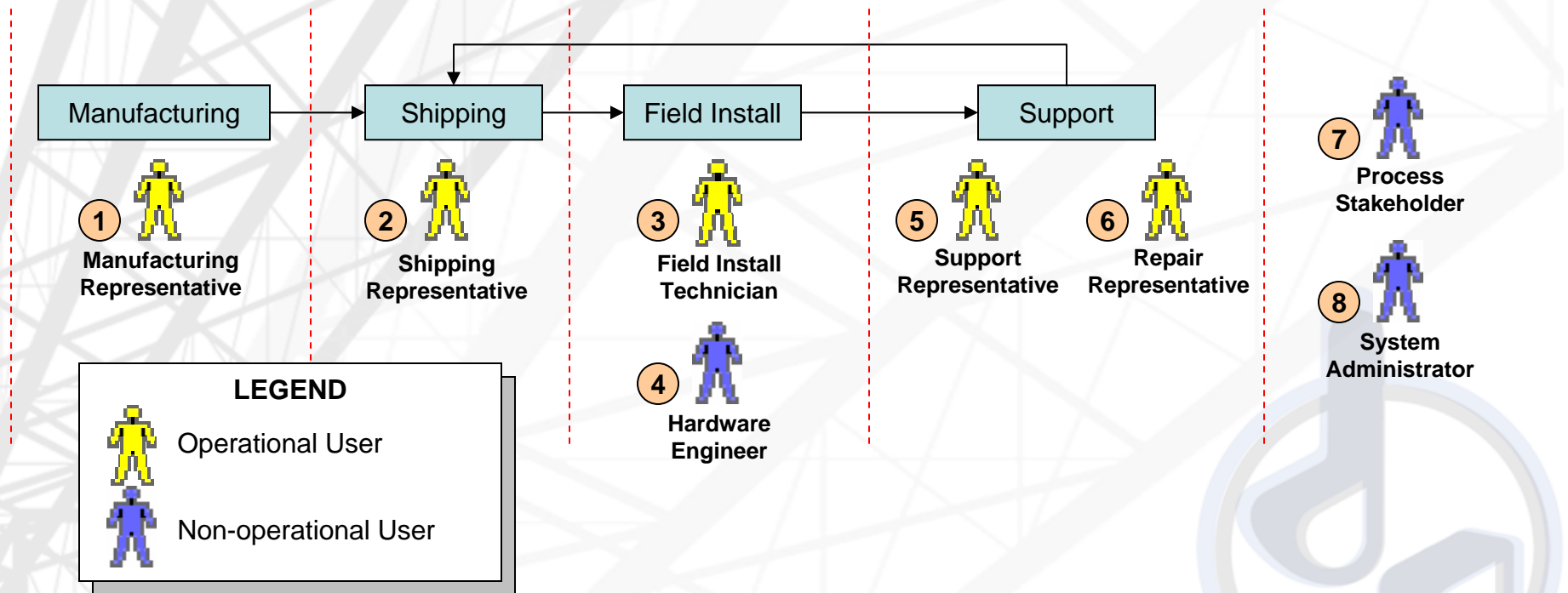


• Application Scope	3
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• Business Logic Design	15
– Manufacturing Representative Interface	16
– Shipping Representative Interface	18
– Field Install Technician/ Hardware Engineer Interface	20
– Support Representative Interface	24
– Repair Representative Interface	26
– Stakeholder Interface	28
– System Administrator Interface	29
– Common Interface	31
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Application Scope: System Users

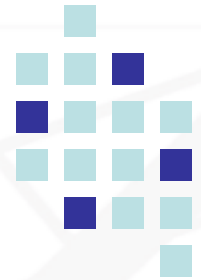


- The following diagram expands on the original with the definition of the 8 system users:

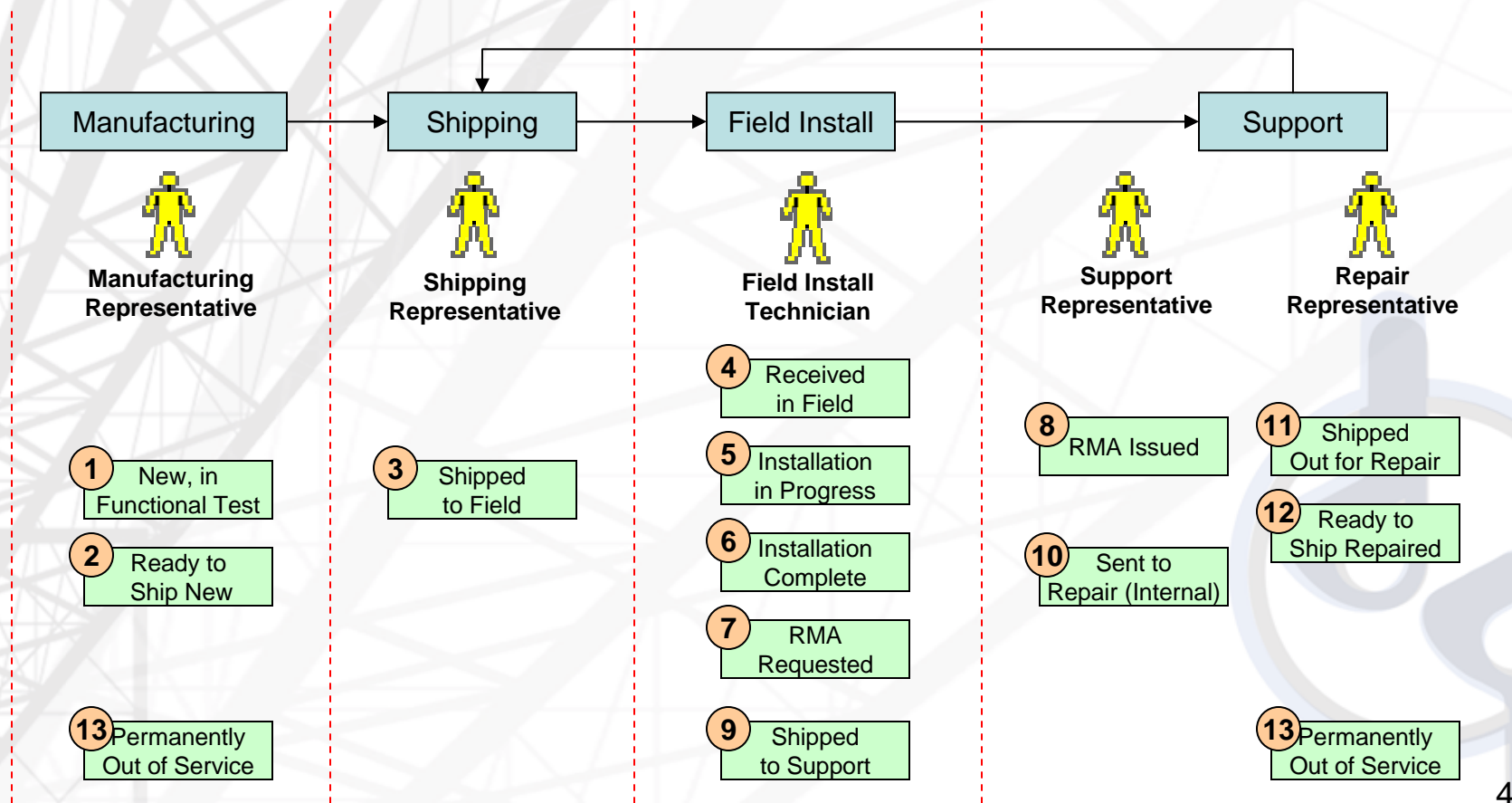


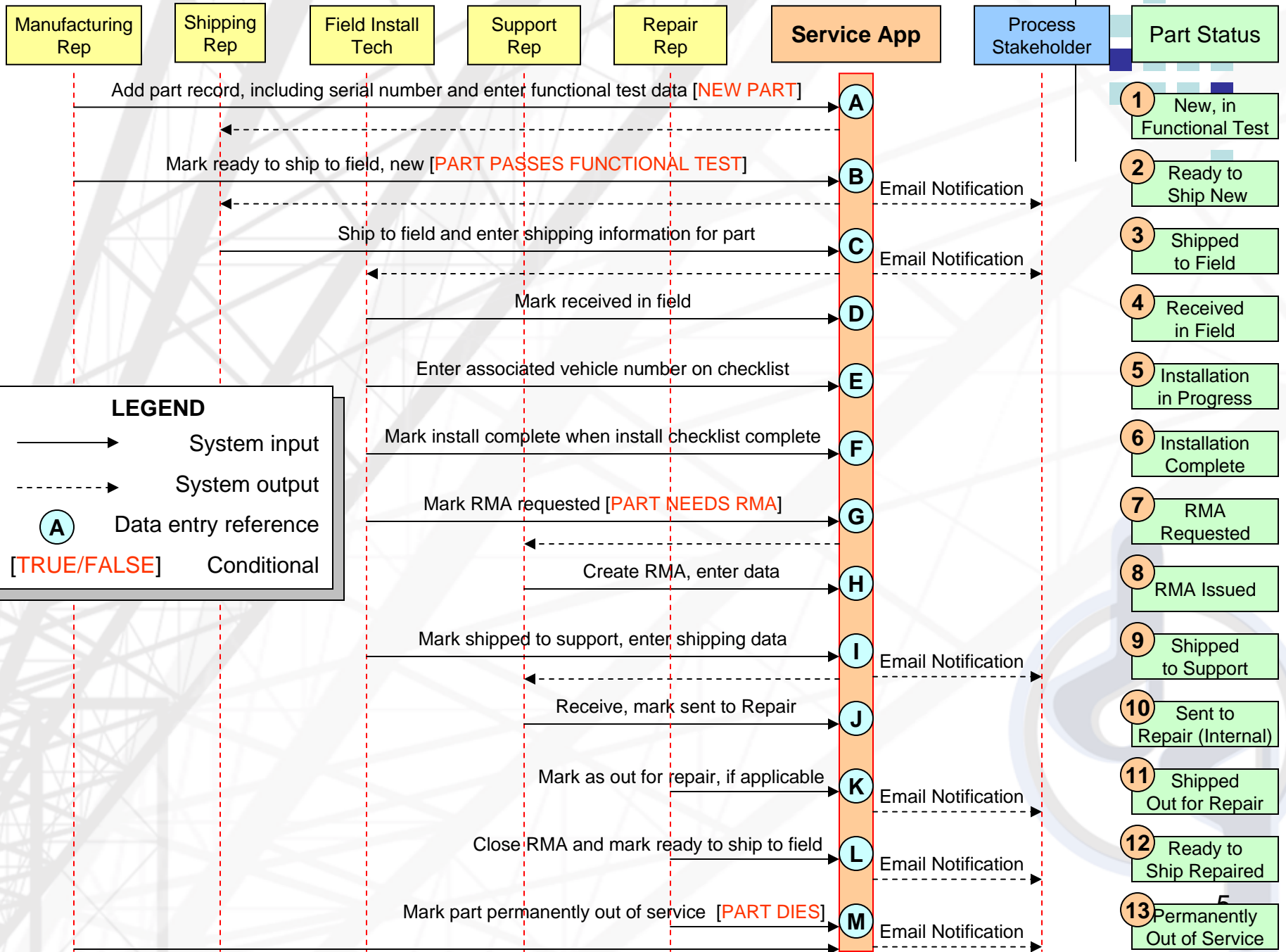
- Each of these users will define a separate security level and graphical interface (navigation set) in the application.

