

Design of Informatics-based Services in Manufacturing Industries: A Framework and Case Studies

by

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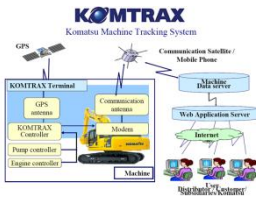
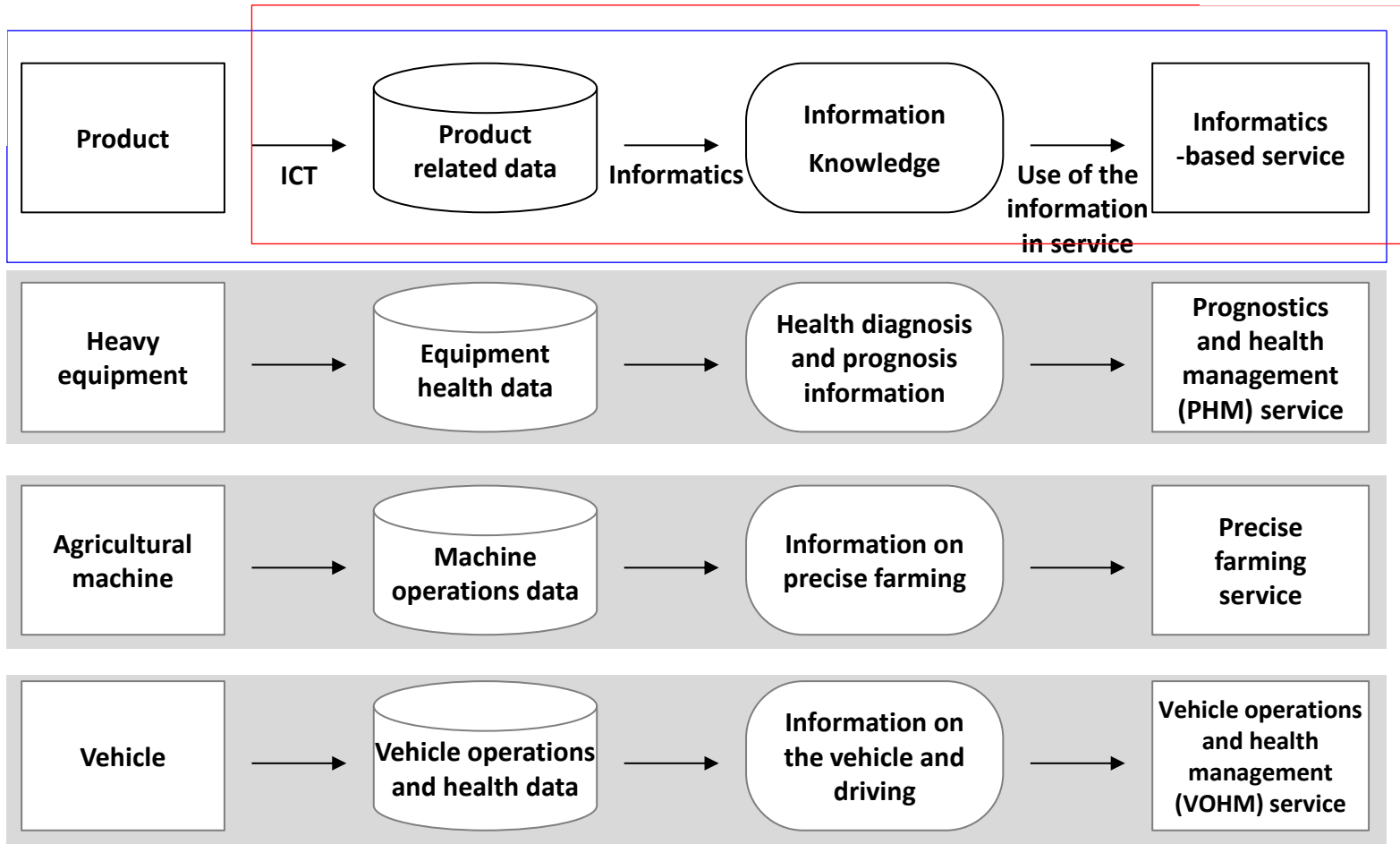
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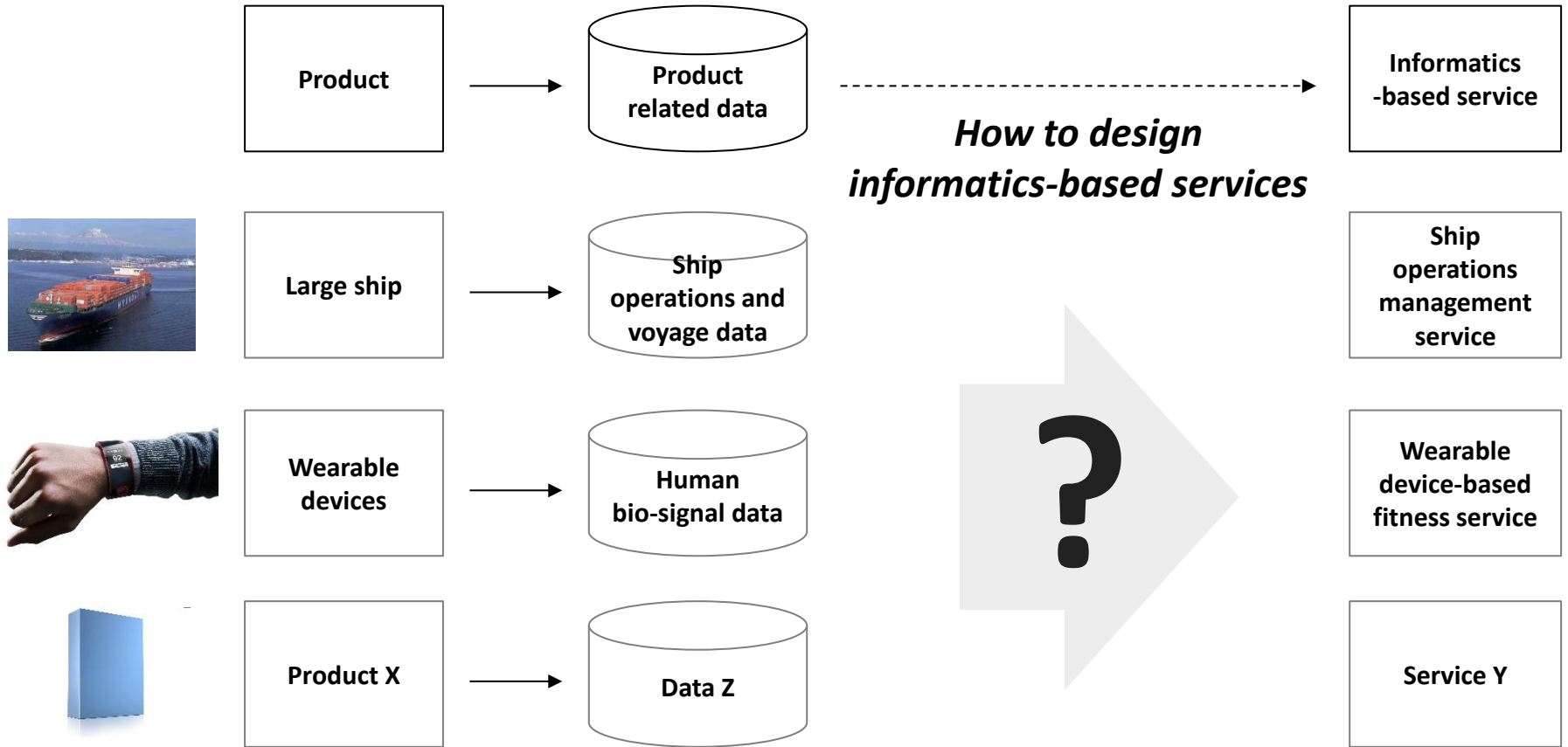
Informatics-based services in manufacturing industries

