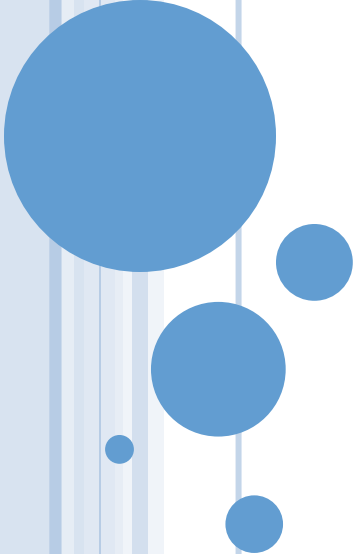




FUTURE TRENDS IN FREIGHT TRANSPORT DEMAND

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SUMMARY

1. Freight and logistic trends in Argentina
2. Freight demand forecasting methodologies
3. Overview of BYFM Model of Great Britain
4. Conclusions: Model development in Argentina

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FREIGHT AND LOGISTIC TRENDS IN ARGENTINA

3

FREIGHT AND THE ECONOMY

- The main determinant of freight transport demand is the economic situation
 - Growth in domestic consumption of locally produced and imported goods
 - Growth in exports of primary products and of manufactured goods
 - Growth in infrastructure investment (construction of dwellings, offices, factories, transport networks)
- Major short-term fluctuations in the economic situation
 - Impact strongly on the nature and level of freight transport demand

Propuestas para una Política Nacional de Transporte Ferroviario de Cargas

OBJETIVO

- ▶ Proponer lineamientos para una estrategia destinada la revitalización del transporte ferroviario de cargas en Argentina
 - El modo sufre un notable retraso ...
 - ...y ofrece un enorme potencial de crecimiento
- ▶ Es el resultado de una iniciativa conjunta de la Administración de Infraestructura Ferroviaria (ADIF S.E.) y del Instituto Tecnológico Ferroviario de la Universidad Nacional de San Martín, que contó con el apoyo financiero de la Embajada del Reino Unido en Argentina.
- ▶ El alcance propuesto es el de un “primer”, un documento base para una discusión ordenada que contiene propuestas para una estrategia

El equipo de trabajo

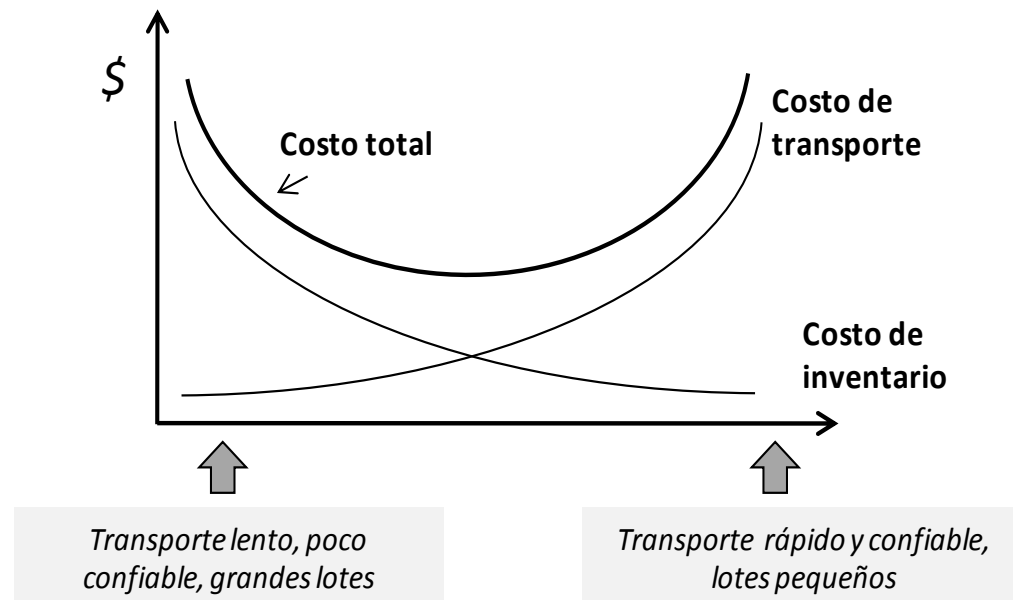
- ▶ Director: José A. Barbero
 - ▶ Coordinadora: Haydée Lordi
 - ▶ Transporte ferroviario: Jorge Kohon
 - ▶ Economía del transporte: Carmen Polo
 - ▶ Infraestructura Ferroviaria: Alejandro O. Rifai
-
- ▶ Apoyo de ADIF
 - ▶ Apoyo del Instituto Tecnológico Ferroviario
 - ▶ Apoyo de un Comité de Expertos

Transporte de Cargas -Situación actual

- ▶ En términos económicos, el sector transporte en Argentina representa el 5% del PBI, emplea al 5% de la población económicamente activa y en él se destina aproximadamente el 40% de la inversión en infraestructura.
- ▶ El transporte de cargas se compone de una participación modal que prioriza el transporte carretero con un 96% del total, contra el transporte ferroviario que lo secunda con apenas un 3%. Sólo el restante 1% es transportado por modo fluvial (principalmente a través de la Hidrovía del Río Paraná).
- ▶ Con una producción agrícola cercana a los 100 millones de toneladas, y con perspectivas de crecimiento sostenido, el escenario presenta una necesidad de desacople en las tendencias proyectadas.
- ▶ A este fin, el desafío consiste en enfocar las acciones y recursos de manera eficaz en pos de viabilizar una mayor captación de carga hacia medios más eficientes, como el ferroviario y fluvial.
- ▶ A su vez, la inversión en infraestructura deberá ser acompañada por medidas y acciones, que conformarán parte del proyecto integral, que potencien los impactos positivos generados por éste.

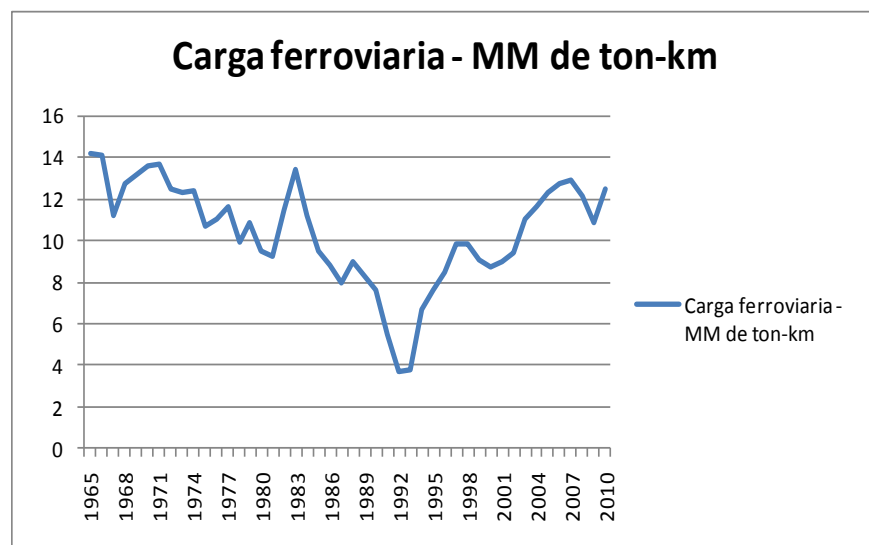
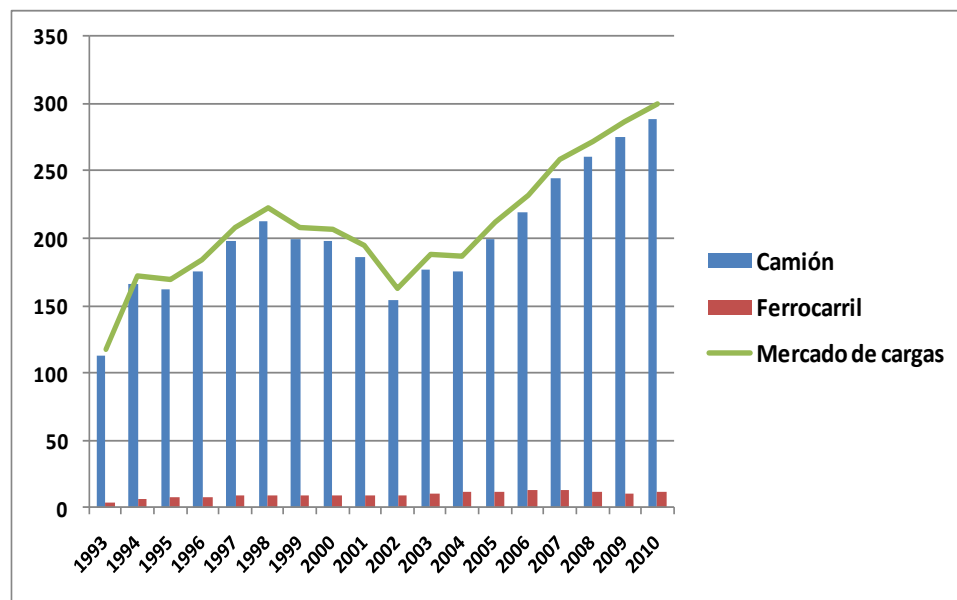
Del transporte de cargas a la logística