Application Scope: Part Status

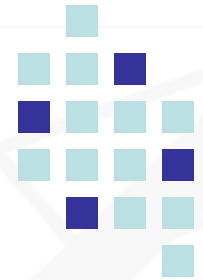


- The following diagram expands on the original with the Introduction of the **13 part status values**, as set by their respective operational users:

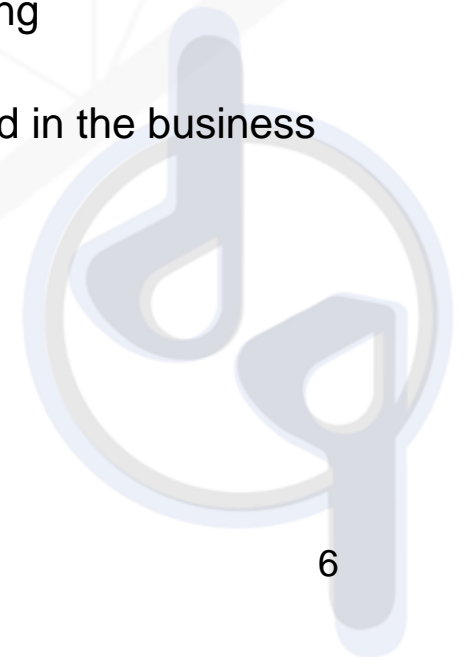




Data Model



- The Data Model serves as the foundation of a well-planned design.
- An understanding of the data model facilitates the understanding of the business logic and the underlying infrastructure design for the system.
- The following model is based on the information submitted thus far to Dever Goodwin, LLC.
 - The data model constitutes the normalized, first-round, minimal structure for implementing the communicated requirements.
 - Fields and tables will likely be added, changed or removed during implementation as details are fleshed out.
 - Specific queries are not shown here as they will be implemented in the business logic via SQL.



Data Model

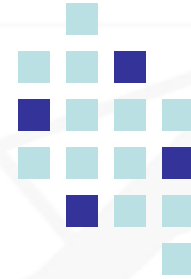
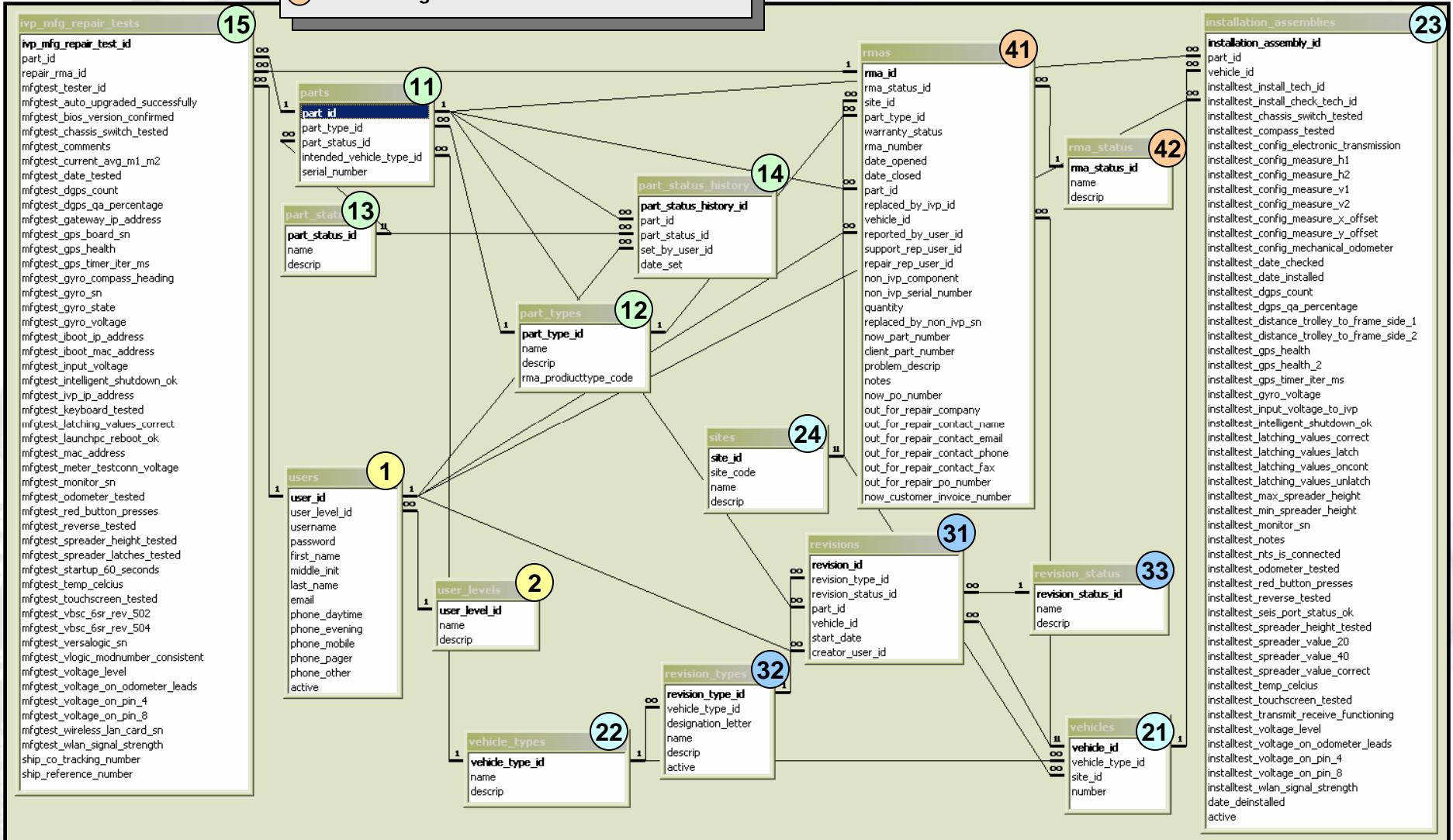
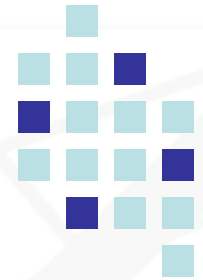


Table Function Key

- System User Management
- Part/IVP Management
- Vehicle/Site/Assembly Management
- Field Revision Management
- RMA Management



List of DB Tables



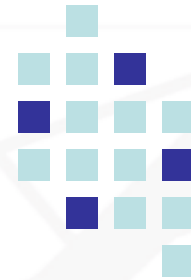
- Table Listing for System User Management:
 1. **USERS**
 - The main table for each unique system user¹ and its properties.
 2. **USER_LEVELS**
 - The main table for each unique user security level² and its properties.

user_levels Database Prepopulation Data Sample	
user_level_id	name
1	Manufacturing Representative
2	Shipping Representative
3	Field Install Technician
4	Hardware Engineer
5	Support Representative
6	Repair Representative
7	Process Stakeholder
8	System Administrator

Notes:

1. A “system user” is defined by a unique username that allows the person to log in. Stakeholders may be users if they log into the system to view reports, etc., but may not if they simply receive reports by email, etc.
2. User levels correspond directly with the users defined in the process, in the Application Scope defined earlier in this document.

List of DB Tables



- Table Listing for Part/IVP Management:

11. PARTS

- The main table for each unique part^{3,4} and its properties.

12. PART_TYPES

- The main table for each unique part type⁵ (product) and its properties.