Our focus

Scope of PSS

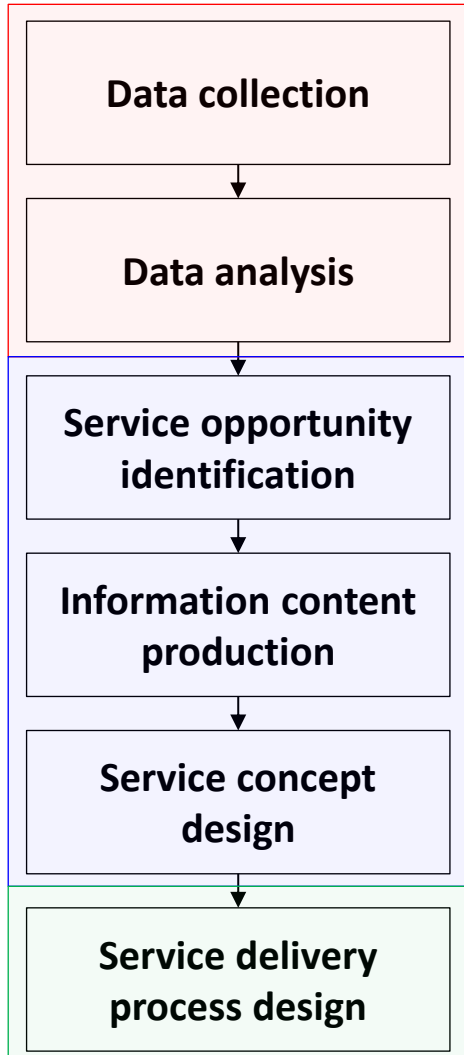


Research question

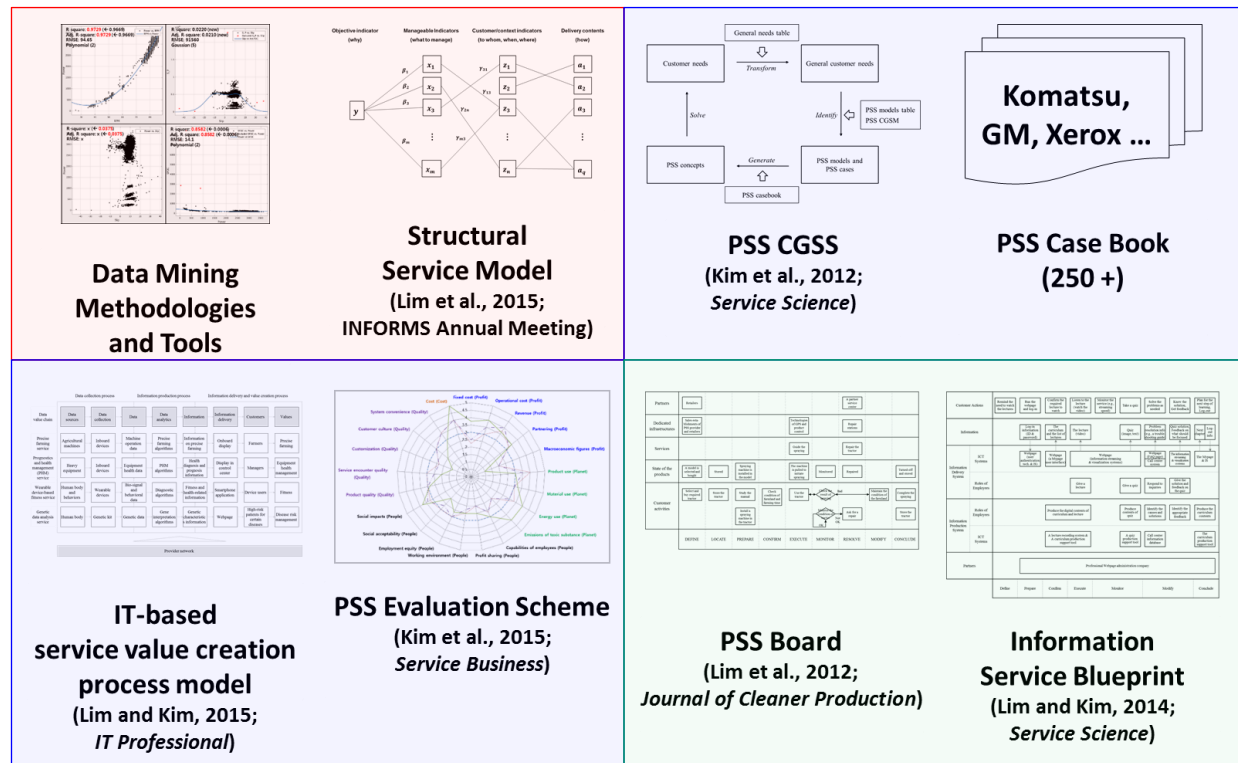


Design framework: Version 2.0

Informatics-based service design process

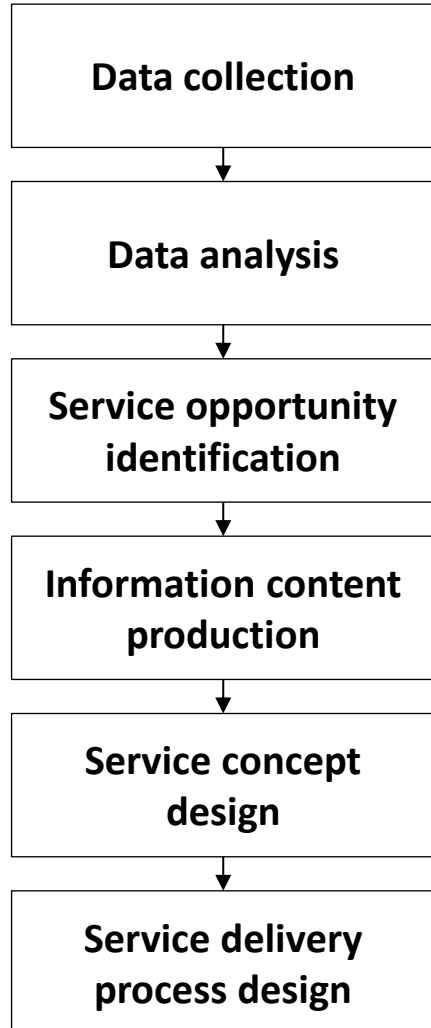


Design support tools



Overview of the case studies

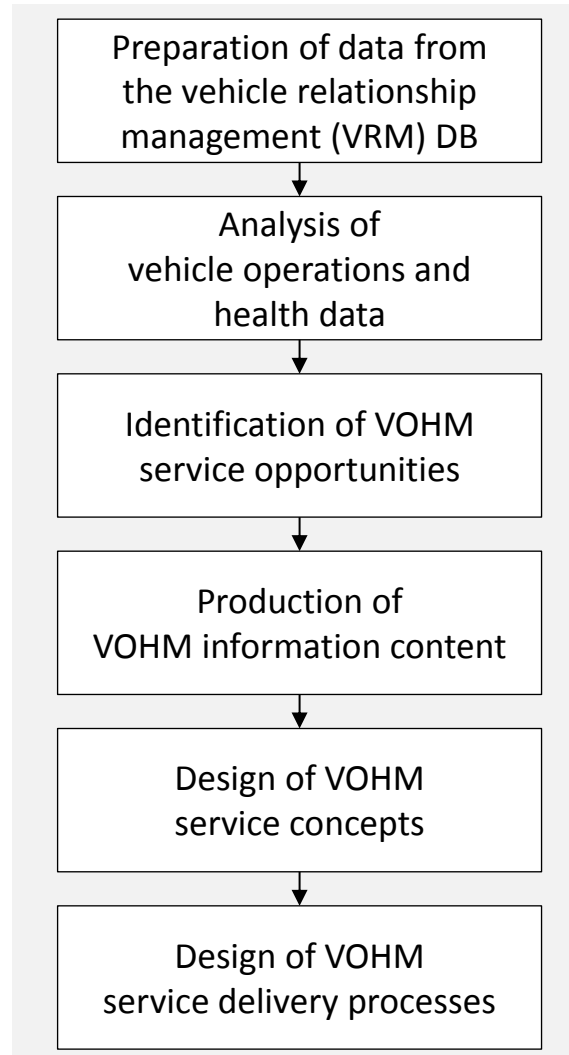
Informatics-based service design process