- ▶ La moderna logística de cargas ha introducido cambios en el movimiento de bienes: los generadores de cargas ya no procuran reducir el costo del transporte sino minimizar el costo logístico
 - La logística incluye el transporte, el almacenamiento, los costos de inventario, el deterioro de la mercadería, y otros incurridos en el desplazamiento de los bienes en el espacio y en el tiempo.

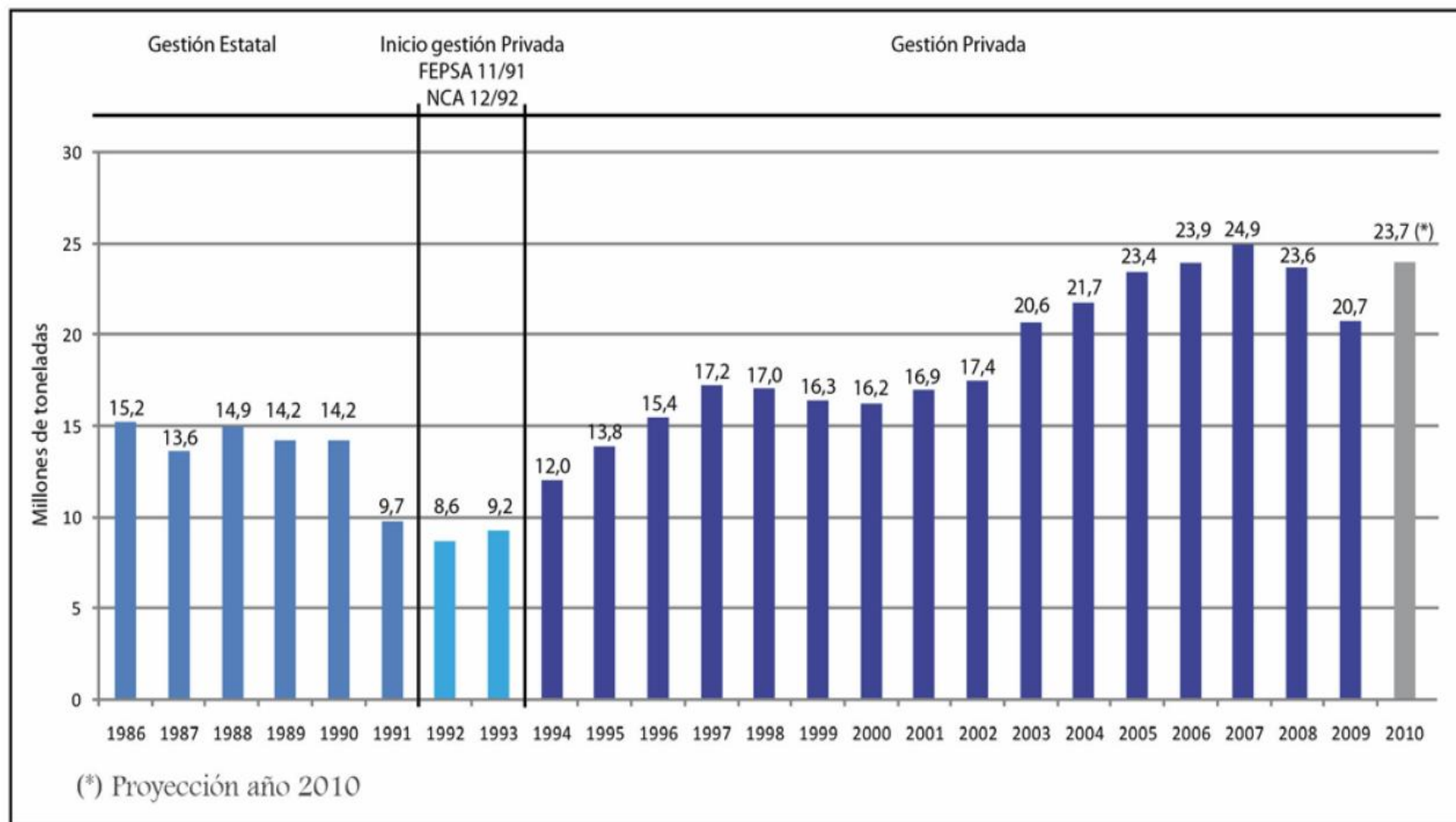


Si bien el transporte de cargas por ferrocarril aumentó en términos absolutos, retrocedió en términos relativos

- ▶ Entre 1992 y 1998 los FFCC recuperaron cargas; las inundaciones y la recesión detuvieron el crecimiento, que retornó a partir de 2004.
- ▶ En los últimos años, de gran crecimiento, su tasa fue inferior a la del mercado en su conjunto: el ferrocarril no ha cesado de perder participación en un mercado de cargas que crece impulsado por el movimiento de graneles
- ▶ La participación actual en ton-km no llega al 5% sin contar el transporte propio. La mejor estimación es 4.2% en ton-km en el año 2010, aproximadamente 4% en ton)



Las cinco concesiones de cargas lograron recuperar el tráfico perdido durante la década del '80 aún cuando a la actividad, globalmente, le faltan al menos 3 millones de toneladas que el Belgrano Cargas aún no logró recuperar

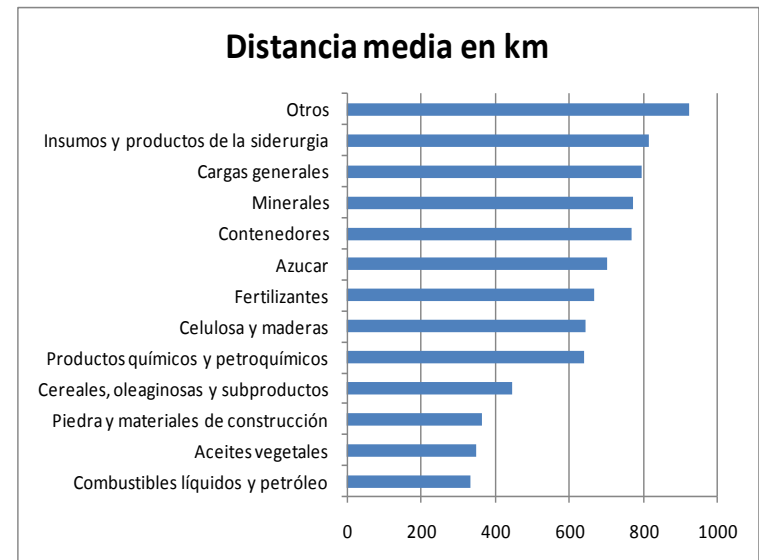


La composición del tráfico de cargas ferroviarias muestra una fuerte predominancia de los graneles, y distancias medias del orden de los 500 km