13. PART_STATUS

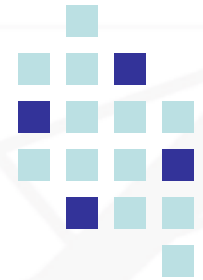
- The main table for each unique part status value⁶ and its properties.

part_status	
Database Prepopulation Data Sample	
part_status_id	name
1	New, in Functional Test
2	Ready to Ship New
3	Shipped to Field
4	Received in Field
5	Installation in Progress
6	Installation Complete
7	RMA Requested
8	RMA Issued
9	Shipped to Support
10	Sent to Repair (Internal)
11	Sent Out for Repair
12	Ready to Ship Repaired
13	Permanently Out of Service

Notes:

- A “part” is defined as an instance of a “part type.” It corresponds to a single IVP, monitor, height sensor, etc. with a unique serial number. Initially, this table will manage only IVPs, but the database is designed for future growth in which parts of other types are tracked as well.
- The parts table contains a field for intended_vehicle_type_id since this determines which test fields to use in mfg/repair tests.
- Even though this system will initially not manage parts other than IVPs, a part type must be defined for each type defined in the RMA numbering system, so that RMA numbers can be generated for parts other than IVPs.
- Part status values correspond directly with the users defined in the process, in the Application Scope defined earlier in this document.

List of DB Tables

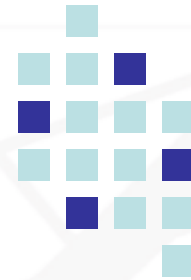


- Table Listing for Part/IVP Management (Continued):
 14. PART STATUS HISTORY
 - The main table for each unique part status change and its properties, including who made the change and when.
 15. IVP_MFG_REPAIR_TESTS
 - The main table for each unique set of Functional Tests performed on the part before it returns to the field, either after it is first manufactured or after it is repaired under RMA⁷. This table also contains any stored Shipping information⁸ for each such cycle.

Notes:

7. The repair_rma_id field would be set to 0 for the initial (Manufacturing) Functional Tests, and any subsequent set would be tied to an RMA per this field.
8. Shipping information is recorded by the Shipping Representative each time the part is shipped to the field.

List of DB Tables



- Table Listing for Vehicle/Site/Assembly Management:

21. VEHICLES

- The main table for each unique vehicle and its properties.

22. VEHICLE_TYPES

- The main table for each unique vehicle type and its properties.

23. INSTALLATION_ASSEMBLIES⁹

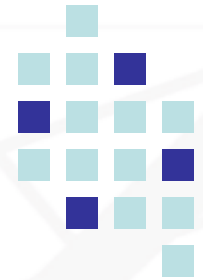
- A cross table between IVPs and VEHICLES that determines which IVPs are installed in which VEHICLES. This table allows for each IVP to be installed in multiple vehicles (over time), and each vehicle to contain multiple IVPs (over time).

vehicle_types Database Prepopulation Data Sample	
vehicle_type_id	name
1	Top Pick
2	Side Pick
3	UTR
4	Gantry Crane
5	RTG
6	Straddle Carrier

Notes:

9. An "installation assembly" is defined by the pairing of an IVP with a vehicle. It contains Field Installation Checklist data, since the checklist fields are properties of the installation itself.

List of DB Tables



- Table Listing for Vehicle/Site/Assembly Management (Continued):

24. SITES

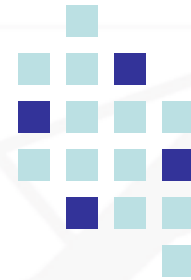
- The main table for each unique site¹⁰ (terminal, port section, installation location) and its properties.

sites		
Database Prepopulation Data Sample		
site_id	name	site_code
1	TTI	44
2	WBCT	54
3	STS	64

Notes:

10. The Sites table contains a “site code” field, which is a two-digit number used in building the Return Merchandise Authorization (RMA) number when the part is sent for repairs. See the “RMA Numbering System” documentation later in this document for more information.

List of DB Tables



- Table Listing for Field Revision Management:

31. REVISIONS

- The main table for each unique field revision¹¹ and its properties.

32. REVISION_TYPES

- The main table for each unique revision type and its properties.

33. REVISION_STATUS

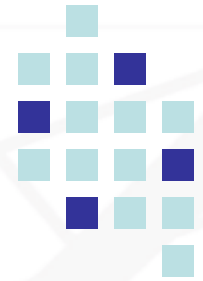
- The main table for each unique field revision status value¹² and its properties.

revision_types			
Database Prepopulation Data Sample			
revision_n_type_id	vehicle_type_id	design_ation_letter	descrip
1	1	A	Installation of a fuse on the ignition line
2	1	B	Caulking added to through-holes to avoid damage
3	1	C	Installation of the IVP cover
4	1	D	Reverse pressure switch installed
5	1	E	Electronic Transmission terminal strip modification
6	1	F	New Honeywell chassis switch (blue)
7	3	A	Installation of a fuse on the ignition line
8	3	B	Caulking added to through-holes to avoid damage
9	3	C	Installation of the IVP cover

Notes:

11. A "revision" is simply a procedure performed on a certain vehicle OR part in the field, on a certain date. Although Field Install Technicians can add a revision record for a vehicle or part at any time, the revision must be of a specific type that is "allowed" for the vehicle type associated with the vehicle or part. Allowable revision types for each vehicle types are set by Hardware Engineers.
12. Revision status values may be as simple as "Needed," "In Progress," and "Complete."

List of DB Tables

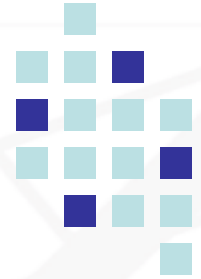


- Table Listing for RMA Management:
 41. RMAs
 - The main table for each unique Return Merchandise Authorization (RMA)¹³ and its properties.
 42. RMA_STATUS
 - The main table for each unique RMA status value¹⁴ and its properties.

Notes:

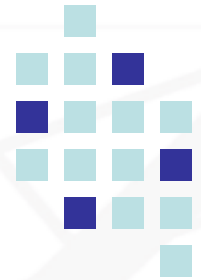
13. Even though this system initially will not track parts other than IVPs, an RMA can be created for a part that is not an IVP. In that case, the `ivp_id` would be set to 0, and the `non_ivp...` fields would be used to track part information. The `part_type_id` will be set to a type other than "IVP" for these non-IVP parts.
14. RMA status values may be as simple as "Requested", "Open" and "Closed."

Business Logic Design

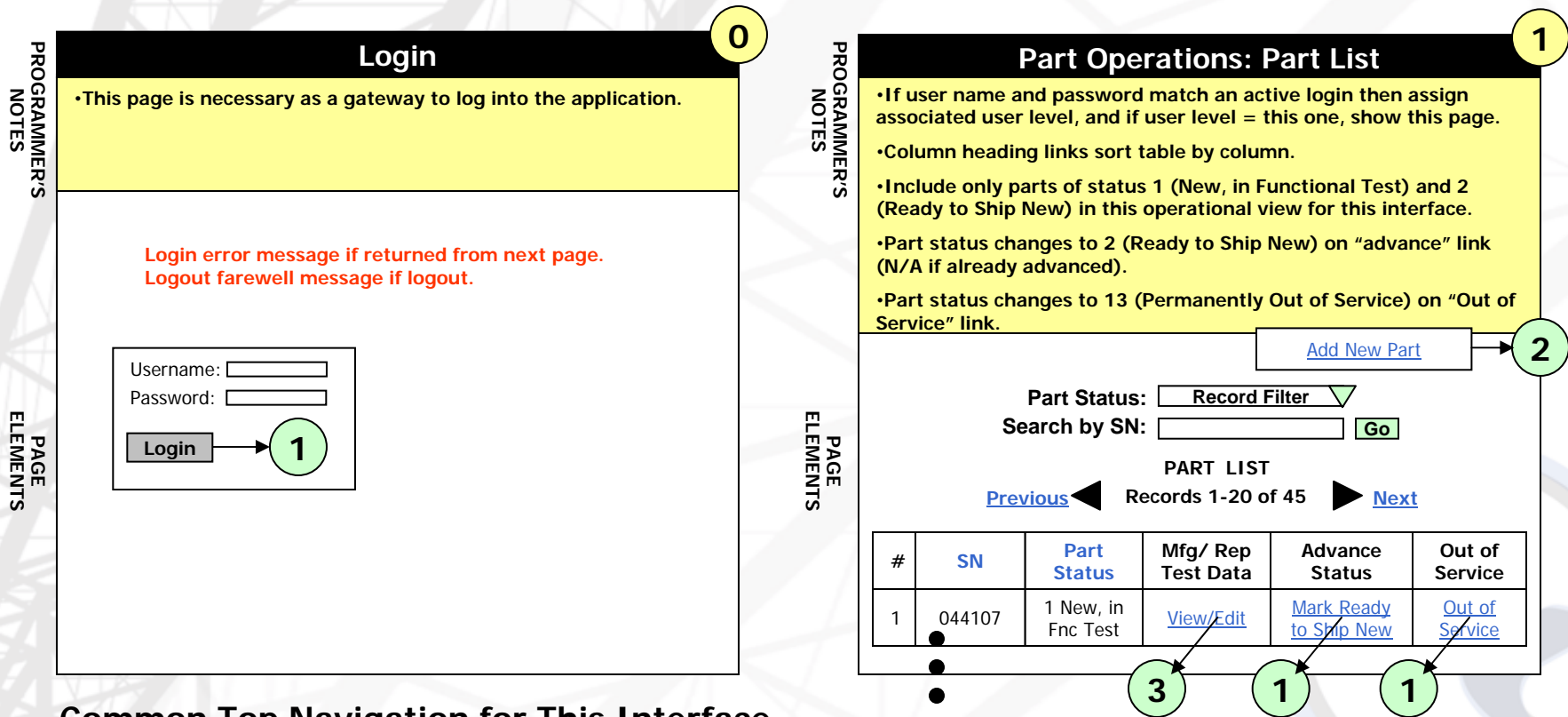


- The Business Logic Design determines the scope and interactions of the dynamic web documents that control the flow of information through the system.
- For clarity, the design for each section is organized as a storyboard of the user's experience navigating through the application.
- The models are not intended to show the layout or appearance of the web pages— rather, to symbolize major functionality/ elements.
- The models are intended to show a representative sample of fields, including any key operational fields, but do not show all fields. Fields to show in application should be based on screen design, plus data available in DB schema and screen-space available in view.
- Pages and elements may be added, changed or removed during implementation as details are fleshed out.