<Case study 1>



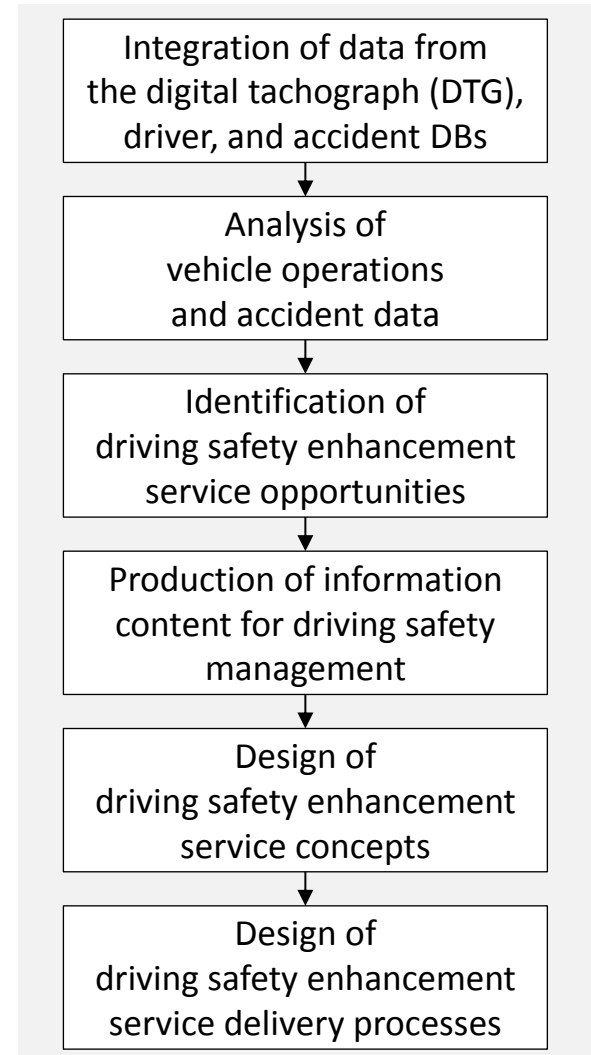
Vehicle operations and health management (VOHM) service



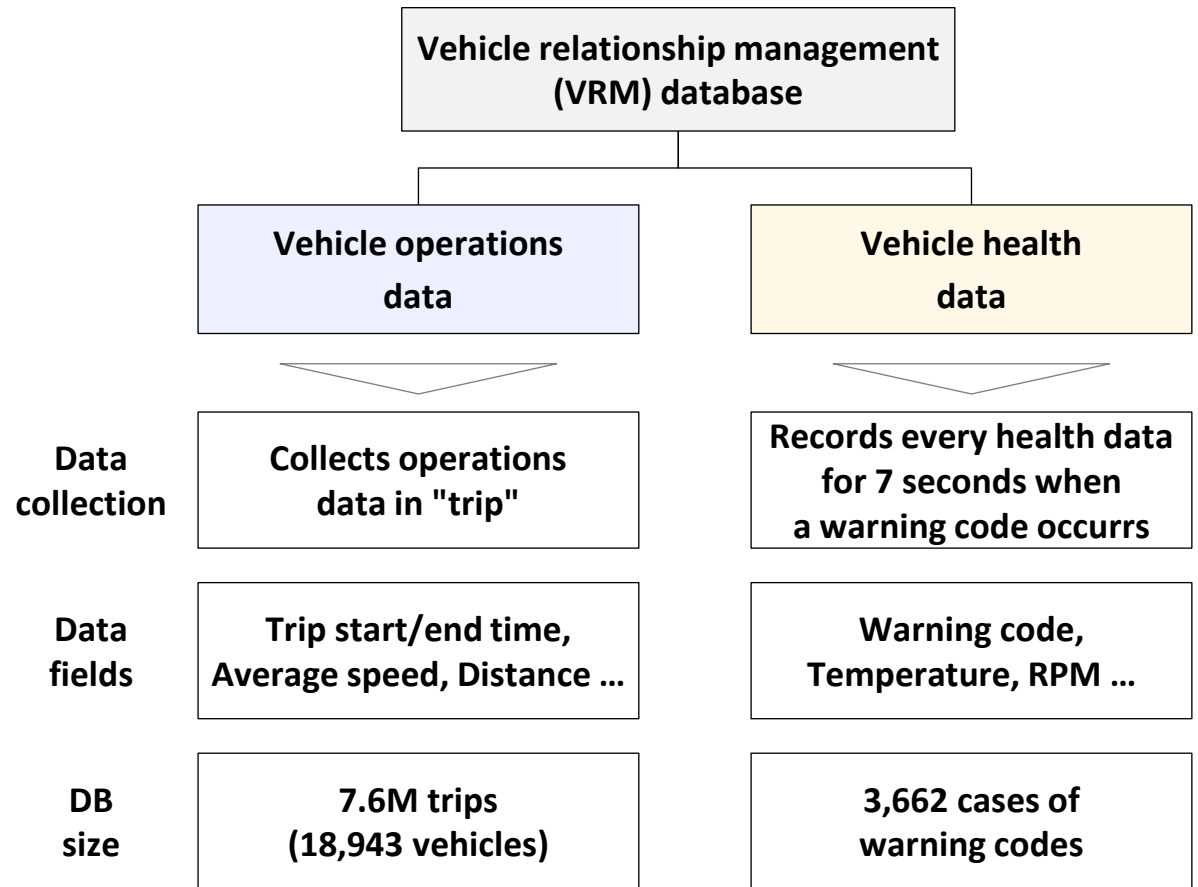
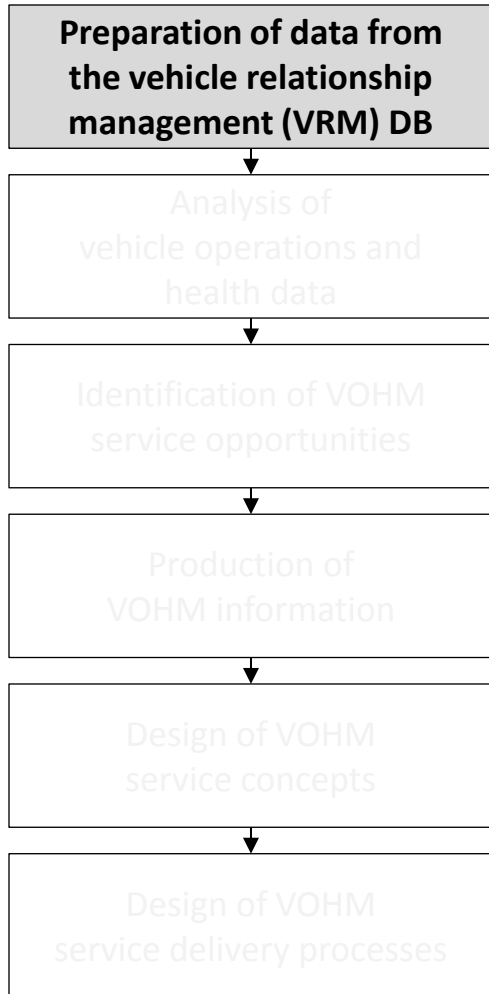
<Case study 2>