Año 2009 – En millones de ton-km

PRODUCTO	Millones de ton-km	%
Cereales, oleaginosas y subproductos	4472.2	43.1%
Piedra y materiales de construcción	1790.2	17.3%
Insumos y productos de la siderurgia	1481.2	14.3%
Minerales	744.5	7.2%
Contenedores	570.1	5.5%
Aceites vegetales	293.7	2.8%
Productos químicos y petroquímicos	291.3	2.8%
Azucar	223.7	2.2%
Cargas generales	209.2	2.0%
Fertilizantes	134.3	1.3%
Celulosa y maderas	92.1	0.9%
Otros	65	0.6%
Combustibles líquidos y petróleo	0.1	0.0%

Distancia media ferroviaria por producto

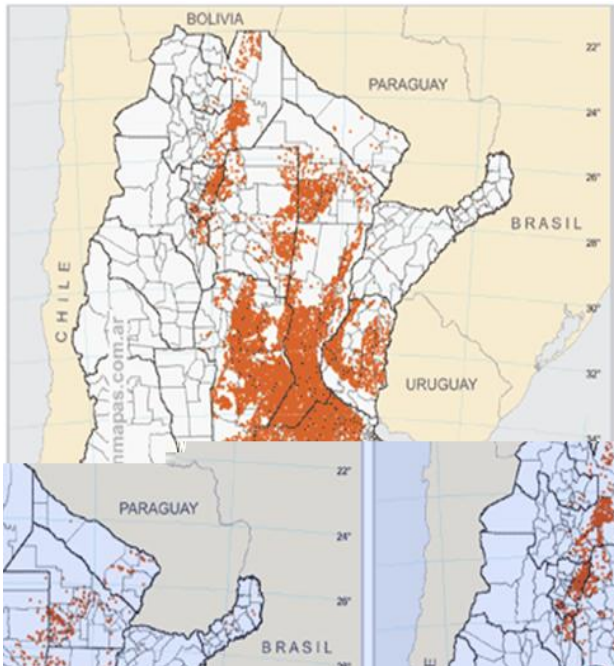


- ▶ Los productos del complejo oleaginoso y cerealero, las piedras y materiales de la construcción, y los insumos y productos de la siderurgia representan las tres cuartas partes del tráfico
- ▶ La distancia media actual es relativamente corta: 520 km, casi igual a la del transporte carretero (estimada en 500 km)

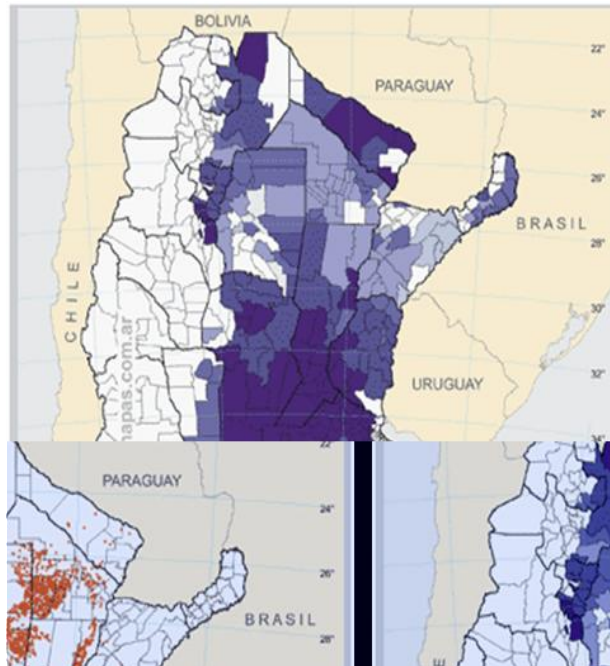
Las expectativas futuras de transporte de cargas

- ▶ No existe en Argentina un plan de desarrollo que permita visualizar las futuras demandas
- ▶ Se han elaborado varios planes sectoriales
 - Plan Estratégico Agroalimentario y Agroindustrial 2010-2020 (PEA2)
 - Plan Estratégico Industrial 2020
 - Plan Minero
 - Plan Estratégico Territorial
 - Plan Ferroviario Nacional 2012-2023
- ▶ Trabajos no oficiales pueden contribuir a proyectar escenarios de demanda

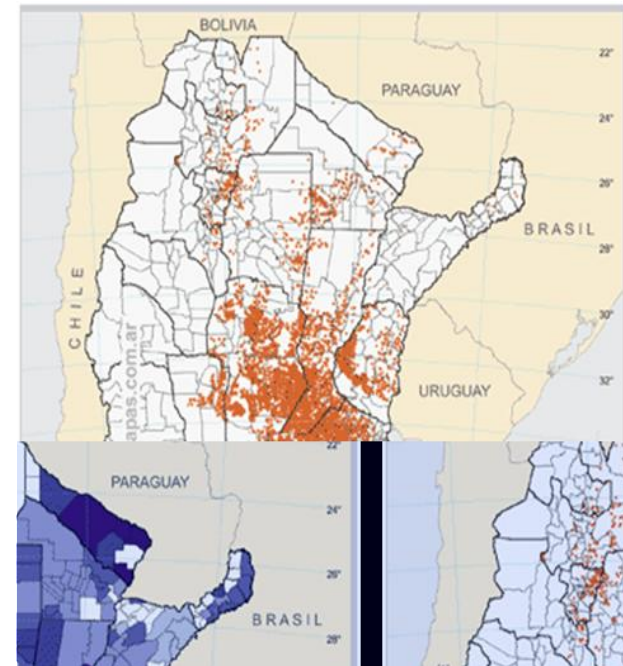
El PEA constituye un enorme desafío logístico



Soja: producción (2000-2005)



Soja: rendimiento (2000-2005)



Maíz: producción (2000-2005)

- ▶ Los cultivos que conforman el mayor volumen de producción se concentran en la zona central del país
- ▶ Gran parte de las 60 millones de ton adicionales se van a producir en esa zona

El Plan Estratégico Agroalimentario e Industrial 2010-2020 plantea metas ambiciosas, proponiendo 60 millones más de ton de granos y 12 millones de cultivos industriales

	Unidades	Línea de base 2010	Meta 2020	Crecimiento en %
Granos	Millones de ton	100	157.5	58% 
Cultivos industriales	Millones de ton	22.5	34.5	53% 
Complejo algodonero	Millones de ton	0.4	1.3	235%
Complejo cárneo bovino	Millones de ton	2.6	3.8	46%
Complejo avícola	Millones de ton	1.6	3.0	88%
Complejo cárneo porcino	Miles de ton	281	822	193%
Complejo cárneo ovino	Miles de ton	76	106	40%
Complejo frutal citrícola	Millones de ton	3.3	4.5	36%
Complejo frutal pepita y carozo	Millones de ton	2.4	3.1	29%
Complejo vitivinícola	Millones de ton	2.6	3.0	15%
Complejo apícola	Miles de ton	55	118	115%
Complejo lácteo-bovino	Miles de millones litros	10.4	18.3	76%
Complejo hortícola	Millones de ton	5.4	10.2	89% 
Complejo Forestal	Millones de ton	7.8	9.9	27% 

Proyecciones de los complejos exportadores muestran un escenario favorable al ferrocarril