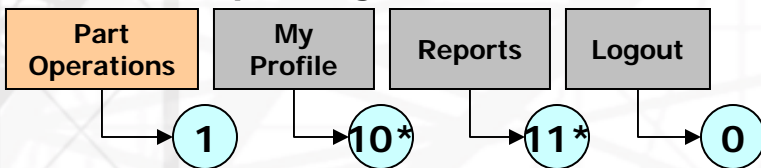
Business Logic Schema



Manufacturing Representative Interface

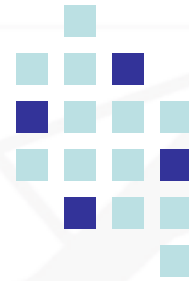


Common Top Navigation for This Interface



* Refers to screens in the common interface

Business Logic Schema



2

Part Operations: Add Form

PROGRAMMER'S NOTES

- The part type selection is to be hard-coded at IVP for now.
- For the Add Form, do NOT present mfg test fields, as these will be presented only in Edit mode, with particular fields shown according to the vehicle type of the part.
- IVP status is 1 (New, in Functional Test) for all new IVPs.

PAGE ELEMENTS

Display error msg if returned from processing page.

ADD RECORD

Part Type: **In-Vehicle Processor (IVP)** _____

Vehicle Type: _____

Site: _____

Serial Number: _____

[Add Record](#)

1

3

Part Operations: Edit Form

PROGRAMMER'S NOTES

- Form fields to show for mfg tests are dependent upon vehicle type. See current mfg functional test documents, or data correlation spreadsheet included in this document, for fields to show per vehicle type, and how to organize them for clarity.
- Part type and Vehicle Type are not editable in this view.

PAGE ELEMENTS

Display error msg if returned from processing page.

DETAILS FOR RECORD ID=xx

Part Type: **In-Vehicle Processor (IVP)** .

Vehicle Type: Gantry Crane .

Site: _____

Serial Number: _____

Manufacturing Functional Test Data

Date: _____

•

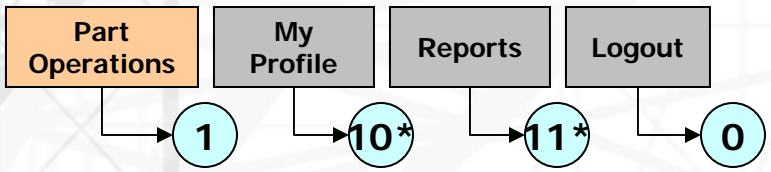
•

•

[Save Changes](#)

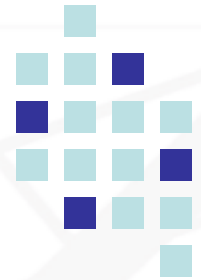
1

Common Top Navigation for This Interface



* Refers to screens in the common interface

Business Logic Schema



Shipping Representative Interface

0

PROGRAMMER'S NOTES

•This page is necessary as a gateway to log into the application.

PAGE ELEMENTS

Login error message if returned from next page.
Logout farewell message if logout.

Username:
Password:
Login → **1**

1

PROGRAMMER'S NOTES

- If user name and password match an active login then assign associated user level, and if user level = this one, show this page.
- Include only parts of status 2 (Ready to Ship New), 12 (Ready to Ship Repaired), and 3 (Shipped to Field) in this operational view for this interface.
- Part status changes to 3 (Shipped to Field) on "advance" link (N/A if already advanced).

PAGE ELEMENTS

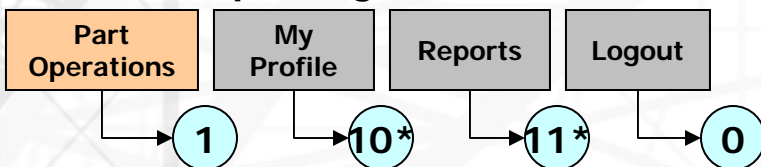
Part Status:
Search by SN:

PART LIST
Records 1-20 of 45
[Previous](#) [Next](#)

#	SN	Part Status	Shipping Data	Advance Status
1	044107	2 Ready to Ship New	View/Edit	Mark Shipped to Field
...				

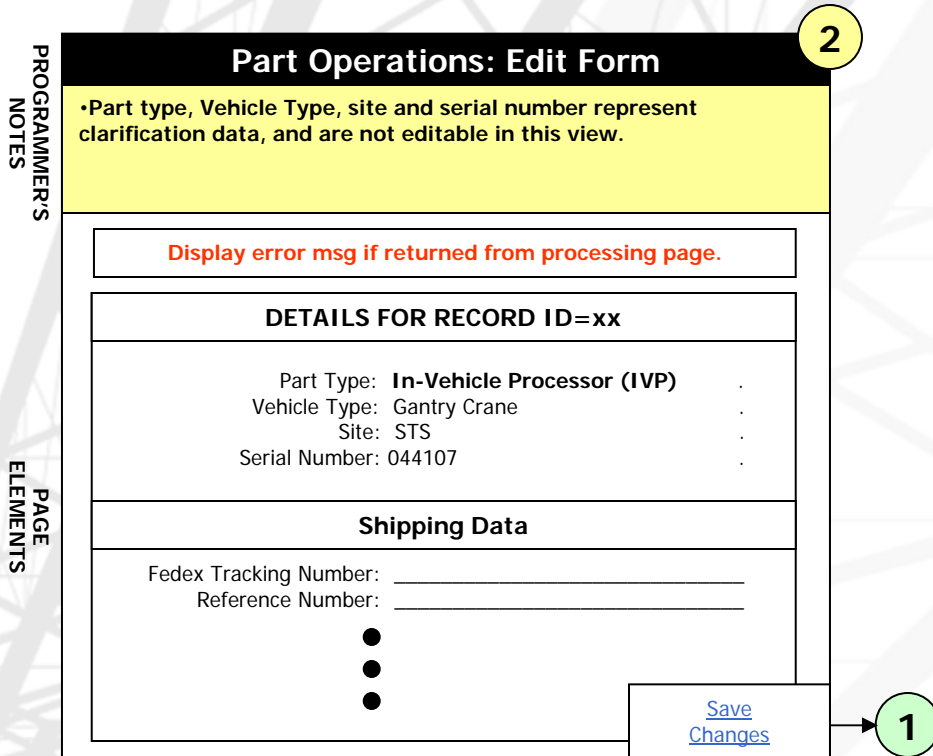
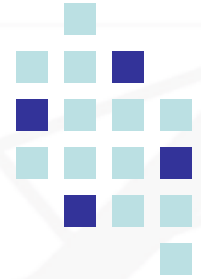
→ **2** **1**

Common Top Navigation for This Interface

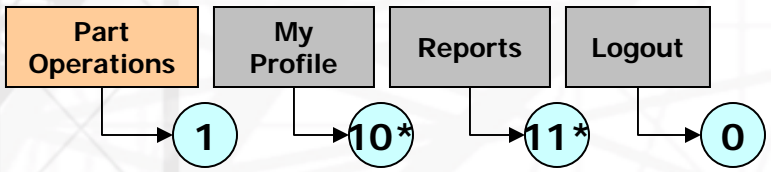


* Refers to screens in the common interface

Business Logic Schema



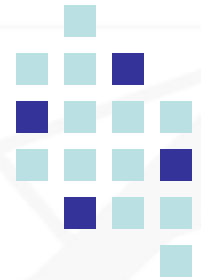
Common Top Navigation for This Interface