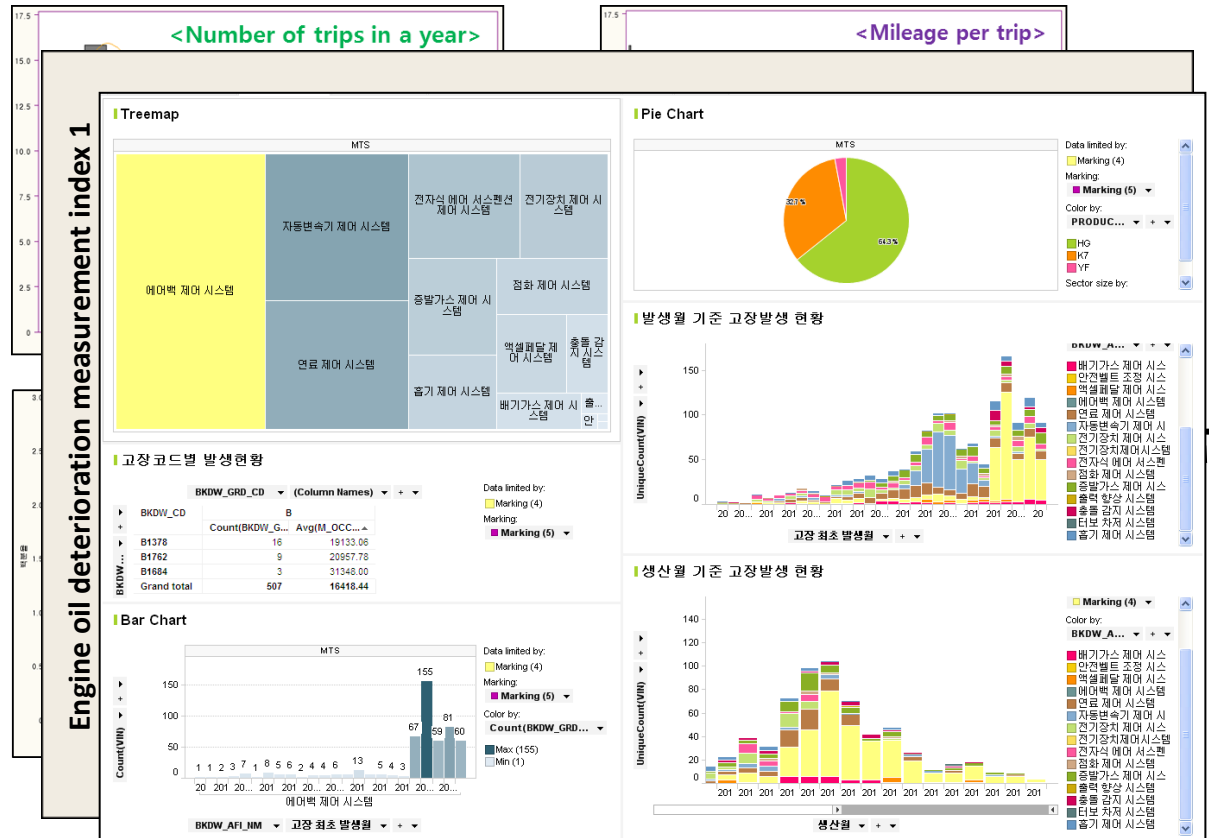
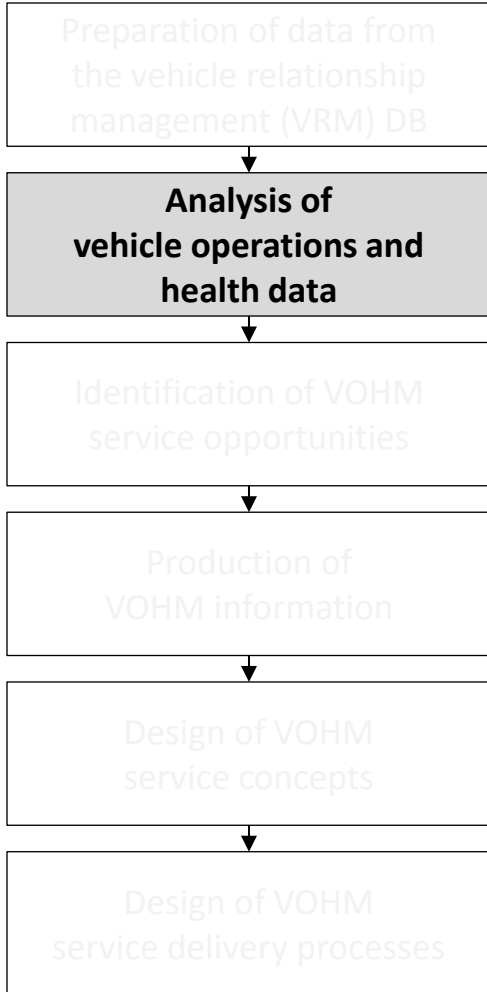
Driving safety enhancement service



Case study 1: With HYUNDAI (1/6)



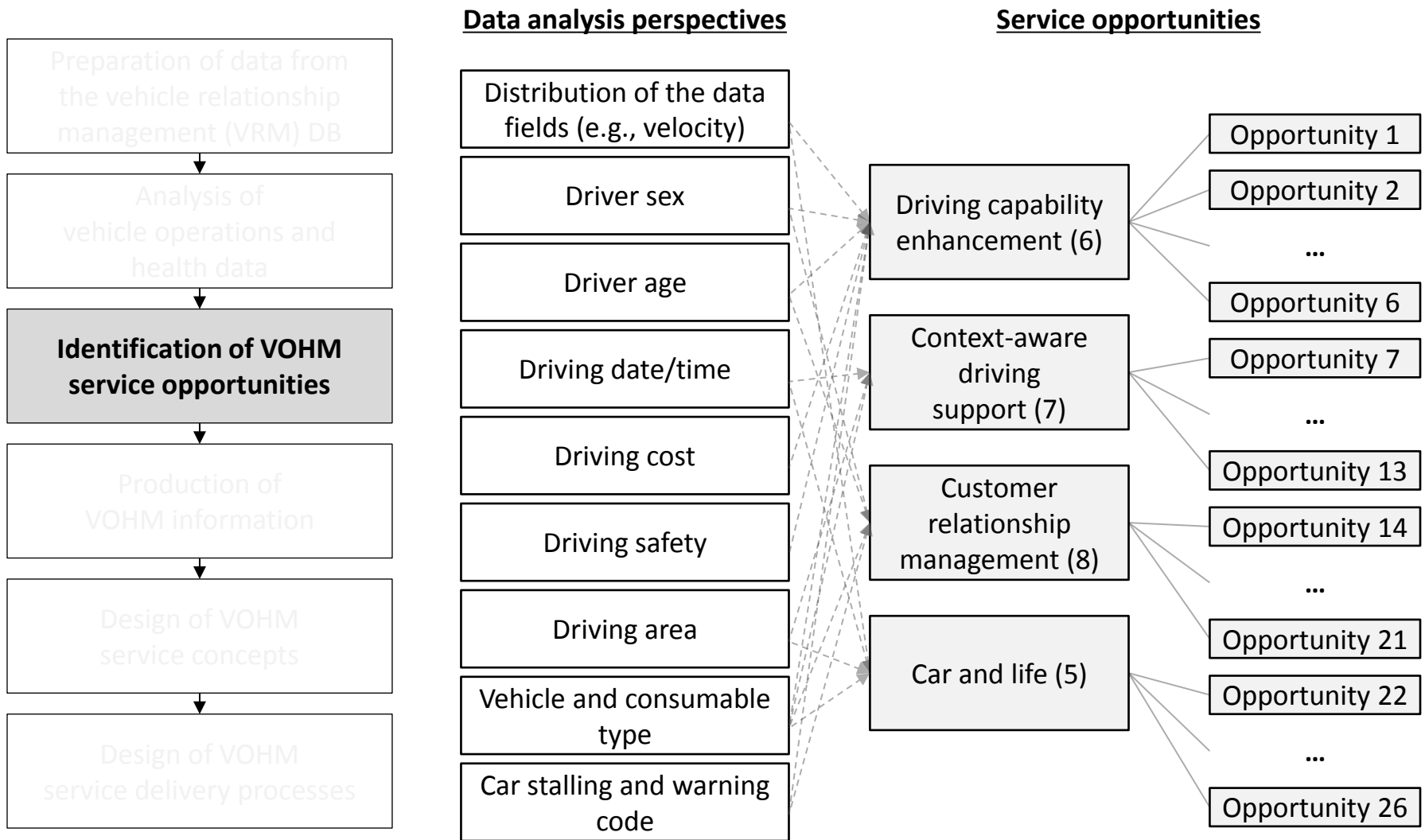
Case study 1: With HYUNDAI (2/6)