Complejo (7 de 17)	Exportación 2008		Tasa de crecimiento	Exportación 2020	
	Valor	Volumen estimado	% anual	Valor	Volumen estimado
	Miles millones US\$	Millones de ton		Miles millones US\$	Millones de ton
Oleaginoso	13.4	30.7	6.3%	27.8	63.7
Cerealero	7.7	28.7	1.5%	9.2	34.3
Petroquímico	2.3	2.8	6.7%	5.0	6.0
Automotriz	7.2	0.8	8.2%	18.6	2.0
Siderúrgico	2.3	1.4	7.0%	5.2	3.2
Forestal	1.0	1.2	15.4%	5.6	6.7
Cobre	1.0	0.5	5.9%	2.0	0.9
Sub-total	34.9	66.0		73.4	116.8
Total nacional	70.0			122.1	
Participación complejos de orientación ferroviaria	49.90%			60.10%	

Próximos pasos

- ▶ Elaborar estudios de demanda basados en un conocimiento profundo de las necesidades logísticas de los cargadores de cada corredor ferroviario y su disposición a tomar compromisos de carga de mediano y largo plazo. Los estudios de demanda deben contemplar también la revisión y profundización de la dimensión territorial de los planes productivos (agroalimentario, minero, industrial)
- ▶ Relevar cuidadosamente la situación de los acopios de granos, tanto en terrenos ferroviarios o con desvíos como los que no cuentan con acceso al modo. El mismo tipo de relevamiento deberá hacerse respecto a las instalaciones portuarias.
- ▶ Compilar información de detalle sobre el estado de la infraestructura, por tramo, y priorizar segmentos de la red de acuerdo con su estado, potencial de carga y disponibilidad de transporte alternativo, de manera de facilitar el financiamiento y facilitar el cumplimiento de los planes productivos.
- ▶ Y otros mas.....

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FREIGHT DEMAND FORECASTING METHODOLOGIES

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TRADITIONAL FREIGHT DEMAND FORECASTING

- Mainly extrapolated key aggregate indicators
 - such as modal tonnes lifted, tonne kilometres moved
- Focused strongly on aspects *within* the transport sector
- Although these elements are important
- For complex modern freight systems they need to be extended by also representing:
 - Logistic chains
 - Intermodal connections
 - Changes in technology – larger trucks and vessels
- BYFM model of freight transport in GB
 - is an example of how to achieve this

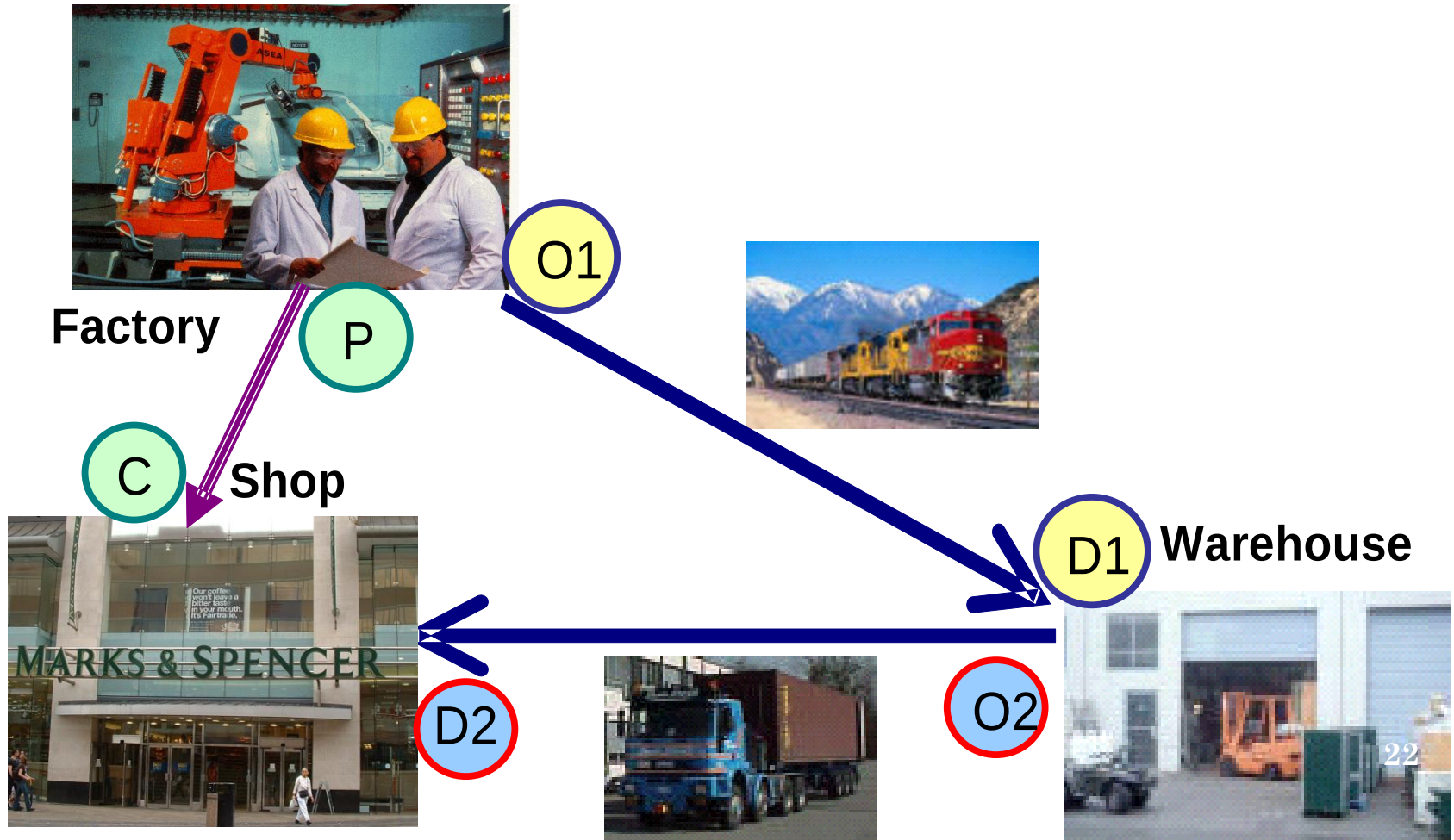
FREIGHT FORECASTING PHILOSOPHY

- The pattern of freight movements is a *derived demand*
 - It arises from the social and economic structure of an area
 - It is governed more by factors *outside* the transport industry
 - than by those *within* it
- Forecasting the changes in freight transport patterns in response to policy measures requires
 - a proper understanding and representation of the underlying freight distribution system
 - use of explanatory models of goods vehicle movements

WHAT SHOULD AN EXPLANATORY MODEL INCLUDE?

- The pattern of goods movement arises from the *interplay* between:
 1. the spatial pattern of the **supply** and of the **cost** of goods
 2. the spatial pattern of the **demand** for goods
 3. and the logistics operations that are in place to ship goods from **producers** (supply) to **consumers** (demand) via **distribution centres** (or warehouses)

ONE P-C MOVEMENT AND ITS ASSOCIATED TWO DISTRIBUTION LEGS (O-D VEHICLE MOVEMENTS)



HOW DOES AN EXPLANATORY MODEL FORECAST?

○ For longer term planning purposes the major influences on the future pattern of vehicle movements are

1. the structure and economics of each industry sector
2. the logistics structures within their supply chains
3. and how both of these evolve into the future

DESIGNING STRATEGIC MODELS OF FREIGHT OPERATIONS: CHOICES

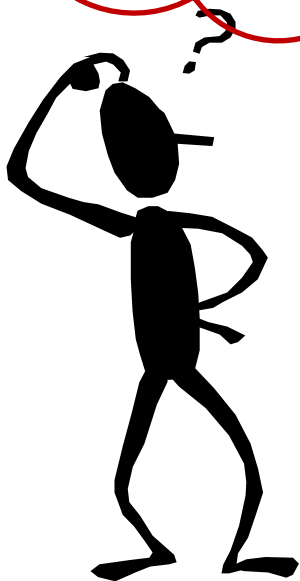
OD vehicle
matrix updating
or
Full explanatory
demand
modelling?