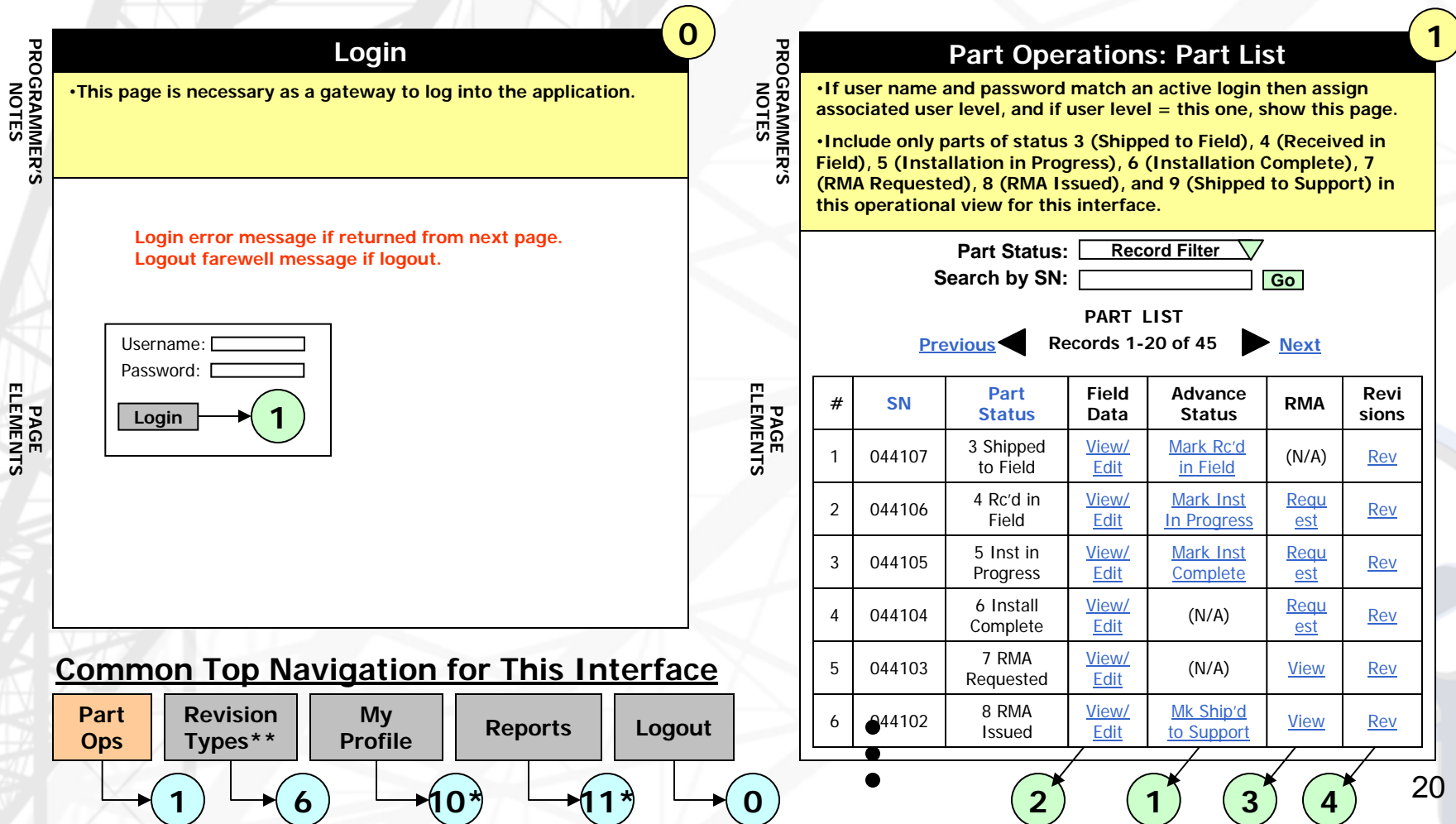
* Refers to screens in the common interface



Business Logic Schema

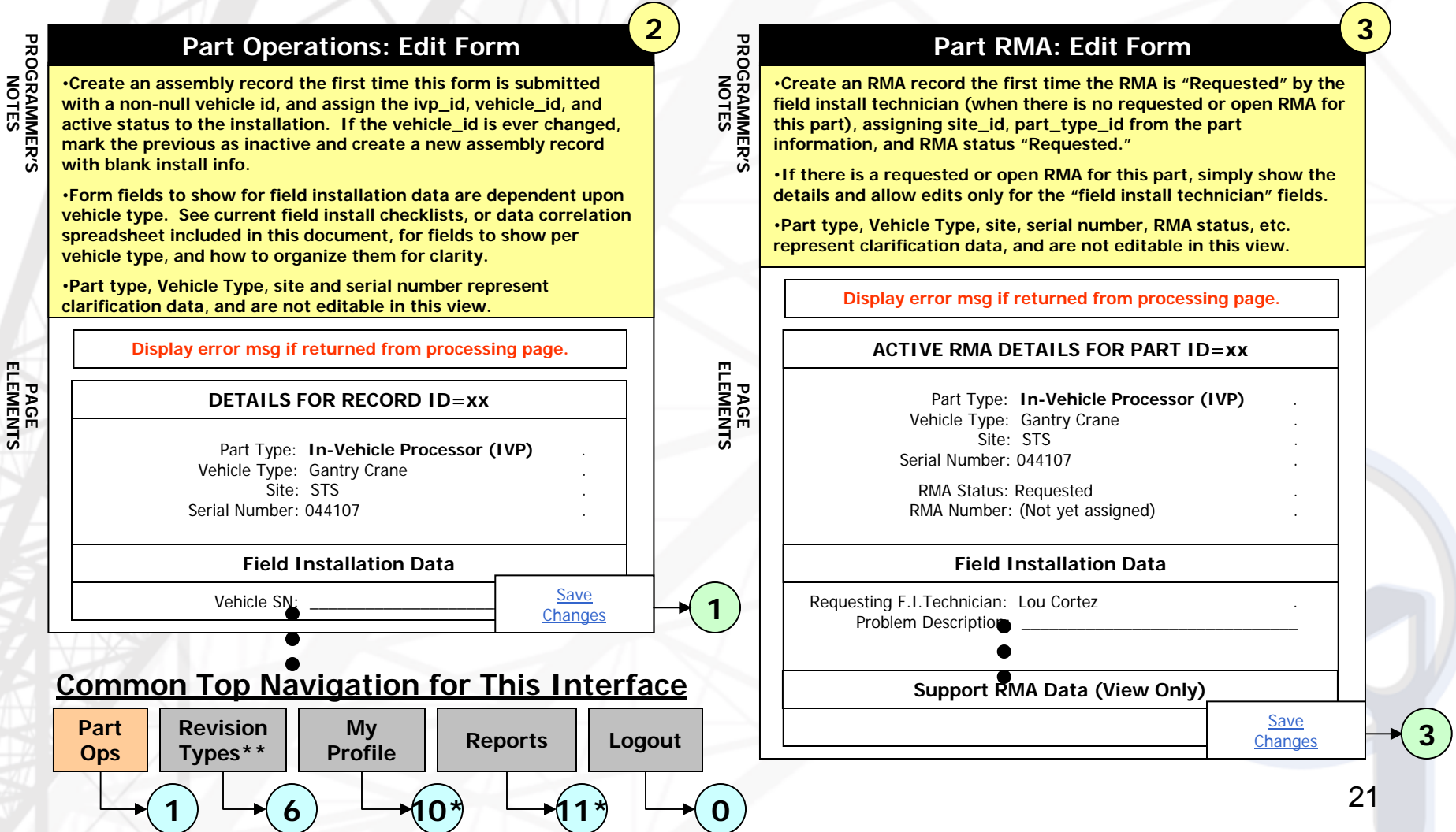
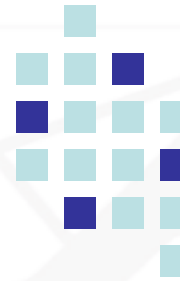


Field Install Technician/ Hardware Engineer Interface



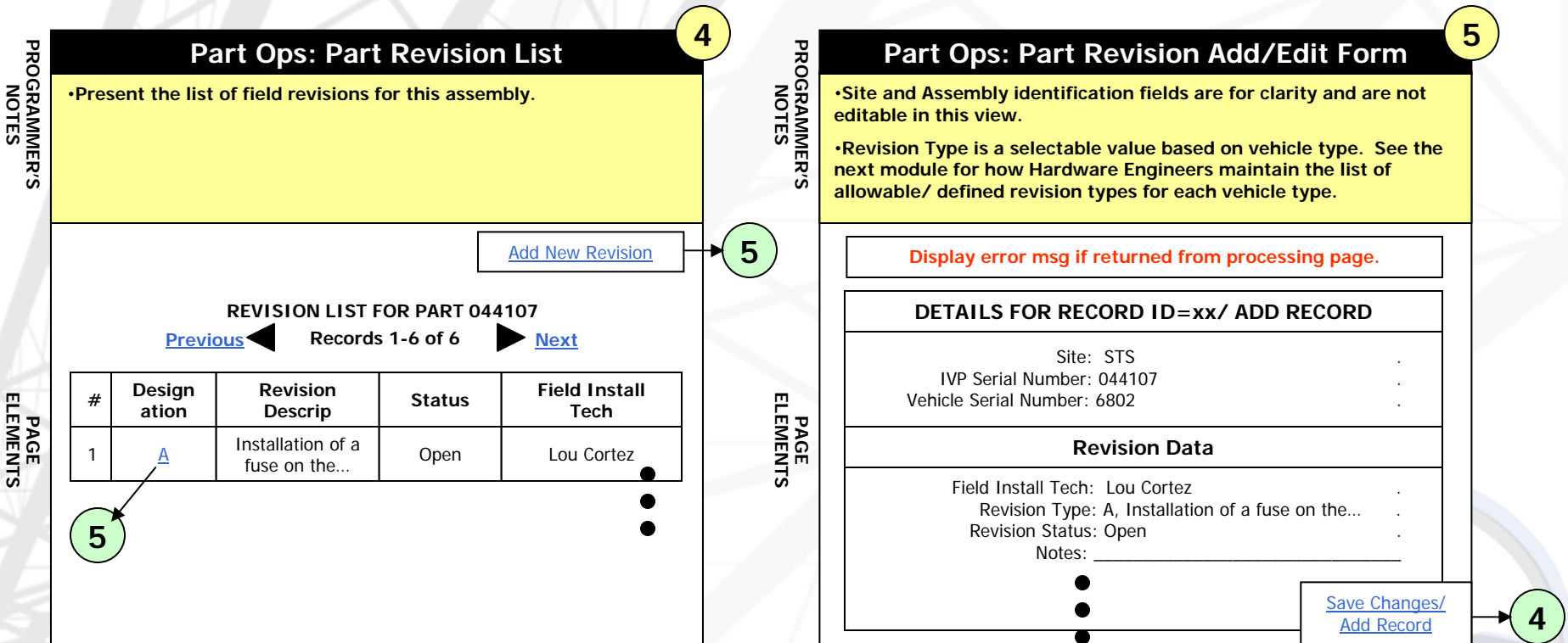
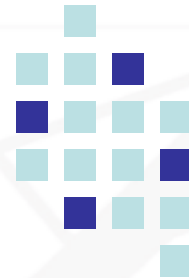
* Refers to screens in the common interface ** This navigational element only available to Hardware Engineers

Business Logic Schema

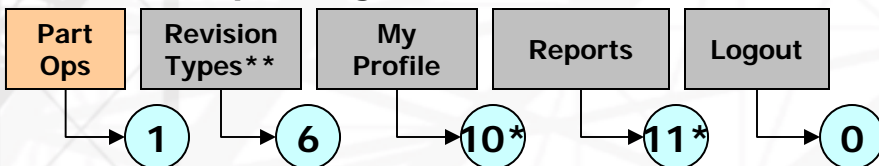


* Refers to screens in the common interface ** This navigational element only available to Hardware Engineers

Business Logic Schema

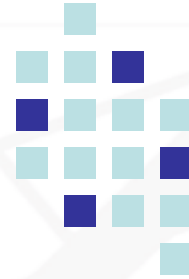


Common Top Navigation for This Interface



* Refers to screens in the common interface ** This navigational element only available to Hardware Engineers

Business Logic Schema



Revision Types: Revision Type List 6

PROGRAMMER'S NOTES
•Present the list of revision types.