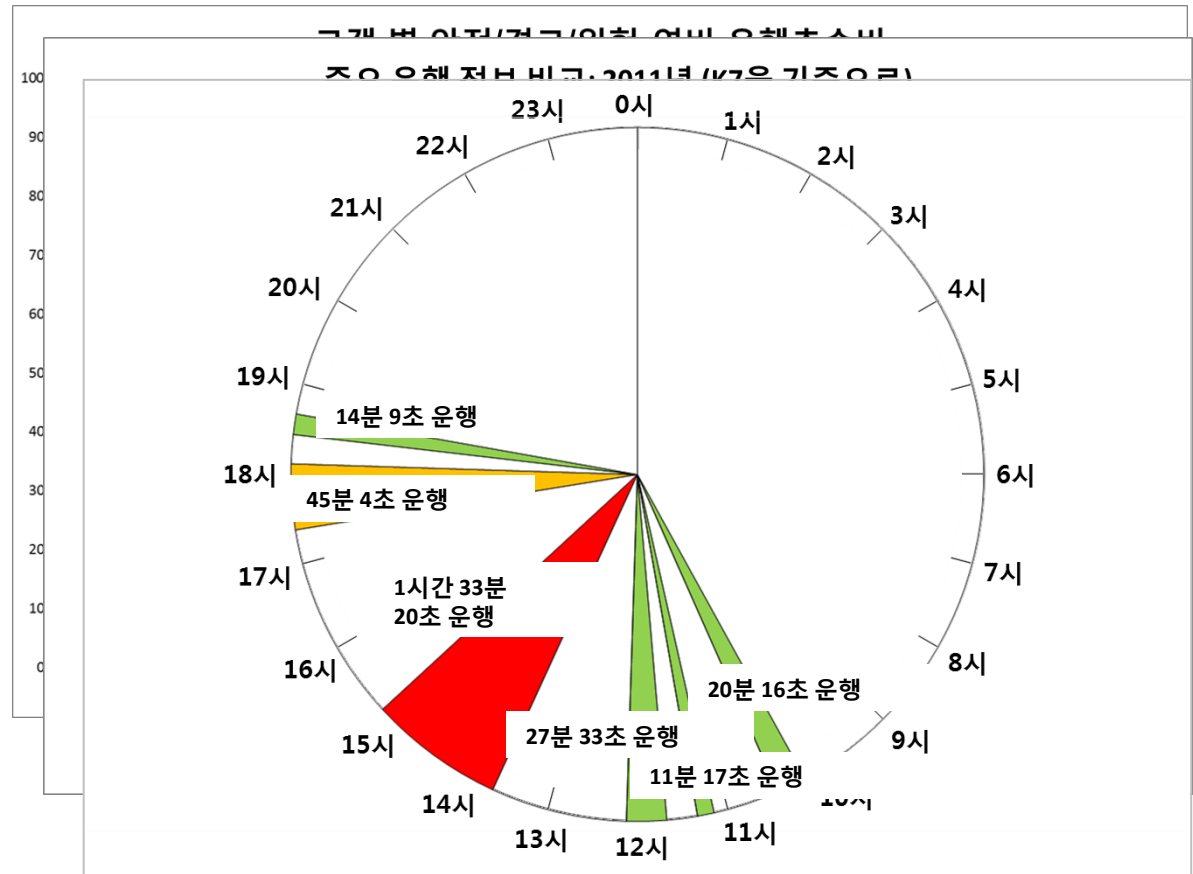
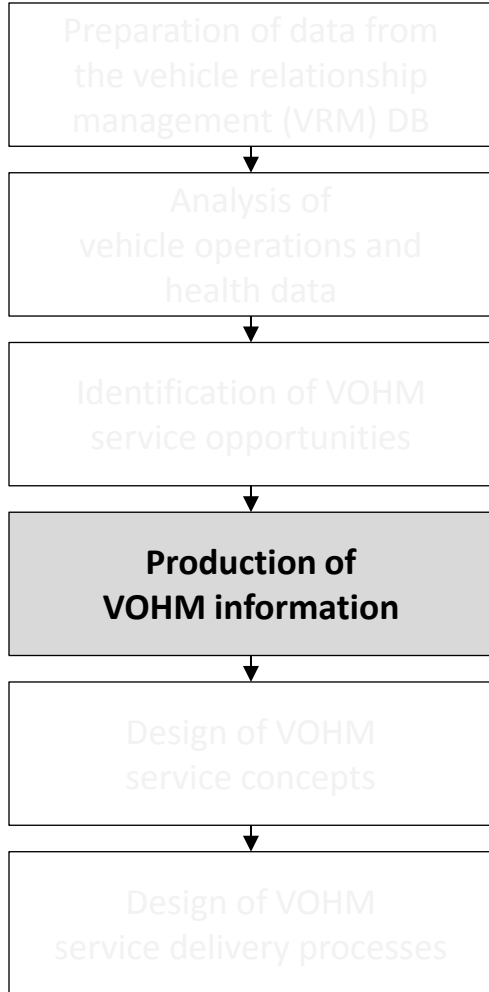
Mean value of index 2 (4.2%)

Mean value of index 1 (47.7%)