PC or OD
or both?

Segment by
commodity
type and/or
logistic leg?

Size of
study area
needed?

How many
modes? road,
rail, waterway,
shipping?



**Choices depend on the types of policies to be tested
which should determine the type of model to be used**

PASSENGER VERSUS FREIGHT DEMAND MODELLING

○ Passenger modelling:

- Breadth of past experience
- Relatively homogeneous behaviour - when segmented
- Moderate segmentation suffices
- Moderate study area size usually sufficient – most trips are not long
- Most trips are in simple 2-leg tours
- Tours are relatively independent of each other

○ Freight modelling

- Limited successful past experience
- Heterogeneous behaviour – even when segmented
- Many segments required
- Large study area size – many trips are very long
- Many tours make multi-stop deliveries (up to 100 collections or drops / day)
- Tours are part of an integrated multi-leg logistic chain (3 to 5+ for retail)

Freight demand models tend to be **more challenging** than passenger models

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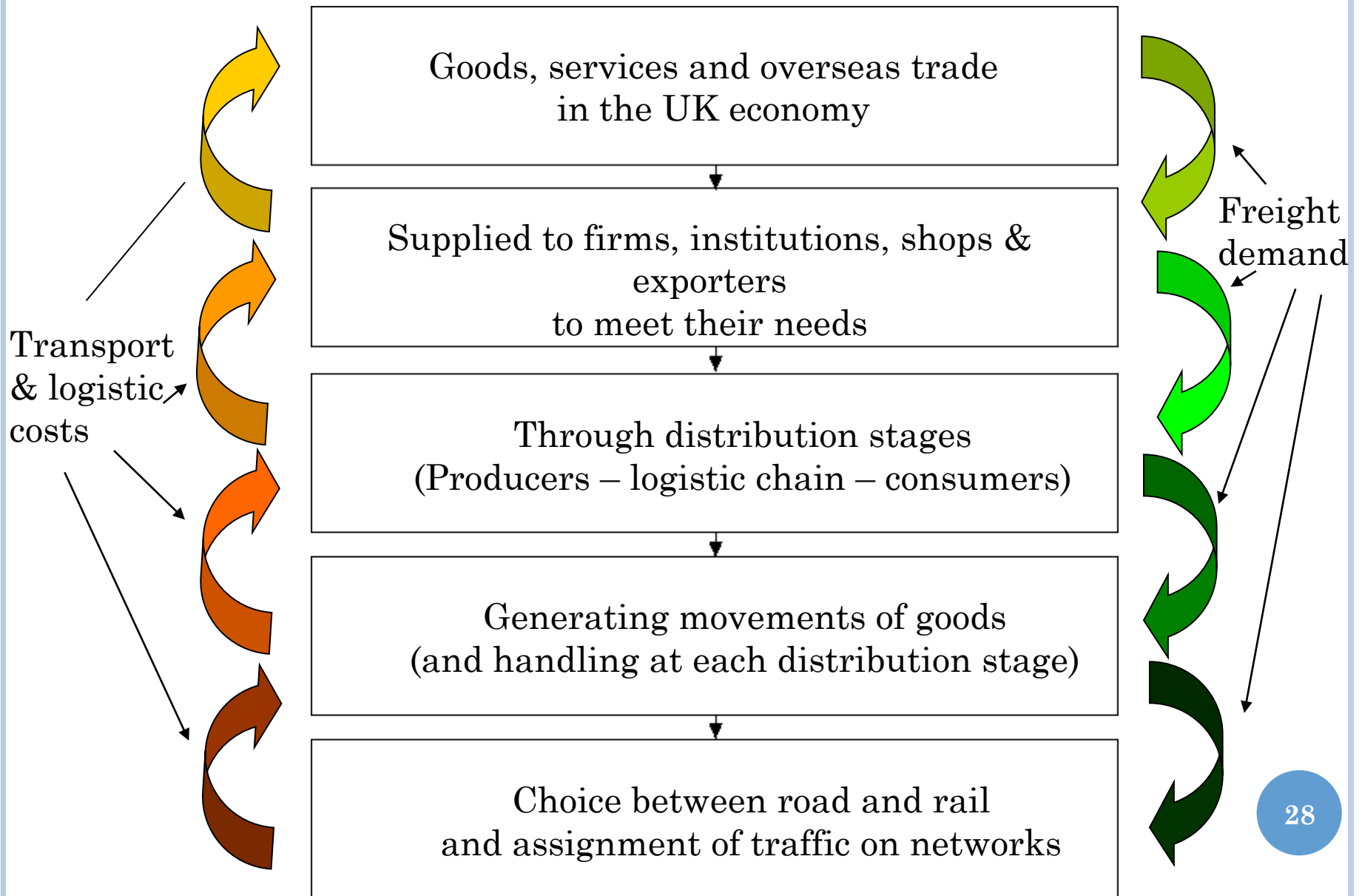
OVERVIEW OF BYFM MODEL

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OVERVIEW OF THE BYFM MODEL

- Model of all *freight movements* covering all of Great Britain:
 - Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs)
 - Rail freight
 - Imports and exports through ports and airports
- Excludes *passenger movements in LGVs*
- LGV passenger trips were included in the similar
 - Freight in London Model - (FiLM)

IN SUMMARY, FREIGHT TRAFFIC IS ESTIMATED IN 5 STAGES



MAIN MODEL STAGES OF BYFM / FiLM

Model stage	Space	Main outputs
Generation / attraction	zone	The total volume of freight by commodity type that is produced, distributed or consumed in a zone plus the passenger (non-freight) movements on LCVs.
Distribution leg proportions / zone choice	zone pair	Uses an SIO model to build up P-C relationships through a fixed proportional split of distribution legs appropriate to each commodity type, including those legs to, from or between distribution centres, together with the spatial allocation of each leg across competing zones to generate O-D matrices of goods movements
Port choice	zone pair	For unitised movements between the UK and the rest of Europe, uses an SIO model to subdivide between the UK ports for imports and exports
Mode choice	zone pair	Subdivides the transported total for each O-D movement into main modes, including their associated feeder legs to and from intermodal terminals
Value to volume	zone pair	Convert the units of O-D movement from value (£) to volume units (tonnes)
Vehicle type choice	zone pair	Subdivides the total road tonnes for each O-D into road vehicle types (artic, rigids [4], LCV) Includes: conversion from volume (tonnes) to vehicles
		Intermediate calculations
Path building	zone pair	Estimate the supply characteristics (cost and time) along the intermodal path between zone pairs
Cost estimation	link	Vehicle operating costs both stopped and in movement - function of vehicle type, link travel speed, link length, etc.
Assignment - path choice	link	Allocation of vehicles to links along their path - a non-equilibrium congested assignment