[Add New Rev Type](#) 7

Vehicle Type:
 Active:

REVISION TYPE LIST
 Previous ◀ Records 1-12 of 12 ▶ Next

#	Vehicle Type	Designation	Revision Descrip	Active
1	Gantry Crane	A	Installation of a fuse on the...	Y ● ● ●

7

PAGE ELEMENTS

Revision Types: Rev Type Add/Edit Form 7

PROGRAMMER'S NOTES
 •Present in a form for record add/edit.
 •An "active" revision type is one that can be performed on a current part.

Display error msg if returned from processing page.

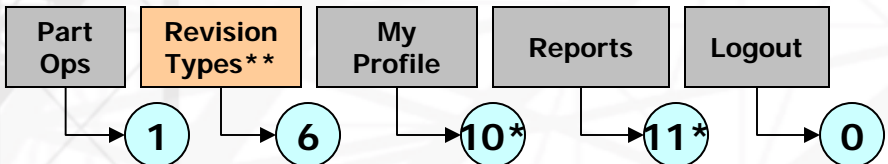
DETAILS FOR RECORD ID=xx/ ADD RECORD

Vehicle Type: Gantry Crane .
 Rev Designation Letter: A .
 Description: Installation of a fuse on the... .
 Active: _____
 ●
 ●
 ●

[Save Changes/ Add Record](#) 6

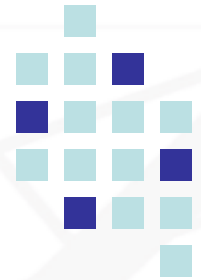
PAGE ELEMENTS

Common Top Navigation for This Interface

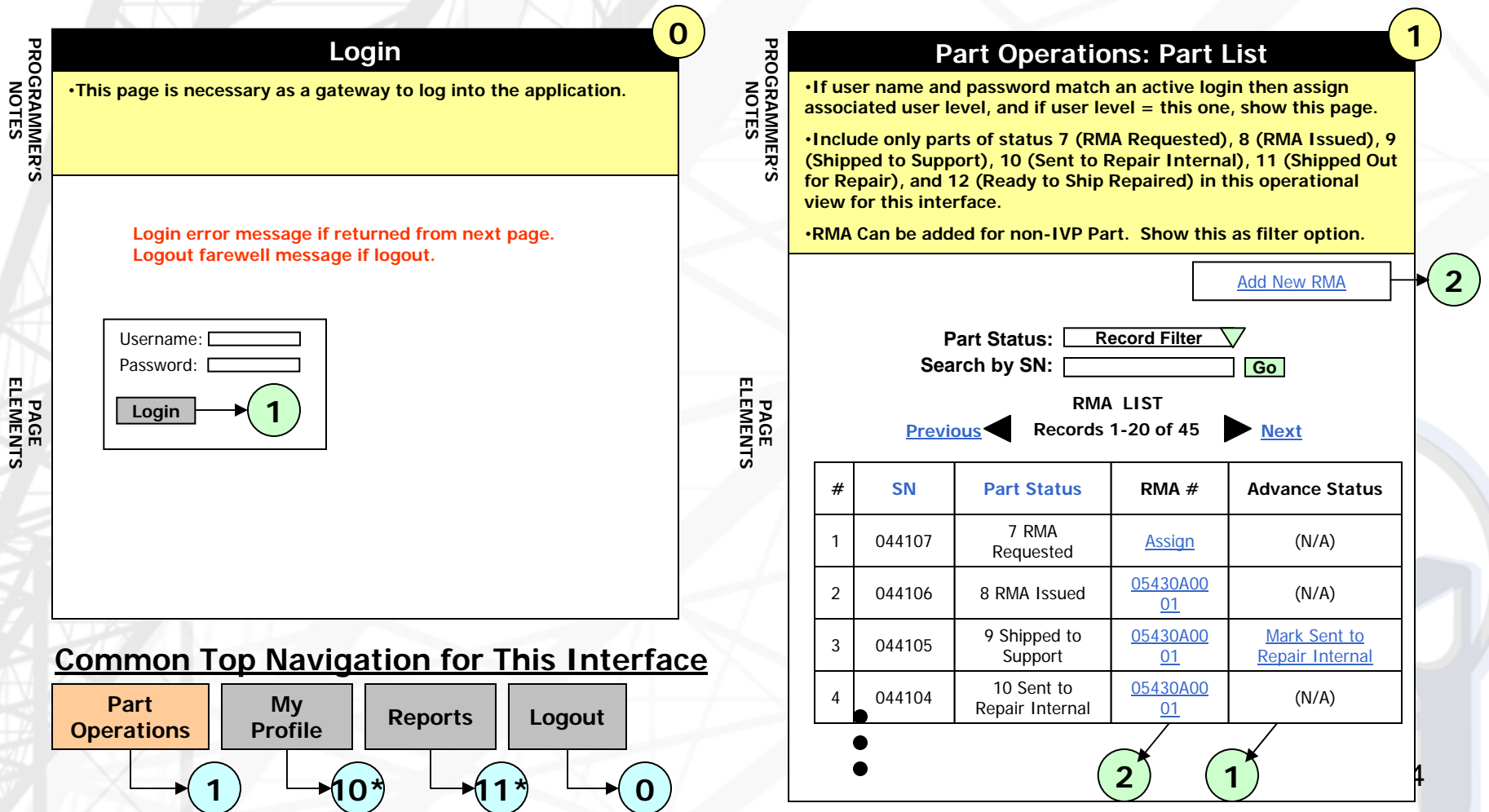


* Refers to screens in the common interface ** This navigational element only available to Hardware Engineers

Business Logic Schema

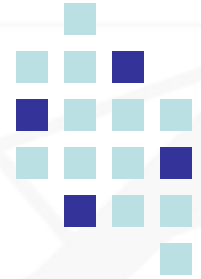


Support Representative Interface



* Refers to screens in the common interface

Business Logic Schema



PROGRAMMER'S NOTES

2

Part Operations: RMA Edit/Add Form

- If linked from "Assign," prepopulate Part type, Vehicle Type, site and serial number. If linked from "Add," Allow entry of these fields.
- Generate RMA Number from input fields on "Add" form, but allow editable on "Edit" form.

PAGE ELEMENTS

Display error msg if returned from processing page.

DETAILS FOR RECORD ID=xx/ ADD RECORD

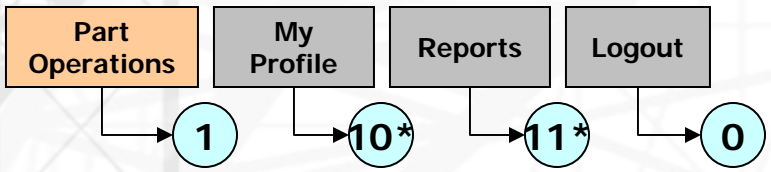
Part Type: **In-Vehicle Processor (IVP)** .
 Vehicle Type: Gantry Crane .
 Site: STS .
 Serial Number: 044107 .
 Warranty Status: _____ .
 RMA Number: _____

RMA Data

Date Opened: _____
 ●
 ●
 ●

[Save Changes/ Add Record](#) **1**

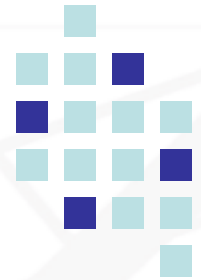
Common Top Navigation for This Interface