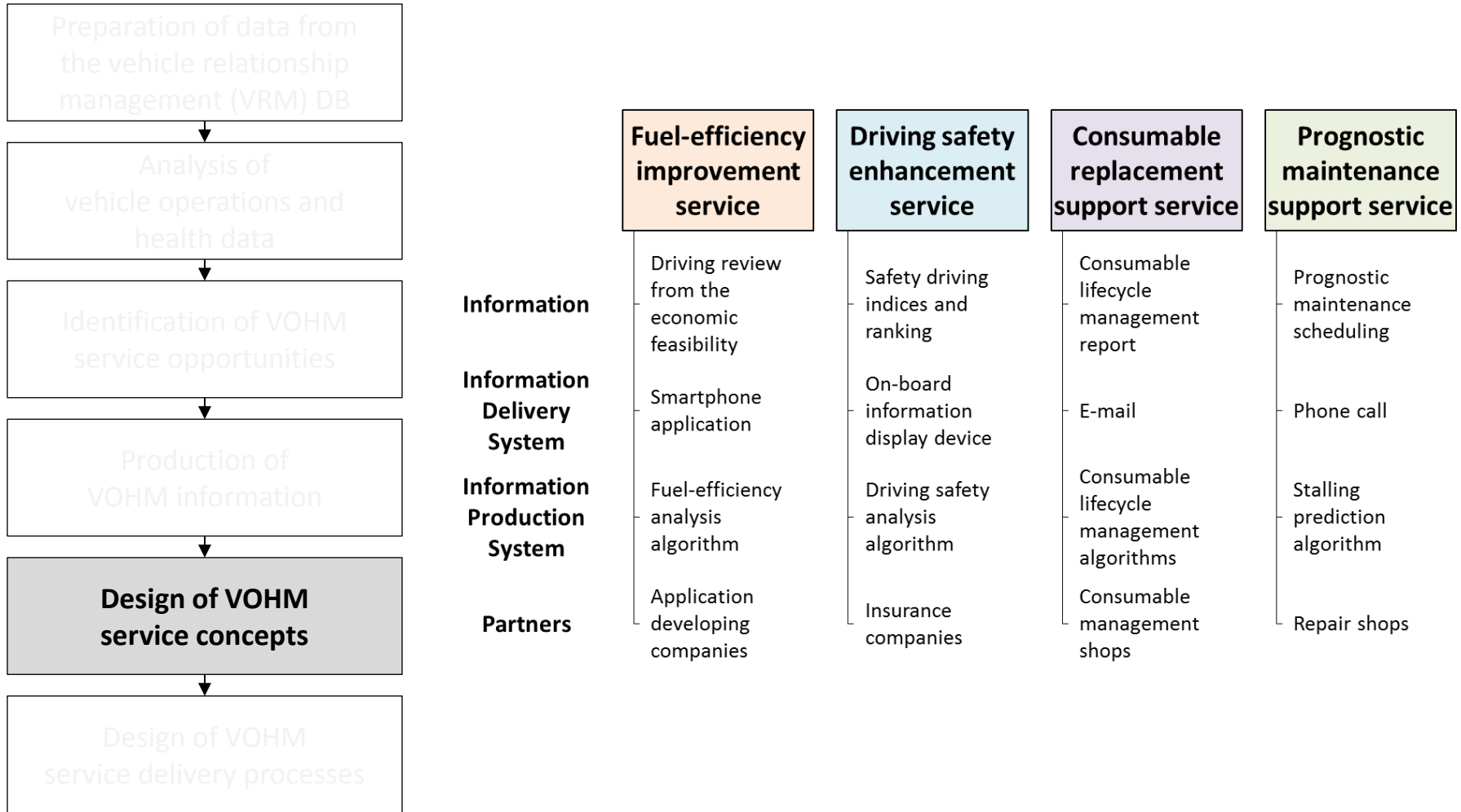
Case study 1: With HYUNDAI (3/6)



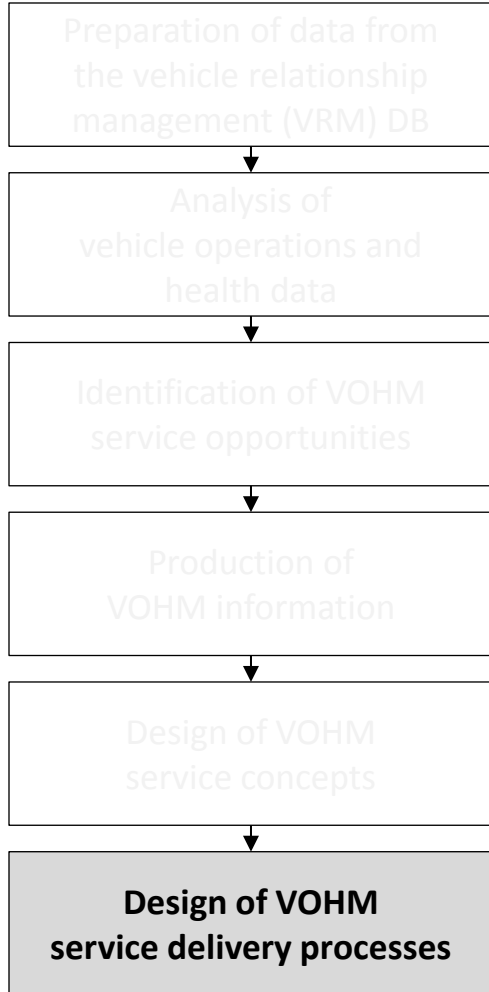
Case study 1: With HYUNDAI (4/6)



Case study 1: With HYUNDAI (5/6)

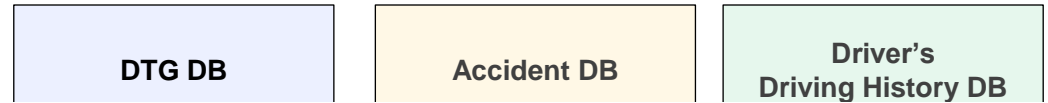
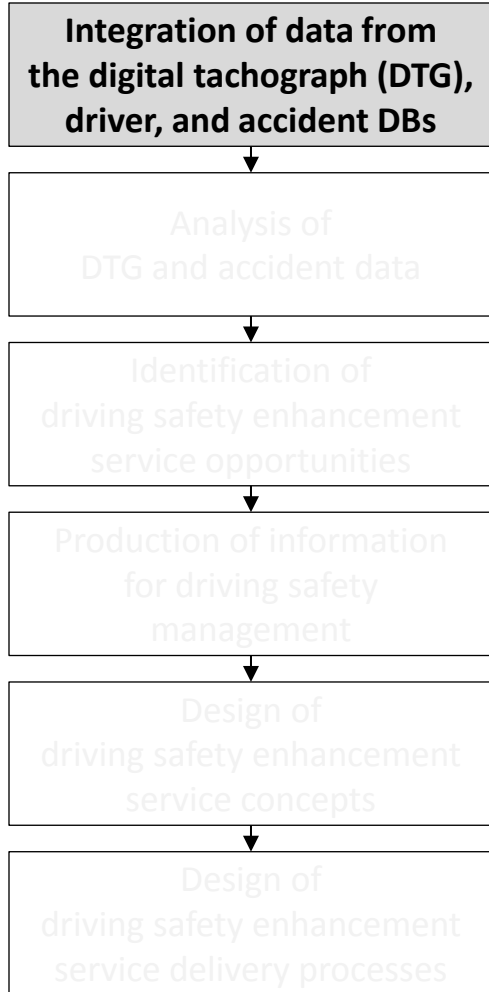


Case study 1: With HYUNDAI (6/6)



경제 운행 가이드 서비스 "경제성 관점에서 고객님의 지난 운행을 리뷰/가이드합니다. 서비스를 통해 고객님의 경제 운행 능력을 높여보세요."							
Customer Actions	경제 운행 관점에서 지난 운행을 리뷰	목적지로 이동	필요한 조정을 수행	목적지에 도착, 자신의 운행 요약 정보를 제공받음	경제 운행 관점에서 자신의 지난 운행 정보를 리뷰	경제 운행 관점에서 차량을 점검/세팅	
Service Contents	경제성 관점에서의 고객 운행 리뷰 정보	연비 향상 가이드	연비 향상 가이드	정해진 규칙을 벗어날 경우 경고	운행 리뷰 정보 (요약)	경제성 관점에서의 고객 운행 리뷰 정보	경제 운행 관점에서의 소모품 관리 가이드 정보
Service Channel (Communication Way)	VRM Report, Driving Game	Driving Game, KIA Radio On	Driving Game	Driving Game	VRM Report, Driving Game	VRM Report	
Service Device	컴퓨터, 스마트폰	UVO 기기, 스마트폰			컴퓨터, 스마트폰		
Service Algorithm (Technology)	운행 정보 리뷰 체계	연비 향상 가이드 체계	경고 제공 규칙	운행 정보 리뷰 체계	주행거리 기반 소모품 관리 체계		
Information System	운행 정보 DB 시스템	VRM 마스터 DB		운행 정보 DB 시스템	운행/진단 정보 DB 시스템		
Partner	어플리케이션 제작/관리 기업					어플리케이션 제작/관리 기업, 차량 정비소	
	이동에 앞서 지난 운행을 리뷰	KIA의 가이드를 제공받음	운행 (이동)	이동 환경, 이동 수행 과정을 모니터	이동을 마무리	지난 운행을 리뷰	운행 목적 관련 정보/물품 등 준비

Case study 2: With the Government (1/3)