BYFM ZONES

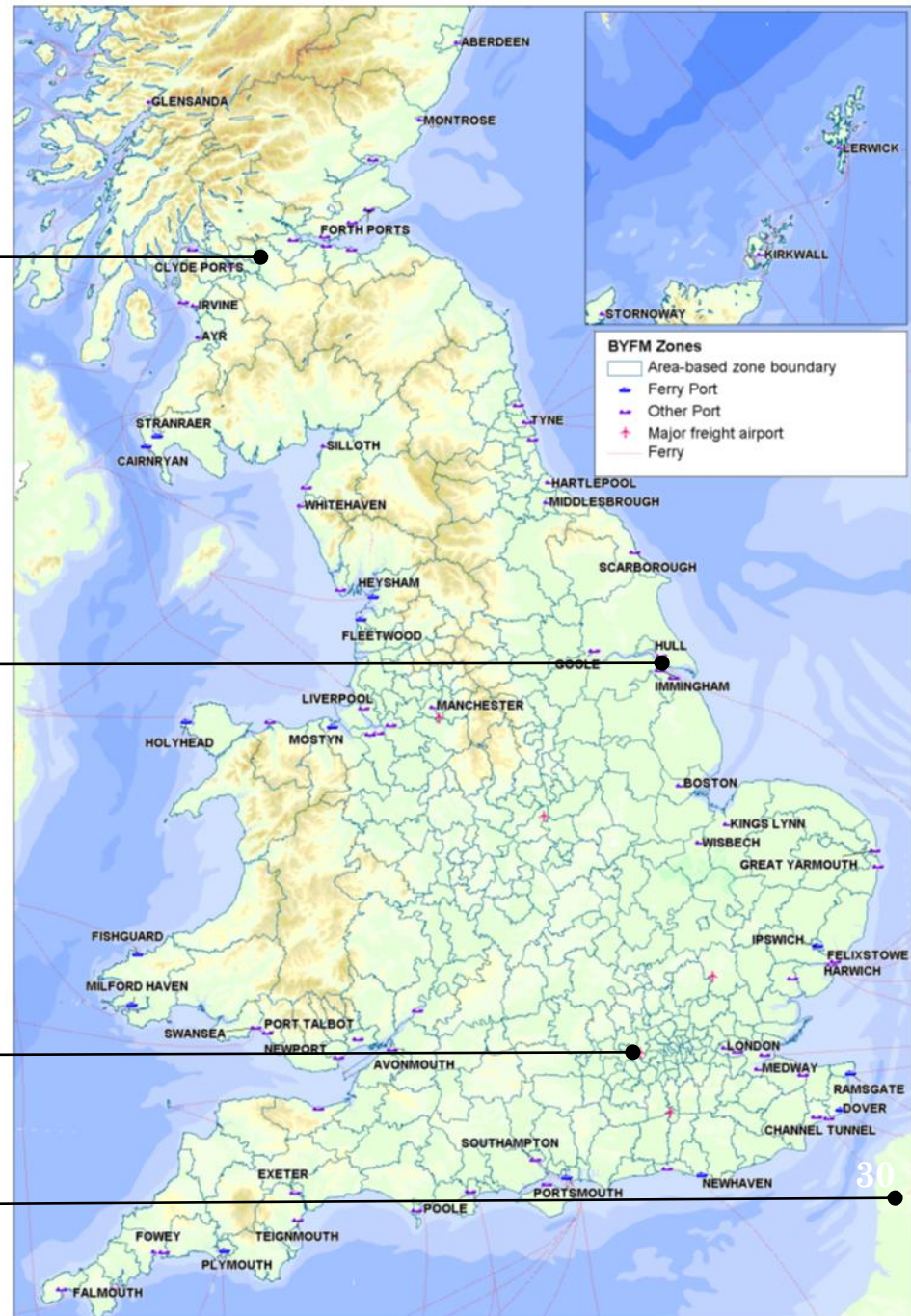
408 area-based zones:
local authority districts,
unitary authorities and
London boroughs

**56 major concentrations
of distribution centers**

88 largest ports for
deep-sea, short-sea and
dry bulk movements

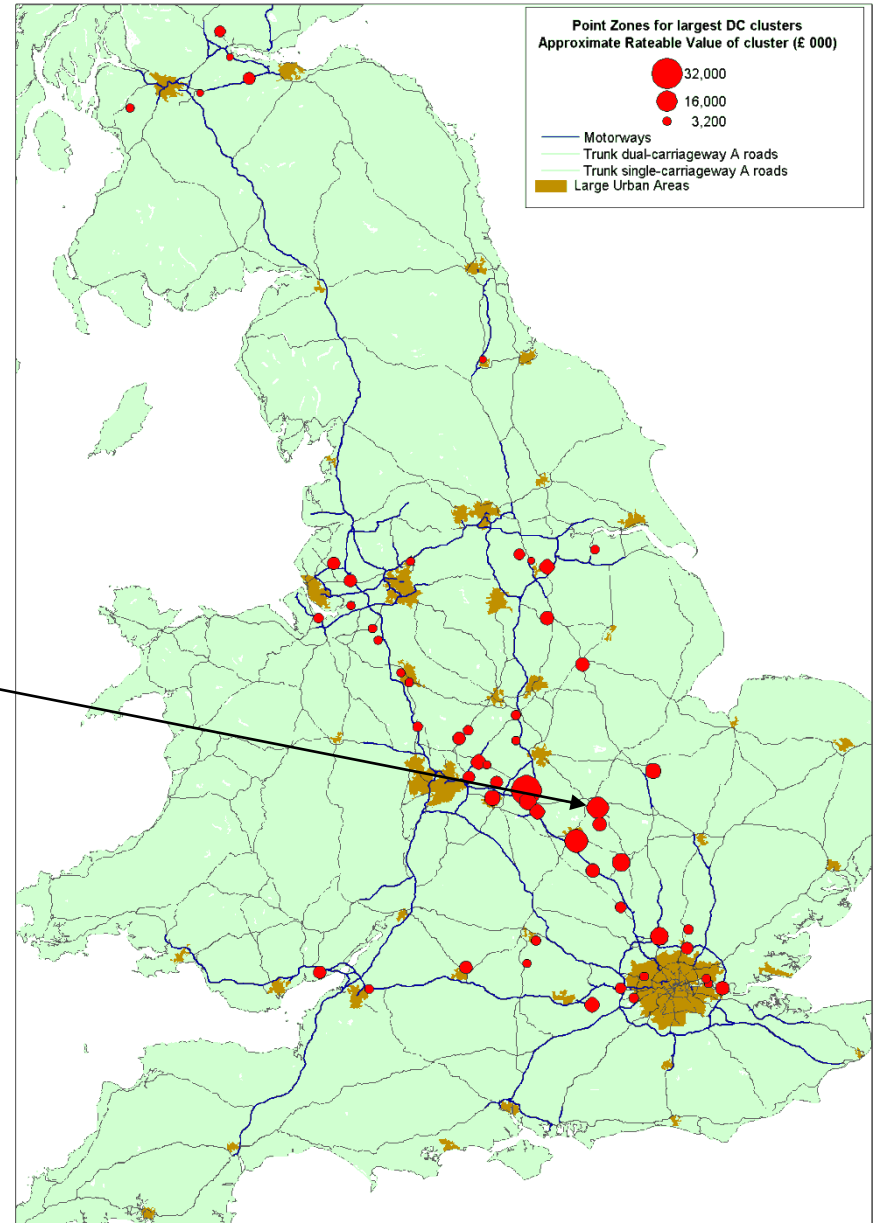
5 main freight airports:
Heathrow, Gatwick,
Stansted, East Midlands
and Manchester