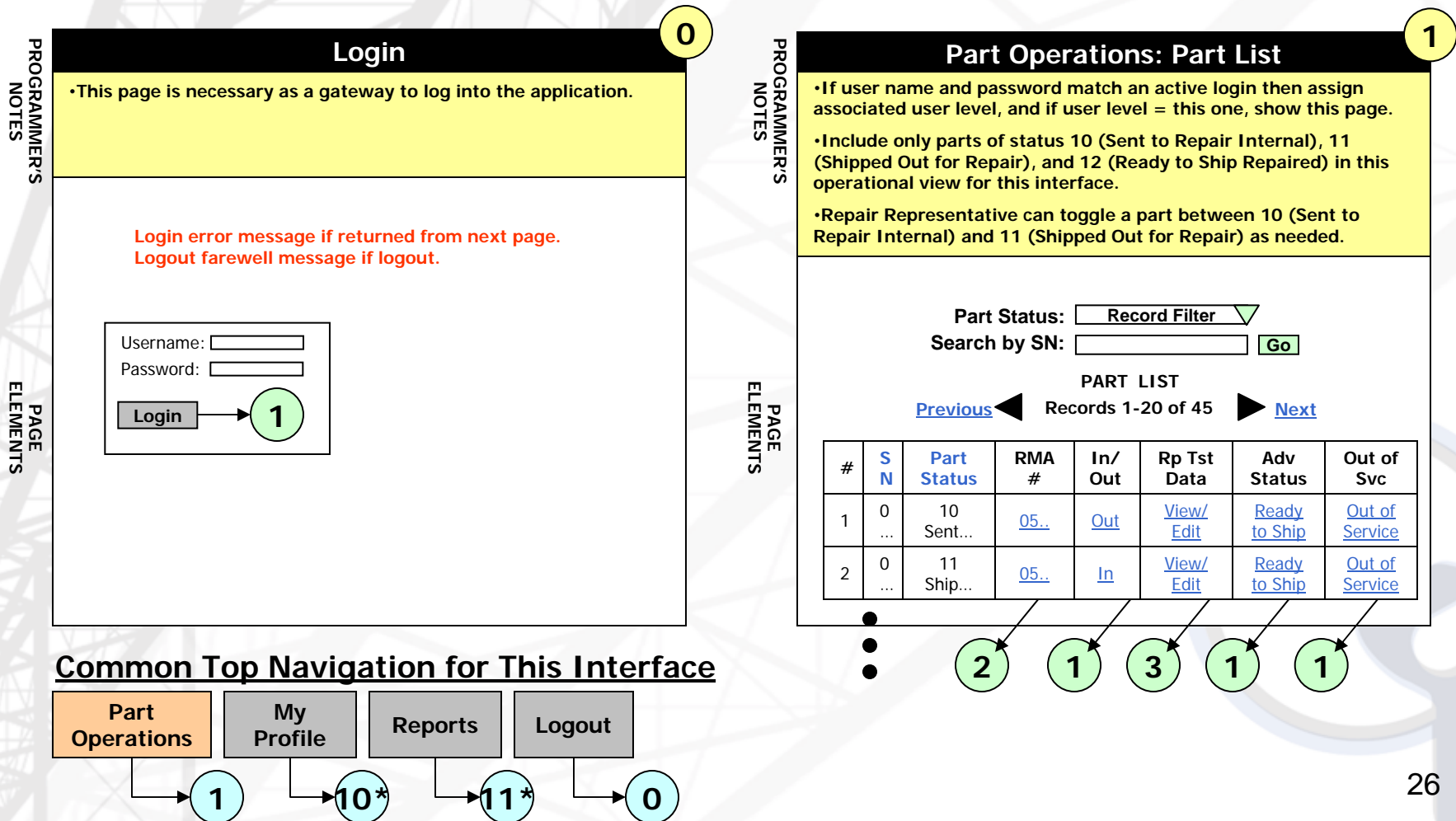
* Refers to screens in the common interface



Business Logic Schema

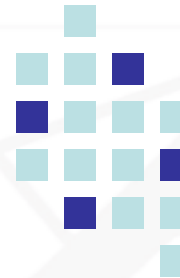


Repair Representative Interface



* Refers to screens in the common interface

Business Logic Schema



2

Part Operations: RMA Edit Form

PROGRAMMER'S NOTES

- Part type, Vehicle Type, site, serial number etc. are for clarity and are not editable in this view.
- Include "Out for Repair" fields in this view.

PAGE ELEMENTS

Display error msg if returned from processing page.

DETAILS FOR RECORD ID=xx

Part Type: **In-Vehicle Processor (IVP)** .
 Vehicle Type: Gantry Crane .
 Site: STS .
 Serial Number: 044107 .
 Warranty Status: _____ .
 RMA Number: _____ .

RMA Data

Date Opened: _____
 ●
 ●
 ●

[Save Changes](#)

1

3

Part Operations: Repair Data Edit Form

PROGRAMMER'S NOTES

- Form fields to show for repair tests are dependent upon vehicle type. See current mfg functional test documents, or data correlation spreadsheet included in this document, for fields to show per vehicle type, and how to organize them for clarity.
- Part type and Vehicle Type are not editable in this view.

PAGE ELEMENTS

Display error msg if returned from processing page.

DETAILS FOR RECORD ID=xx

Part Type: **In-Vehicle Processor (IVP)** .
 Vehicle Type: Gantry Crane .
 Site: _____ .
 Serial Number: _____ .

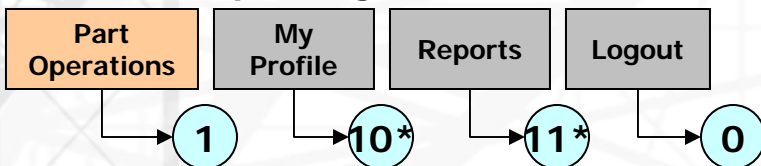
Manufacturing Functional Test Data

Date: _____
 ●
 ●
 ●

[Save Changes](#)

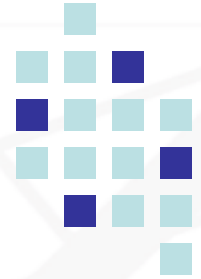
1

Common Top Navigation for This Interface

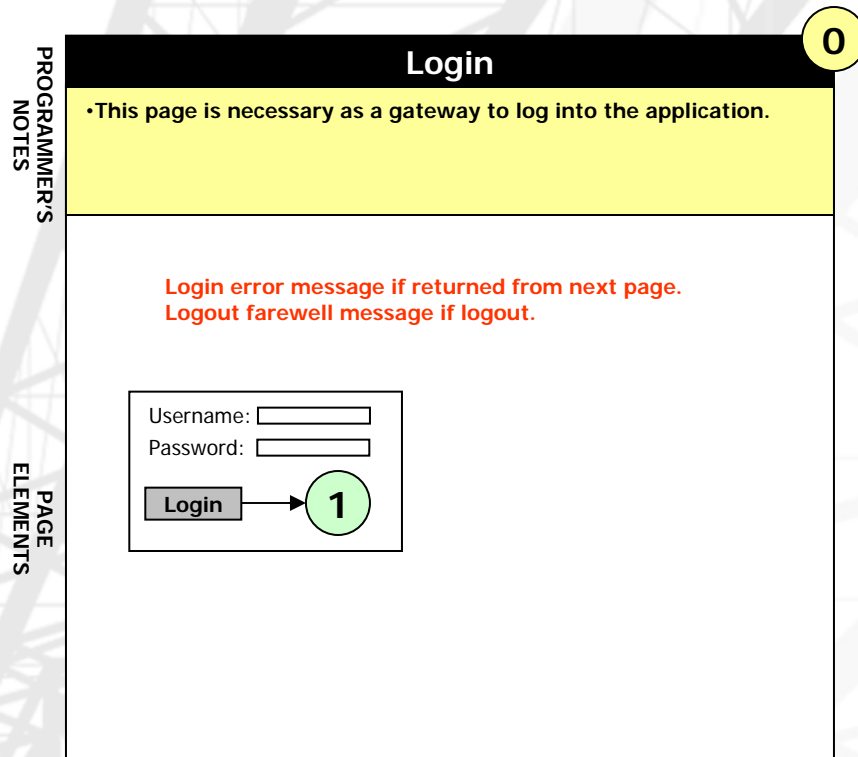


* Refers to screens in the common interface

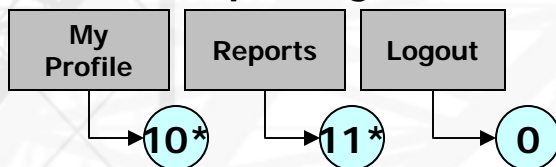
Business Logic Schema



Stakeholder Interface

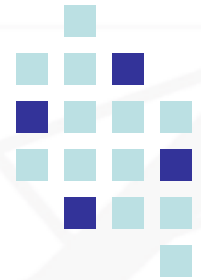


Common Top Navigation for This Interface



* Refers to screens in the common interface

Business Logic Schema



System Administrator Interface

0

PROGRAMMER'S NOTES

•This page is necessary as a gateway to log into the application.

Login error message if returned from next page.
Logout farewell message if logout.

PAGE ELEMENTS

Username:
Password:
Login → **1**

1

PROGRAMMER'S NOTES

- If user name and password match an active login then assign associated user level, and if user level = this one, show this page.
- Include parts of all status in this view. Part Status is editable for all parts, but certain status values require supporting data (for joins).
- Data Links (+) to appropriate screen in other interfaces, not duplicated in this design view.

Part Status:
Search by SN:

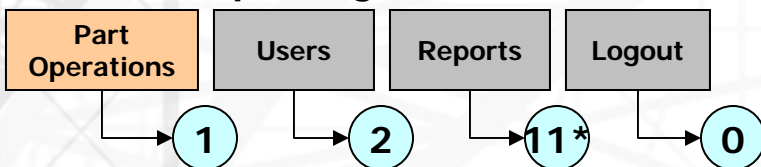
PART LIST
Records 1-20 of 45

[Previous](#) [Next](#)

#	SN	Part Status	Ship Data	Field Data	RMA Data	Out of Service
1	044..	2 Rea...	View/Edt	View/Edt	View/Edt	Out of Service
•	•	•	+	+	+	1