Driver data

Date	Name	ID card number	License number	...	Car number
2013-04-01	Driver A	770225-1XXXXX	Seoul 39-0987xx-xx	...	Seoul 22-1234
...
2013-05-30	Driver K	570421-1XXXXX	Seoul 12-1234xx-xx	...	Seoul 33-1234

Accident data

Name	ID card number	License number	Location	...	Penalty points
Driver K	570421-1XXXXX	Seoul 12-1234xx-xx	Gangbuk	...	10
...
Driver AA	800712-1XXXXX	Seoul 34-1234xx-xx	Gangnam	...	20

DTG data

Company code	Car number	Date	Time	...	Accel.y (m/s ²)
15678	Seoul 33-1234	2013-05-30	00:00.0	...	-2.1
...
15678	Seoul 33-1234	2013-05-30	50:19.0	...	-2.1

■ ■ Keys to data integration

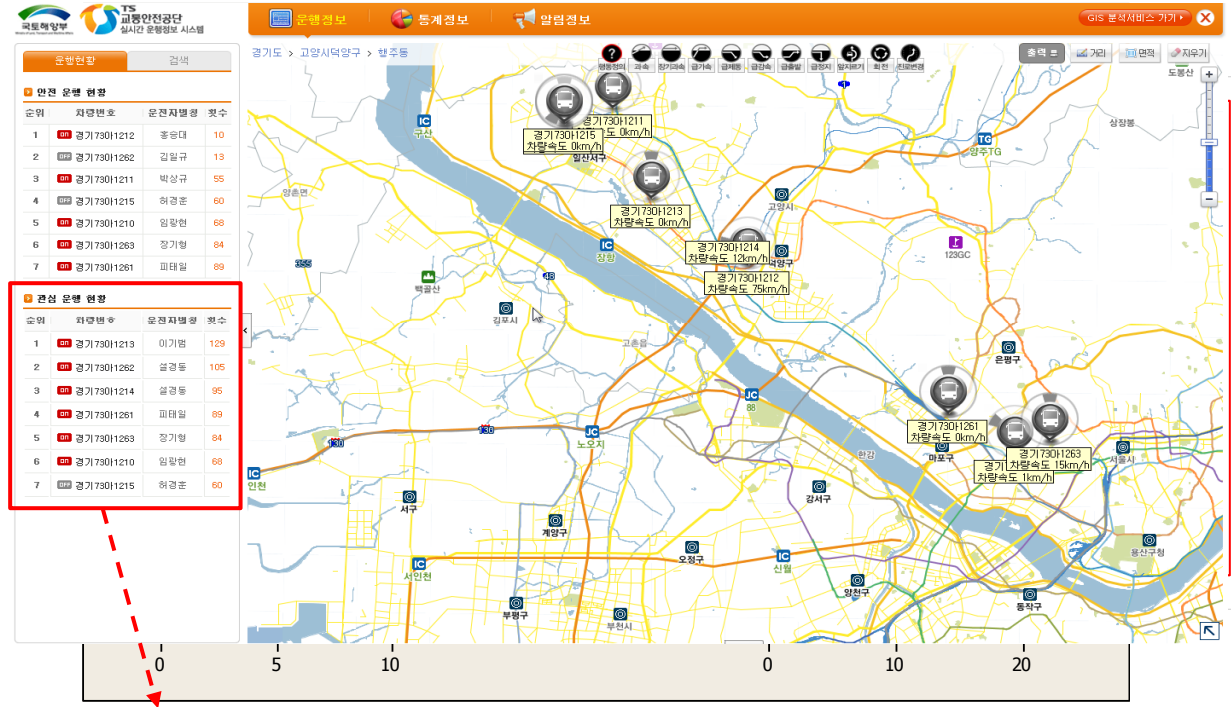
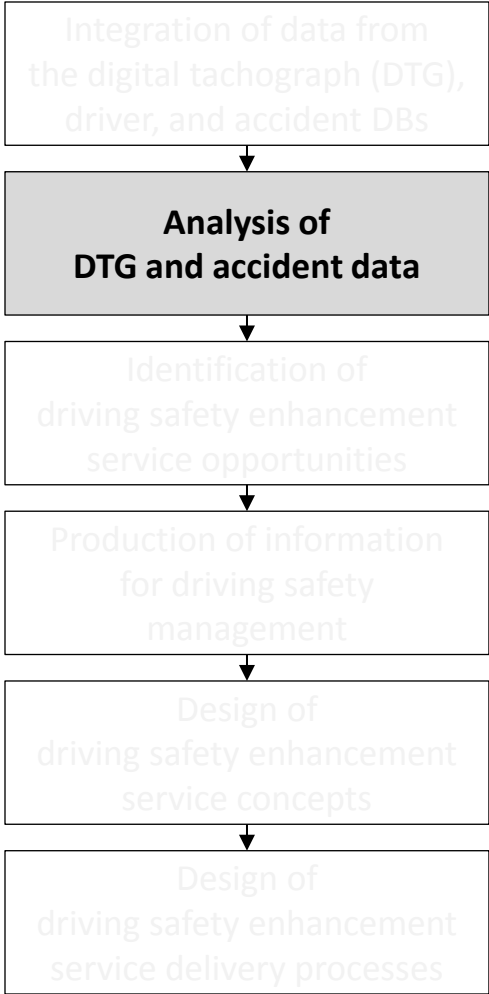
Integrated data

Driver information			Traffic accident information			Driving behavior information		
ID	Name	...	# of accidents	Penalty points (average)	...	# of rapid accel. per 1 hour	# of rapid stop per 1 hour	...
1	Driver K	...	3	13.3	...	12.5	0.018	...
2	Driver C	...	0	0	...	10	0.05	...
...

Current status

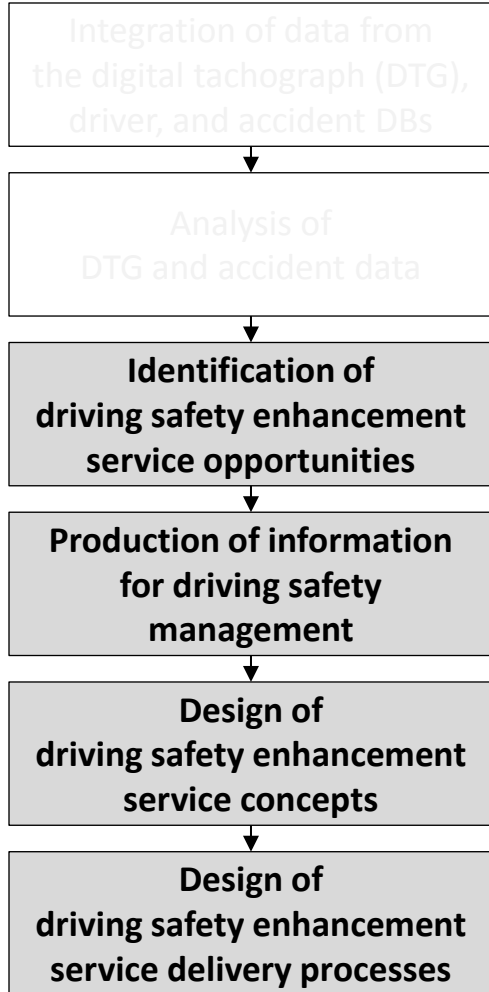
<p>Collected data of 3,342 vehicles</p> <p>Bus: 2,365 (483 GB) Truck: 931 (51 GB) Taxi: 46 (15 GB)</p>	<p>Collected data of 6,329 drivers</p> <p>Bus: 4,289 Truck: 490 Taxi: 1,550</p>	<p>Collected data of 4,557 drivers</p> <p>Bus: 2,437 Truck: 886 Taxi: 1,234</p>
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Case study 2: With the Government (2/3)