52 external zones:
Northern Ireland, EU &
rest of the world



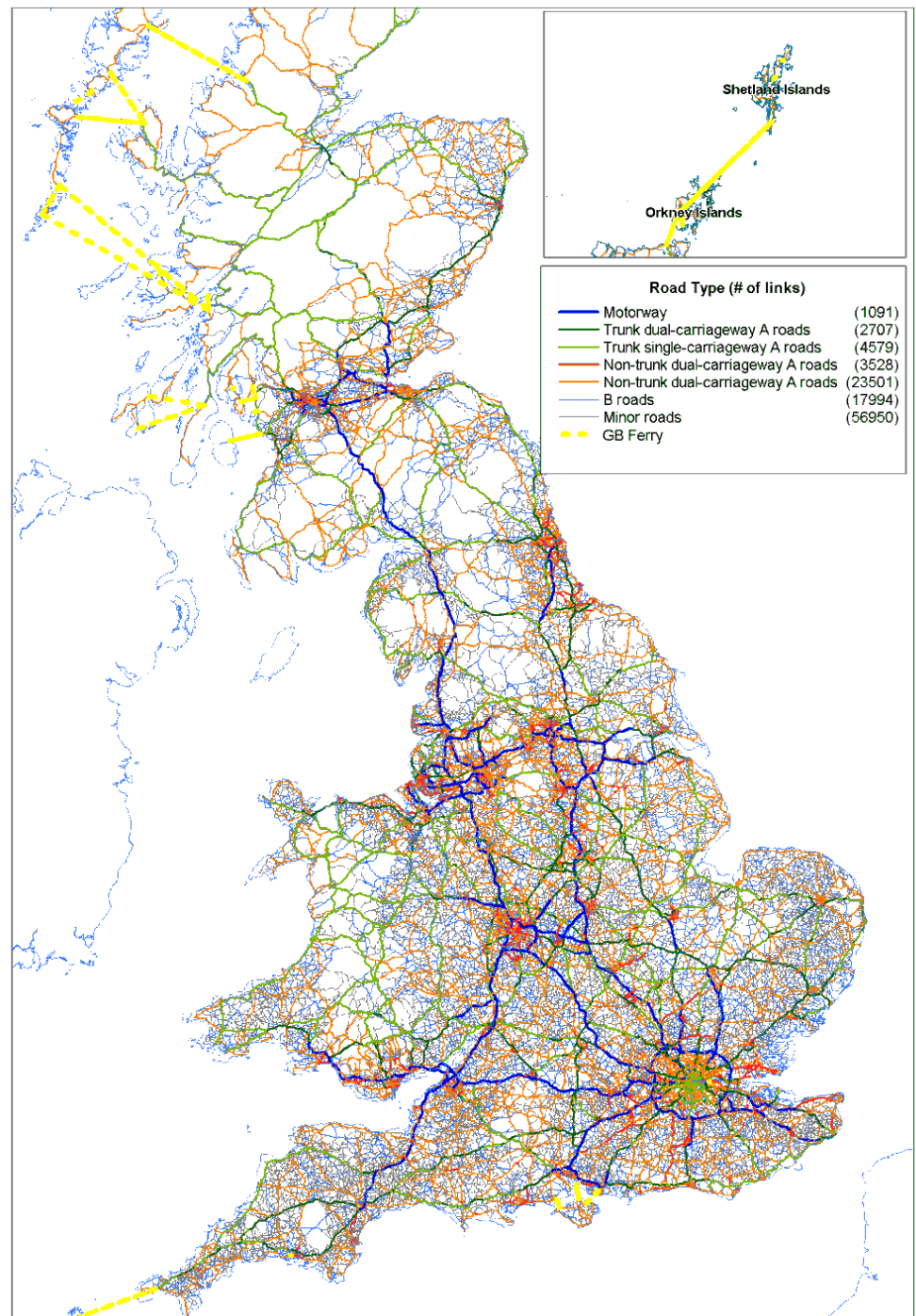
DISTRIBUTION CENTRE POINT ZONES

- A small number of locations are responsible for a large proportion of the freight associated with distribution
- 56 distribution point zones
 - Based on VOA data relating to warehousing value
 - Needed so as to avoid allocating traffic incorrectly to urban centre of district



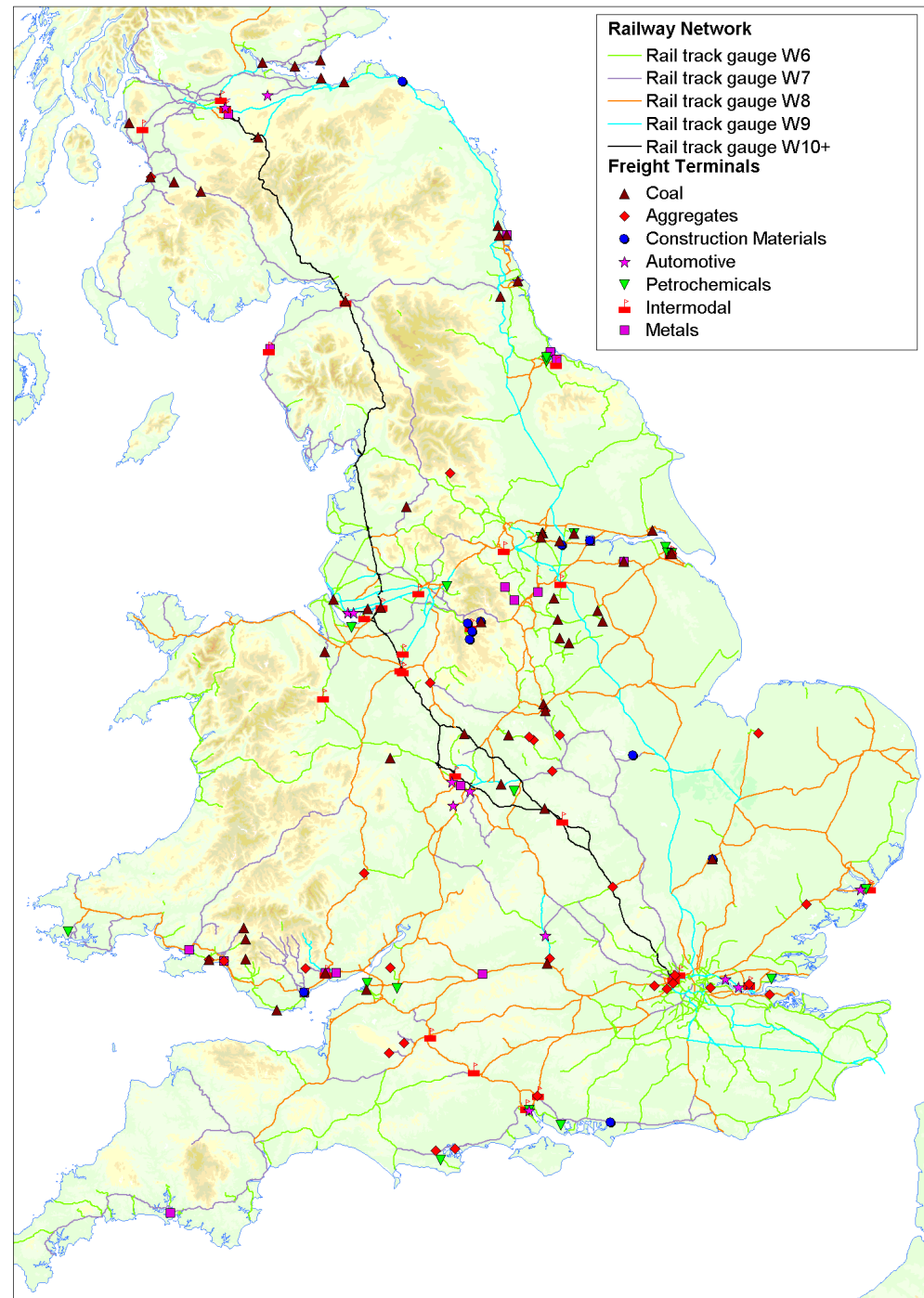
NETWORK OVERVIEW

- Road network same as used in NTMv3
- Centroid connectors from 'representative' NTM zone used
- More half of the links are from minor roads with low proportion of HGV traffic
- Unitised shipping links to EU countries