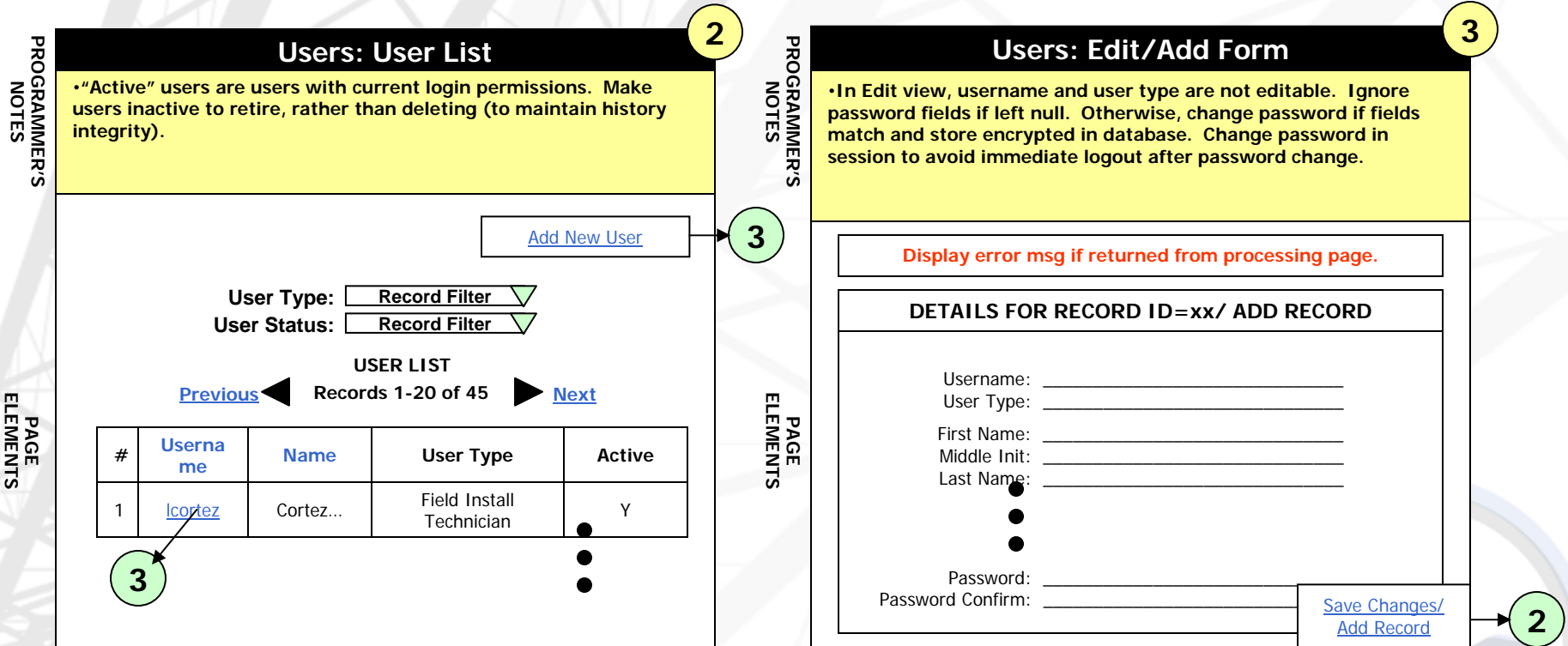
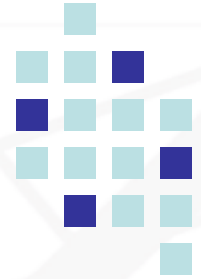
PAGE ELEMENTS

Common Top Navigation for This Interface

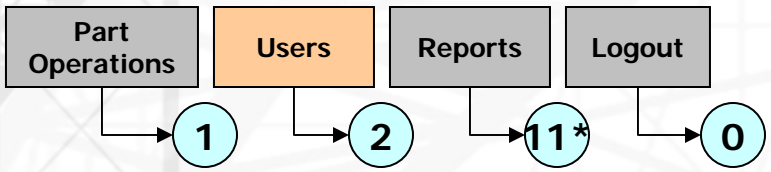


* Refers to screens in the common interface

Business Logic Schema

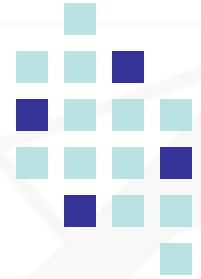


Common Top Navigation for This Interface

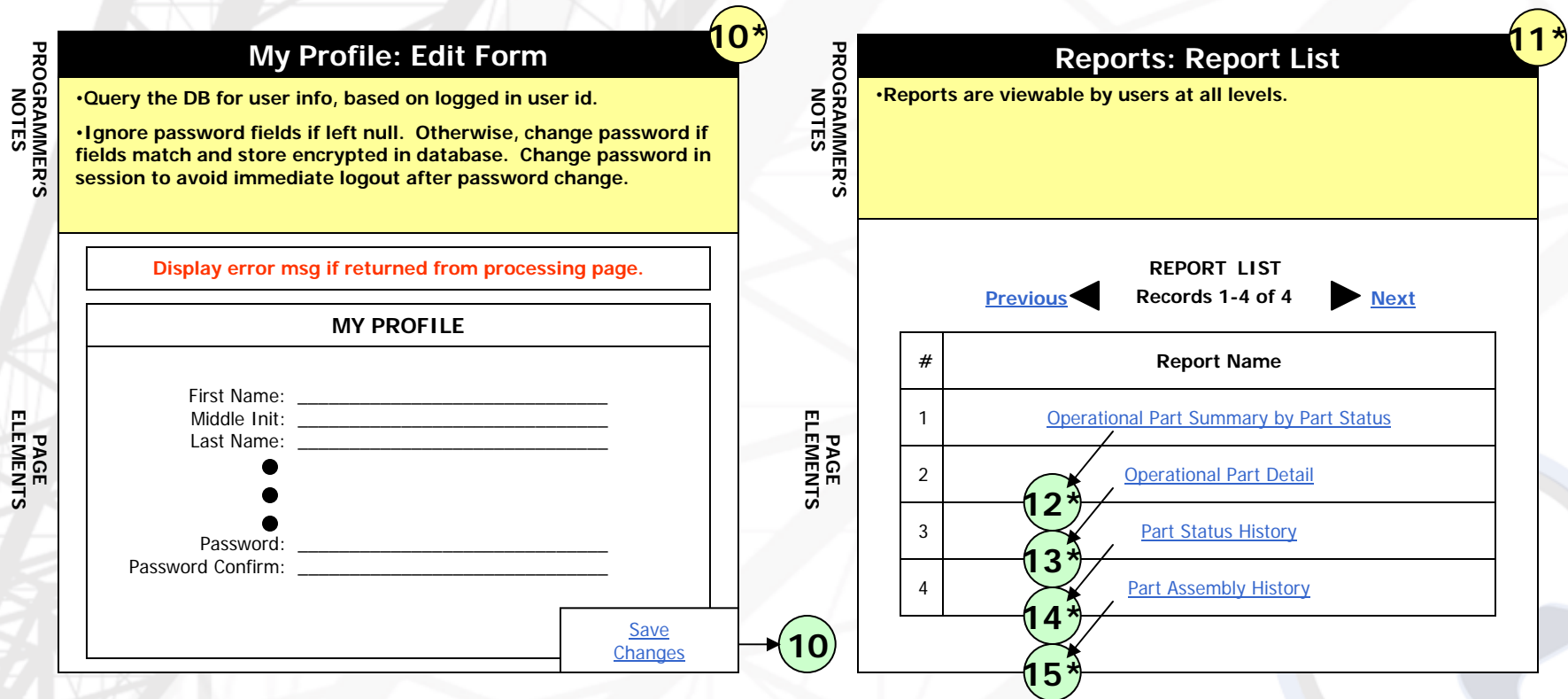


* Refers to screens in the common interface

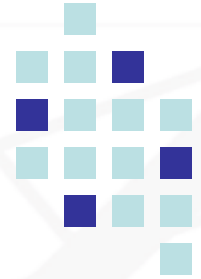
Business Logic Schema



Common Interface



Business Logic Schema



PROGRAMMER'S NOTES

Reports: Part Summary by Status List 12*

- Include parts of all status in this view. No fields are editable.
- Link to part detail sets filter for part status on that screen.

PAGE ELEMENTS

PART SUMMARY BY STATUS
[Previous](#) ◀ Records 1-20 of 45 ▶ [Next](#)

#	Part Status	Total
1	1 New, in Functional Test	23
•		
•		
•		

13*

PROGRAMMER'S NOTES

Reports: Part Detail List 13*

- Include parts of all status in this view. No fields are editable.
- Data Links (+) to appropriate screens formatted like those in other interfaces, but not editable, not duplicated in this design view.

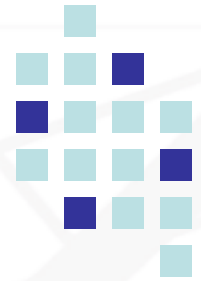
PAGE ELEMENTS

PART LIST
[Previous](#) ◀ Records 1-20 of 45 ▶ [Next](#)

Part Status: ▾
 Search by SN:

#	SN	Part Status	Ship Data	Field Data	RMA Data
1	044..	2 Ready to Ship New	View	View	View
•			+	+	+
•					

Business Logic Schema



PROGRAMMER'S NOTES

14*

•No fields are editable.

Part SN:

PART STATUS HISTORY
[Previous](#) ◀ Records 1-13 of 13 ▶ [Next](#)

#	Part Status	Set on Date	Set by User
1	1 New, in Functional Test	4/10/2004	Smith, John
	●		
	●		
	●		

PAGE ELEMENTS

PROGRAMMER'S NOTES

15*

•No fields are editable.

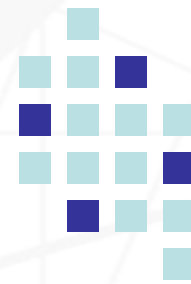
Part SN:

PART ASSEMBLY HISTORY
[Previous](#) ◀ Records 1-13 of 13 ▶ [Next](#)

#	Site	Vehicle	Install Date	De-Inst Date	Assy Active
1	STS	6123	4/10/2002	7/3/2004	Y
		●			
		●			
		●			

PAGE ELEMENTS

Appendix (Removed from this Sample)



Appendix A: Data Samples	37
Appendix B: Initial Data Mapping for Mfg Functional Tests and Field Install Checklist Fields	56