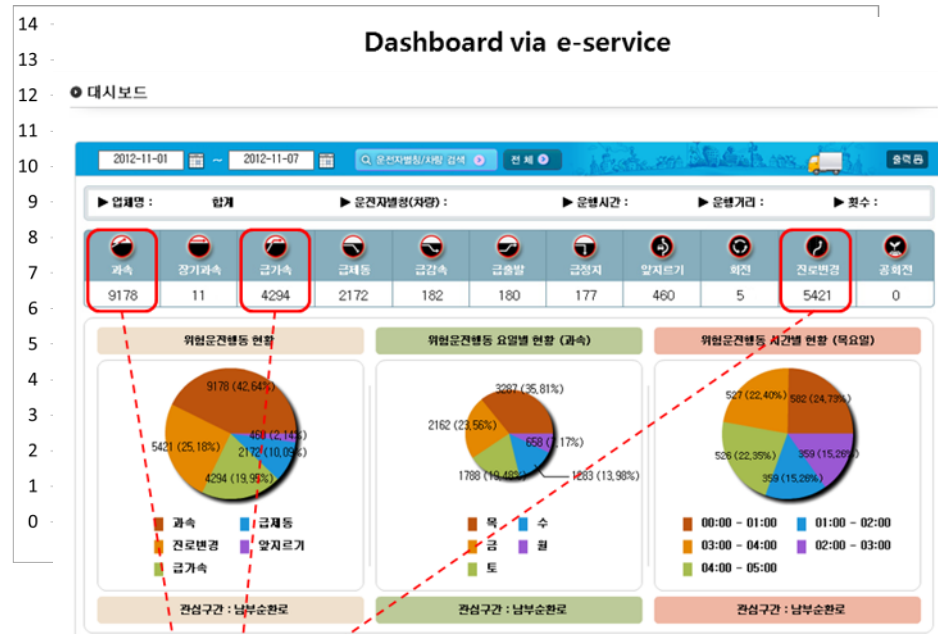


Dangerous drivers

Case study 2: With the Government (3/3)

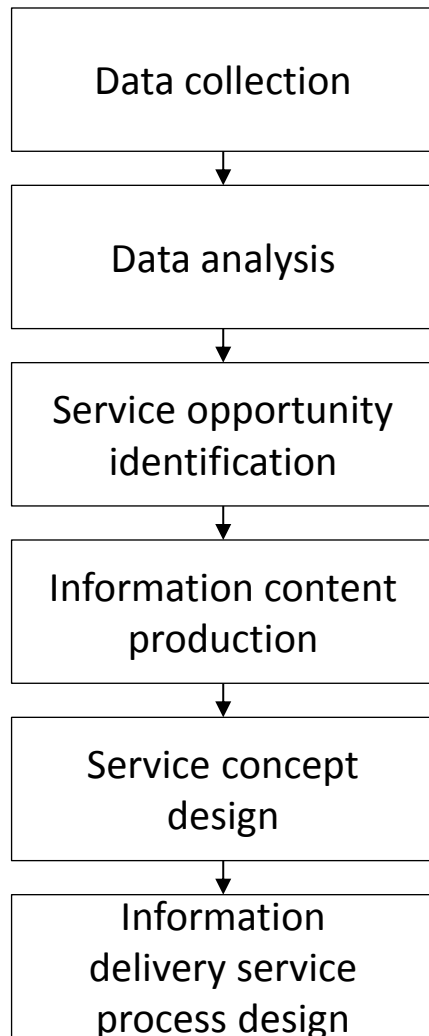


Driving safety index



Warning! : Excessive over-speeding, rapid acceleration, and lane changes

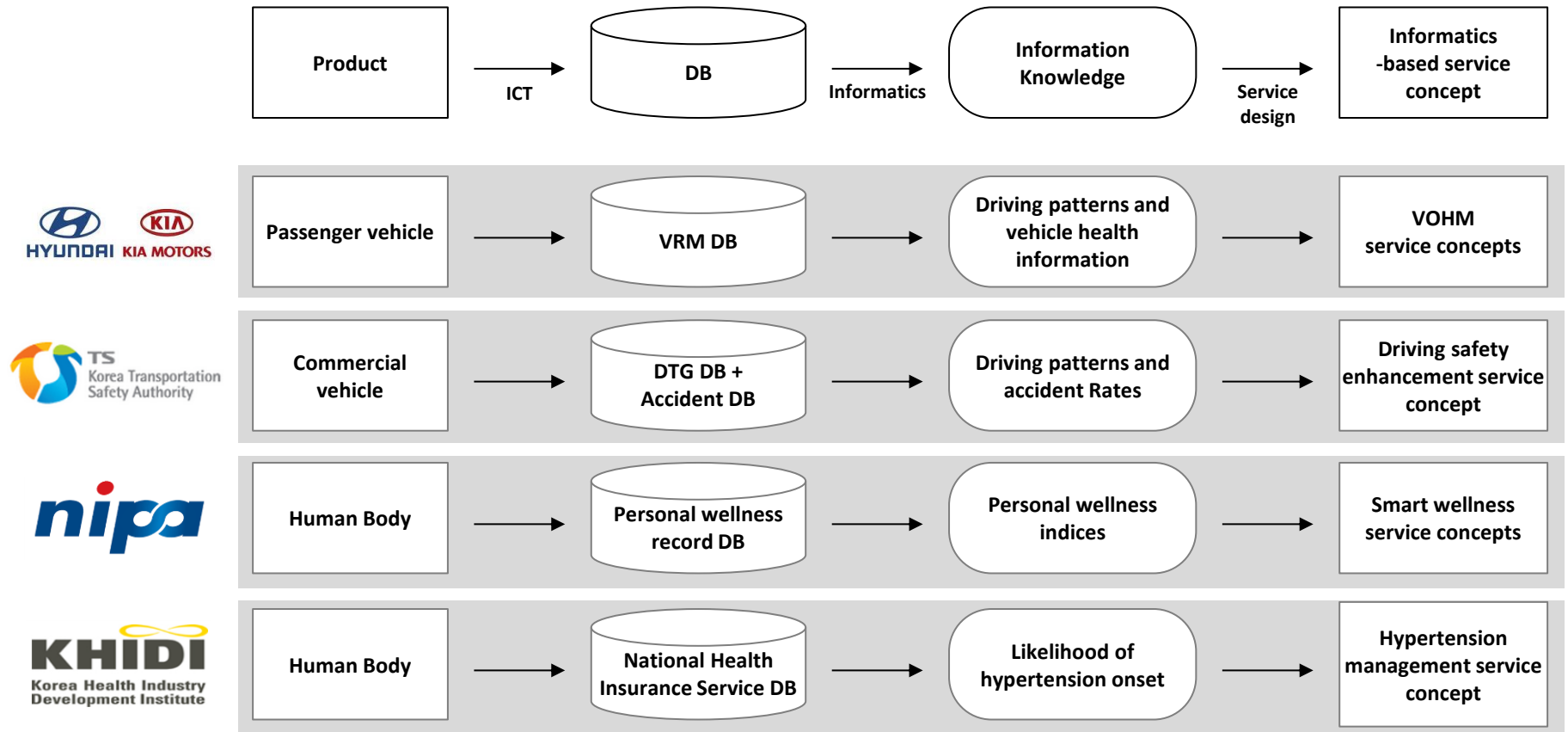
Lessons learned: Challenges in designing informatics-based services



1. Collecting the right data for services
2. Planning the data analyses for service design
3. Understanding the informatics-based services in question
4. Identifying the right information for customers
5. Compromising different stakes on the concepts
6. Designing the appropriate delivery processes for customers

Future research

- Framework version 3.0 with more tools, a refined process, and more case studies



Concluding remarks

- Some keywords in the current information economy:
Big Data Analytics, Internet of Things (IoT), Industry 4.0...
- This study
 - Views phenomena in this economy from a service-oriented perspective
 - Contributes to service design/innovation in manufacturing industries
 - Proposing a framework for the design of informatics-based services in manufacturing industries
 - Reporting on real case studies
 - Providing lessons learned