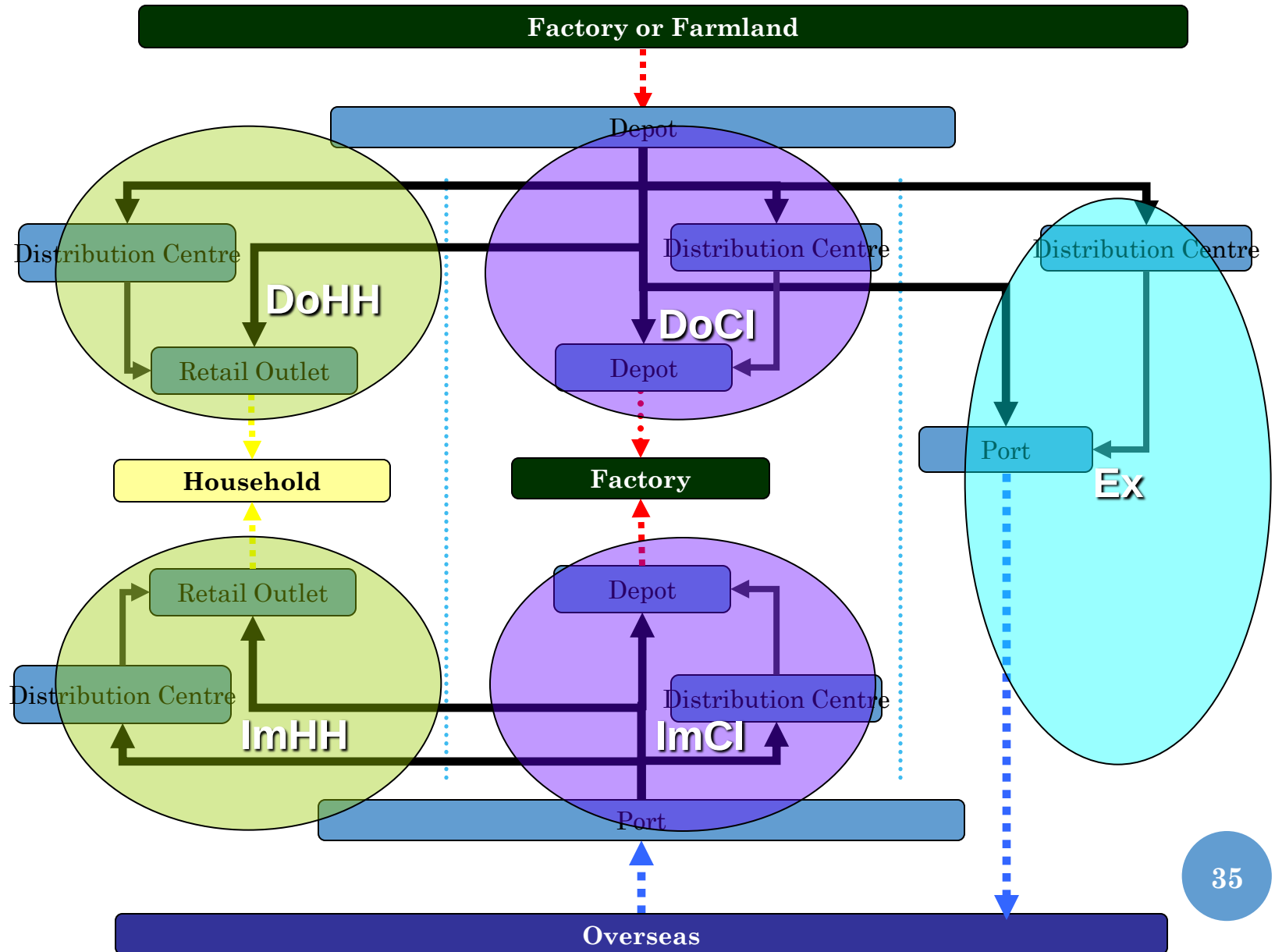
BYFM RAIL NETWORK

- Rail network enhanced from EUNET2 study
- added rail gauge for each of the links
- the higher the gauge number the more scope there is to transport large containers
- large rail freight terminals based on:
Freightmaster (2004)
Network Rail (2007)



Distribution		Description of Freight flow type	Stage
		ROAD AND SHIPPING	
Primary	1	Agricultural products, food	1
	2	Beverages	1
	3	Wood, timber and cork	1
	4	Ore, sand, gravel, clay, crude minerals	1
	5	Crude materials (textiles, pulp)	1
	6	Coal and coke	1
	7	Primary chemicals, fertiliser, chemical products	1
	8	Cement and limes	1
	9	Other building materials	1
	10	Iron, steel and metal products	1
	11	Machinery, transport equipment. & miscellaneous manufactures.	1
	12	Consumer articles, textile products, misc. articles n.e.s. and unknown	1
	13	Containers	1
		ROAD ONLY	
Secondary	15	Food, beverage and agricultural distribution	2
	16	Chemical products, paper articles, wood, timber, cork	2
	17	Petrol and petroleum products	2
	18	Cement	2
	19	Other building materials	2
	20	Machinery, transport equipment. & misc. manufactures	2
	21	Consumer articles, textile products, misc articles n.e.s. and unknown	2
Tertiary	22	Food and beverage tertiary	3
	23	Other tertiary distribution	3
	24	Parcels, packages & couriers	n/a
Other	25	Packaging and empty heavy vehicles	1,2
	26	Packaging and empty light vehicles	3
	29	Road: waste collection	n/a
	35	Road: waste to facilities	n/a
	37	Through traffic between the Republic of Ireland and Europe	n/a
		INTERMODAL+WATERBORNE	
Bulk	30	Aggregates, minerals	1
	31	Coal	1
	32	Building materials and cement	1
	33	Steel, automobiles, iron, metal products	1
Intermodal	34	Containers	1
Other	36	Petrochemicals, waste to facilities by rail and waterway	1

LOGISTIC STRUCTURE AND P-C RELATIONSHIP



SELECTED MODEL OUTPUTS AND THEIR LEVEL OF SEGMENTATION

- O-D matrices of vehicle movements
 - by logistic leg by commodity type by type of road vehicle or of train
- O-D matrices of travel distances, costs and times
 - by logistic leg by commodity type by type of road vehicle or of train
- O-D & P-C matrices of tonnes or of value (£)
 - by logistic leg by commodity type by main mode
- Assigned traffic load
 - by link by type of road vehicle, of train or by barge
- Carbon and other types of emissions
 - by link by vehicle type
- VOC components and fuel consumption
 - by link by vehicle type

POTENTIAL OF MODEL

- BYFM is flexible, can represent outcomes from:
 - Changes in industry by sector
 - Impact of population or employment changes on freight demand
 - Intermodal facilities
 - Different logistics trends
 - Vehicle size choices for different logistics legs, changes in vehicle mix on roads from different trends
 - Vehicle emissions

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CONCLUSIONS:

MODEL DEVELOPMENT IN
ARGENTINA

KEY REQUIREMENTS FOR DEVELOPING A NATIONAL FREIGHT MODEL IN ARGENTINA

- Keep it simple - especially initially
- Develop it in stages
 - to enable it to be used at an early stage for some practical policy uses
 - accepting that initially it will help only to analyse a limited set of transport planning problems
 - and that its forecasts will not have great spatial and network detail
- This allows efficient use to be made of existing data
 - and avoids major initial delays and costs related to collecting primary data
- Use it for practical analysis at an early stage to demonstrate its potential use
 - This helps to develop confidence in its usefulness for long term strategic transport planning
- It will encourage further investment to enhance the model
 - to widen the range of problems it can analyse
 - to provide a greater level of detail in its forecasts

A POSSIBLE INITIAL APPROACH

- Concentrate just on the competition between road and rail to move long distance shipments
 - Include only major primary bulk flows (e.g. grains, aggregates, cement, etc.) plus containers
 - Avoid the complexities of road based secondary and tertiary logistics
 - Examine in detail movements to and from ports
- This enables best use to be made of the good data available from rail and ports
 - and to postpone a major data collection exercise for movements of goods on roads
- It would help to examine policies on how to reduce overall transport costs for Argentina
 - through better use of the rail mode for long distance movements

FURTHER MODEL DEVELOPMENT

- Improve the representation of maritime and fluvial transport
 - and its integration with road and rail
- Initiate data collection on inter-urban road freight movements
 - Introduce a representation of secondary and tertiary logistic stages
 - Increase the level of spatial and network detail
 - Improve the representation of operating costs by mode

Muchas Gracias

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